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INTEGRATED URBAN TRANSPORT PLANNING

ACCESSIBLE CITIES TOWARDS INDIVIDUAL AND COLLECTIVE DEVELOPMENT

Dissertation

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ZUSAMMENFASSUNG

Mit der Bezeichnung “Die Welt wird Stadt” lokalisiert Ribbeck (2005) die Stadt als den Angelpunkt der gesellschaftlichen Aktivitäten in der heutigen Zeit. Die Stadt konfiguriert einen überaus dynamischen Raum, in dem die sozialen, wirtschaftlichen und kulturellen Triebkräfte im höchsten Maße wirken. Um die Bedürfnisse der Bevölkerung zu versorgen, müssen die Städte eine effiziente Infrastruktur und lokale Dienstleistungen anbieten. Neben Wohnung, Energie und Wasserversorgung bildet die Mobilität einen essentiellen Bestandteil dieser urbanen Infrastruktur und damit verbundener Einrichtungen.

Lösungen für die Bedarfslagen der Bevölkerung zu finden bedeutet in einem sehr komplexen und multikulturellen Umfeld zu agieren. Die wachsende Besorgnis um die Umwelt, den Klimawandel, die Energieproduktion und verbrauch, die Stadtentwicklung, die Demographie und die politischen und ökonomischen Machtverschiebungen in unterschiedlichen Weltregionen sind nur einige der Anforderungen, denen Raumplaner heute begegnen und die ihre Projektentwicklung, die Formulierung politischer Maßnahmen und das Entwerfen neuer Konzepte für eine zukunftsweisende urbane Mobilität anleiten. Im Kontext einer globalisierten sozioökonomischen Entwicklung, die durch eine intensive Mobilität von Personen, Produktion, Finanzen und Gütern gekennzeichnet ist, sind Maßnahmen, die auf lokaler Ebene implementiert werden, globalen Einwirkungen ausgesetzt bzw. werden zumindest davon beeinflusst. Einstellungen, die die Entwicklung, die öffentlichen Angelegenheiten und die Planung betreffen, müssen diese gesellschaftlichen Veränderungen berücksichtigen.

Die Welt heute ist städtisch und zudem online. Diese gesellschaftrelevanten Entwicklungsmuster brachten eine große Transformation mit sich, die sich auf die Weise wie die Menschen leben, Räume nutzen, produzieren, konsumieren, kommunizieren, transportieren und sich in globalen und lokalen Territorien bewegen auswirkt. Das Voranschreiten der Globalisierung, die durch die atemberaubende Geschwindigkeit technischer Entwicklung im Bereich der Kommunikation beschleunigt wird, verbesserte im gleichen Maße die Bildung und die Vernetzung der Menschen in weltweiten Web-Verbindungen. Die globale Echtzeit-Kommunikation eröffnet die Möglichkeit, und folglich auch das Bedürfnis, sich sehr schnell zu bewegen: In der Tat, in der kürzest möglichen Zeit.

Heute besteht die Herausforderung für Stadt- und Verkehrsplaner darin, optimale Lösungen zu präsentieren, die auf die Transformationen im städtischen Raum ausgerichtet sind. Die Akteure in der Kommunalpolitik, auf den unterschiedlichen Regierungsebenen und die Bevölkerung sind gefordert, konstruktive und koordinierte Handlungsansätze zu entwickeln. Gleichzeitig begegnen ihnen die Unsicherheiten bezüglich der Umwelt, der Energieproduktion und des Konsums, ebenso wie der Finanzierung. Diese Fragestellungen sind sowohl in der territorialen Planung als auch in der Planung der Verkehrsinfrastruktur und städtischer Einrichtungen in europäischen und auch in lateinamerikanischen Städten einzubeziehen.

Ab den 1970er Jahren waren die Städte Lateinamerikas beschleunigten Urbanisierungsprozessen ausgesetzt, die auf die ökonomischen Transformationen und den intensivierten Strukturwandel von einer landwirtschaftlichen zu einer industriellen Produktion zurückzuführen sind. Dieser Prozess trieb eine Vielzahl von Menschen in die urbanen Räume, welche zu diesem Zeitpunkt nicht die entsprechende Infrastruktur besaßen, um die Massen aufzunehmen. Die Stadtentwicklung war stark davon beeinflusst, die Territorien zu verwalten und Infrastruktur zu implementieren, um die neuen Bevölkerungsgruppen anzusiedeln. Das Anwachsen der Städte verlief unkontrolliert, im Besonderen in den urbanen Peripherien, die als „informelle“ oder „unregierbare“ Städte und Stadtviertel bezeichnet wurden. Heute besteht für diese Städte die zentrale Herausforderung darin, Investitionen in die Infrastruktur zu erhöhen, um zum einen der Bevölkerung Dienstleistungen anzubieten, und um zum zweiten das Territorium zu planen und effiziente Verwaltungs- und Regierungsmodelle einzurichten.

In Anbetracht der hier aufgeführten Feststellungen wird angenommen, dass heute sowohl in Industrie- als auch in Entwicklungsländern ein zentrales Anliegen in der Re-Evaluierung der derzeit etablierten Planungsansätze besteht. Städte in Industrieländern müssen ihre Planungskonzepte neu entwerfen und sich neu erfinden. Grund hierfür sind die derzeitigen Transformationen durch den technologischen und demographischen Wandel und deren Auswirkungen auf die Stadtentwicklung, Verkehrsplanung und –infrastruktur. Städte in Entwicklungsländern müssen Planungskonzepte entwickeln, die auf ihre spezifischen Realitäten abgestimmt sind. Sie benötigen eine Integration der Stadt- und der Verkehrsplanung, um effizientere Lösungen für eine sozialgerechte Erreichbarkeit zu bieten und um die Kosten der Implementierung und Instandhaltung der urbanen Infrastruktur zu reduzieren. Darüber hinaus sollen die Konzepte die Kosten für Anbieter und Nutzer senken und Umweltschäden abmildern.

Daher bieten die urbanen Verkehrsplanungskonzepte aus Industrie- und Entwicklungsländern gleichermaßen relevante Anhaltspunkte für die Erforschung und Identifizierung von Methoden zur Förderung der Politik- und Planentwicklung. Hierbei können Lehren aus den Erkenntnissen, die bereits bei den renommierten Planungsschulen gewonnen wurden, gezogen werden. Der Schwerpunkt dieser Dissertation liegt daher in der Analyse der angewandten urbanen Verkehrsplanung in europäischen und lateinamerikanischen Städten. Der Fokus ist auf Vergleiche zwischen Planungskonzepten in ausgewählten Städten gerichtet, die als Fallstudiengebiete verwendet werden. Ziel ist es, Schlussfolgerungen und Empfehlungen für einen integrierten urbanen Verkehrsplanungsansatz zu treffen, der eine zugängliche Stadt anvisiert, in der individuelle und kollektive Entwicklungen berücksichtigt werden.

Wie können wir die Ansätze der urbanen Verkehrsplanung in Europa und Lateinamerika erklären? Worin besteht der zentrale Einflussrahmen, der die Planungsansätze in diesen zwei geographischen Regionen bestimmt? Wie wirken sich die Planungsansätze und der Einflussrahmen auf das Mobilitätskonzept in den Fallstudiengebieten aus?

Die Analyse berücksichtigt den Hintergrund lateinamerikanischer Verkehrsplanung gegenüber europäischen Planungstraditionen. Es werden die Defizite im Transportsystem und die Anforderungen, denen die Planer gegenüberstehen, ausgewertet. Ebenso werden die Lösungen, die in europäischen und lateinamerikanischen Städten entwickelt werden, in die Untersuchung einbezogen. Ausgehend von einer interkulturellen Perspektive beschreibt die Studie die Gemeinsamkeiten, Unterschiede und Divergenzen der urbanen Verkehrsplanungsansätze, sowie ihre Schnittstellen mit den derzeitigen Stadtentwicklungskonzepten. Darauf aufbauend wird ein Modell vorgeschlagen, welches darauf abzielt, die Planungsansätze in europäischen und lateinamerikanischen Städten zu verbessern. Der Vergleich zielt darauf ab, den Akteuren der Raumplanung wertvolle Beiträge für die Konzipierung öffentlicher Politik und für die Modellierung und Implementierung der urbanen Verkehrsplanung bereitzustellen.

SUMMARY

As expressed by Ribbeck (2005), “Die Welt wird Stadt”[1]. The city has indeed become the heart of human activity today and the most dynamic space where the highest levels of social, economic and cultural pressure take place. In order to satisfy human needs, cities must provide efficient infrastructure and urban services. Besides housing, energy and water supply, an essential part of this urban infrastructure and facilities is related to mobility.

Addressing solutions for any human demand today means working in a very complex and multicultural environment. The growing concerns about the environment, climate change, energy production and consumption, urban development, demography and the political and economic power shifts in different regions of the world, are some of the challenges that planners face today when designing projects, proposing policies and measures, or developing new concepts in urban mobility for the future. Within a globalised socioeconomic development, with its intense movement of people, production, financing and goods, implementing measures on a local level can have impacts, or at least repercussions on a global scale. Attitudes regarding development, public affairs and planning must follow these societal changes.

The world today is urban and also online. This pattern of development in human affairs has brought about a great transformation in the ways people live, occupy space, produce, consume, communicate, transport and move around in both the local and global territories. As globalisation moves forward, supported by the breathtaking speed of technological development in communication, education has improved and people form webs of interconnections in a global environment. This global real-time communication creates the possibility, and then the need, to move very fast: in fact, within the shortest possible time.

The challenge for urban transport planners today is to present optimal solutions in accordance with the transformations taking place in cities. The actors involved in local governance, the different levels of government and the population themselves, all face the challenge of developing constructive and co-ordinated actions. On the other hand they have to face concerns of environment, energy production and consumption, as well as finance. These topics may be taken into account for both European and Latin American cities when planning their territories and transporting services and facilities.

After the 1970s the cities of Latin America underwent a process of fast urbanisation due to economic transformation and the intensification of change from agricultural to industrial production. This process pushed a great volume of people into urban areas, which at that time did not possess the infrastructure to receive them. Urban development was strongly affected by the administration of the territory and the implementation of infrastructure required to host the new population. The growth of cities was nearly uncontrolled, particularly in areas along their peripheries, called ‘informal’ or ‘unruly’ cities or districts. Indeed, for

[1] “The world becomes city“.

those cities the main challenge today is to increase investments in infrastructure, on the one hand in order to offer services to the population, and on the other hand to plan the territory and establish a pattern of administration and governance.

Considering the above statements, it can be assumed that today there is a strong need for a re-evaluation of the current planning approaches, both in developed and developing countries. Cities from the developed world need to redesign planning concepts and reinvent themselves, due to the current transformations related to technological and demographic change and the impacts on urban development, transport planning and infrastructure. Developing cities need to generate a planning concept appropriate to their reality. Furthermore, they need to integrate urban and transport planning, in order to produce more efficient solutions for city accessibility and reduce costs for the implementation of infrastructure and maintenance in the cities. In addition, the implemented plans might decrease costs for operators and users, and also decrease environmental impacts.

Based on that, urban transport planning approaches from both the developing and developed world are relevant issues for the researching and seeking of methods to support and strengthen the development of public policies and plans, taking advantage of the gains already obtained by the mature planning schools. Therefore, the main issue of this thesis is to analyse currently employed urban transport planning (UTP) models in European and Latin American cities, focusing on comparisons between the planning approaches of selected cities used as case study areas (CSAs), in order to support the conclusions and recommendations of an integrated urban transport planning approach towards accessible cities meeting individual and collective development.

How do we explain the urban transport planning approaches practiced in European and Latin American cities? What is the main influencing framework that affects urban transport planning approaches in use in these two geographical areas? What are the main results of the planning approaches and the influencing framework on the mobility concepts of the case study areas?

The analysis considers the background of Latin American urban transport planning alongside European planning traditions. It analyses the deficiencies of urban transport, the challenges faced by planners, and the solutions developed in the European and Latin American cities which are part of the present study. The study describes the similarities, differences and incongruities of urban transport planning approaches within a multicultural perspective, and their interface with the current urban development concepts in these cities. Based on that, a model is proposed aiming to contribute to the enhancement of planning approaches in the European and Latin American cities. Indeed, the comparison aims to give contributory ideas to urban transport planners in the search of solutions for the development of public policies and for the design and implementation of urban transport planning.

RESUMEN

Tal como expresa Ribbeck (2005), “Die Welt wird Stadt”. La ciudad ciertamente se ha convertido en el corazón de la actividad humana de hoy en día y en el espacio más dinámico, en el que se dan los más altos niveles de presión social, económica y cultural. Por tal de satisfacer las necesidades humanas, las ciudades deben ofrecer infraestructuras y servicios urbanos eficientes. Además de vivienda y provisión de agua y energía, una parte esencial de dicha infraestructura urbana y de sus instalaciones está relacionada con la movilidad.

Abordar soluciones para las exigencias humanas hoy en día supone trabajar en un entorno muy complejo y multicultural. Las crecientes preocupaciones sobre el medio ambiente, el cambio climático, la producción y consumo de energía, el desarrollo urbano, la demografía y los flujos de poderes políticos y económicos en las diferentes regiones del mundo, son algunos de los retos que los proyectistas asumen actualmente a la hora de diseñar proyectos, proponer políticas y medidas o desarrollar nuevos conceptos para la movilidad urbana del futuro. En un desarrollo socioeconómico globalizado, con el intenso movimiento de gente, producción, finanzas y vienes, implementar mesuras a nivel local puede tener impacto o al menos repercusión a escala global. Las posturas sobre el desarrollo, los asuntos públicos y la planificación deben seguir estos cambios sociales.

El mundo de hoy es urbano y también en línea. Este padrón de desarrollo de los asuntos humanos ha supuesto una gran transformación en la manera de vivir de la gente, en la forma en que ocupa el espacio, produce, consume, se comunica, transporta y desplaza por territorios tanto locales como globales. Con el avance de la globalización, apoyado por la imponente velocidad del desarrollo tecnológico en el ámbito comunicativo, la educación ha evolucionado y la gente forma redes de interconexiones a nivel global. Esta comunicación global a tiempo real crea la posibilidad, y con ello la necesidad, de moverse realmente rápido: de hecho, en el menor tiempo posible.

El reto para los diseñadores del transporte urbano actual es presentar soluciones óptimas en conformidad con las transformaciones que tienen lugar en las ciudades. Tanto los agentes involucrados en el gobierno local como los diferentes niveles de gobierno y la misma población se enfrentan al reto de desarrollar acciones constructivas y coordinadas. Por otro lado, deben afrontar las preocupaciones ambientales, de producción y consumo de energía y financieras. Estos aspectos se deben tener en cuenta en las ciudades tanto europeas como latino americanas a la hora de planear sus territorios, servicios de transporte e instalaciones.

Después de los años setenta, las ciudades de América Latina se sometieron a un proceso de rápida urbanización debido a la transformación económica y el paso de la producción agrícola a la industrial. Este procesó impulsó a un gran volumen de población a las áreas urbanas, que en el momento no poseían las infraestructuras necesarias para recibirla. El desarrollo urbano fue fuertemente afectado por la administración del territorio y la

implementación de dicha infraestructura necesaria para asentar a la nueva población. El crecimiento de las ciudades era incontrolado, particularmente en áreas periféricas, llamadas ciudades “informales” o “sin ley”. De hecho, para estas ciudades el mayor reto hoy en día es incrementar las inversiones en infraestructura, por un lado para proveer a la población de servicios, y por el otro para planificar el territorio y establecer un patrón de administración y gobierno.

Considerando las previas afirmaciones, puede entenderse que hoy en día hay una fuerte necesidad de revaluación de las estrategias de planificación actuales, tanto en los países desarrollados como en los que están en proceso. Las ciudades del primer mundo deben rediseñar sus conceptos de planificación y reinventarse a sí mismas, dadas las transformaciones actuales relacionadas con los cambios tecnológicos y demográficos así como el impacto en el desarrollo urbano y la planificación e infraestructura del transporte. Las ciudades en desarrollo necesitan generar una nueva concepción de la planificación, adecuada a su realidad. Es más, deben integrar la planificación urbana y la del transporte, por tal de producir soluciones más efectivas para la accesibilidad urbana y reducir los costes de la implementación de infraestructuras y el mantenimiento de las ciudades. Además, los planes implementados podrían reducir el coste de operadores y usuarios, así como el impacto medioambiental.

Sobre esta base, las estrategias de planificación del transporte urbano tanto en el primer mundo como en los países en desarrollo son asuntos relevantes para la investigación y la búsqueda de métodos que apoyen y fortifiquen el desarrollo de políticas y planes públicos, aprovechándose de los avances ya alcanzados por las escuelas expertas en planificación. De esta manera, el tema principal de esta tesis es el análisis de la planificación de transporte urbano (UTP: Urban Transport Planning) en uso en ciudades de Europa y América Latina, focalizando la atención en la comparativa entre las estrategias de las ciudades seleccionadas, usadas como áreas de estudio de caso (CSAs: Case Study Areas) con el objetivo de apoyar las conclusiones y las recomendaciones para la estrategia de un plan de transporte urbano integrado en ciudades accesibles, de acuerdo al desarrollo tanto individual como colectivo en éstas.

¿Cómo explicamos las estrategias de transporte urbano en práctica en las ciudades europeas y latinoamericanas? ¿Cuál es el principal marco de actuación que influencia dichas estrategias en ambas áreas geográficas? ¿Cuáles son los resultados de las estrategias de planificación y el marco de actuación sobre la concepción de la movilidad en las áreas de estudio?

El análisis considera el trasfondo de la estrategia de transporte urbano en América Latina junto a la tradicionalidad de las planificaciones europeas. Analiza las deficiencias del transporte urbano, los retos a los que se enfrentan los planificadores y las soluciones desarrolladas en las ciudades de Europa y América Latina que son parte del presente estudio. El estudio describe las similitudes, diferencias e incongruencias de la estrategia de planificación urbana desde una perspectiva multicultural, así como su interrelación con los

actuales conceptos de desarrollo urbano en dichas ciudades. Basado en ello, un modelo es propuesto con la intención de contribuir a la mejora de las estrategias de planificación de las ciudades europeas y latinoamericanas. Efectivamente, la comparación pretende dar ideas contributivas a los planificadores del transporte urbano que buscan soluciones para el desarrollo de políticas públicas y para el diseño e implementación de estrategias de transporte urbano.

RESUM

Tal com expressa Ribbeck (2005), “Die Welt wird Stadt”. La ciutat certament s'ha convertit en el cor de l'activitat humana d'avui dia i en l'espai més dinàmic, en el qual es donen els nivells més alts de pressió social, econòmica i cultural. Per tal de satisfer les necessitats humanes, les ciutats han d'oferir infraestructures i serveis urbans eficients. A més d'habitatge i provisió d'aigua i energia, una part essencial d'aquesta infraestructura urbana i de les seves instal•lacions està relacionada amb la mobilitat.

Abordar solucions per a les exigències humanes avui dia suposa treballar en un entorn molt complex i multicultural. Les creixents preocupacions sobre el medi ambient, el canvi climàtic, la producció i consum d'energia, el desenvolupament urbà, la demografia i els fluxos de poders polítics i econòmics a les diferents regions del món, són alguns dels reptes que els projectistes assumeixen actualment a l'hora de dissenyar projectes, proposar polítiques i mesures o desenvolupar nous conceptes per a la mobilitat urbana del futur. En un desenvolupament socioeconòmic globalitzat, amb l'intens moviment de gent, producció, finances i béns, implementar mesures a nivell local pot tenir impacte o almenys repercussió a escala global. Les postures sobre el desenvolupament, els assumptes públics i la planificació han de seguir aquests canvis socials.

El món d'avui és urbà i també en línia. Aquest patró de desenvolupament dels assumptes humans ha suposat una gran transformació en la manera de viure de la gent, en la forma en que ocupa l'espai, produeix, consumeix, es comunica, es transporta i es desplaça per territoris tant locals com a globals. Amb l'avanç de la globalització, recolzat per la imponent velocitat del desenvolupament tecnològic en l'àmbit comunicatiu, l'educació ha evolucionat i la gent forma xarxes d'interconnexions a nivell global. Aquesta comunicació global a temps real crea la possibilitat, i amb això la necessitat, de moure's realment ràpid: de fet, en el menor temps possible.

El repte per als dissenyadors del transport urbà actual és presentar solucions òptimes d’acord a les transformacions que tenen lloc a les ciutats. Tant els agents involucrats al govern local com els diferents nivells de govern i la mateixa població s'enfronten al repte de desenvolupar accions constructives i coordinades. D'altra banda, han d'afrontar les preocupacions ambientals, de producció i consum d'energia i financeres. Aquests aspectes s'han de tenir en compte a les ciutats tant europees com a llatinoamericanes a l'hora de planejar els seus territoris, serveis de transport i instal•lacions.

Després dels anys setanta, les ciutats d’Amèrica Llatina es van sotmetre a un procés de ràpida urbanització a causa de la transformació econòmica i el pas de la producció agrícola a la industrial. Aquest procés va impulsar a un gran volum de població a les àrees urbanes, que en el moment no posseïen les infraestructures necessàries per rebre-la. El desenvolupament urbà va ser fortament afectat per l'administració del territori i la implementació d'aquesta infraestructura necessària per assentar la nova població. El creixement de les ciutats era descontrolat, particularment en àrees perifèriques,

anomenades ciutats “informals” o “sense llei”. De fet, per a aquestes ciutats el major repte avui dia és incrementar les inversions en infraestructura, d'una banda per proveir a la població de serveis, i per l'altre per planificar el territori i establir un patró d'administració i govern.

Considerant les prèvies afirmacions, pot entendre's que avui dia hi ha una forta necessitat de revaluació de les estratègies de planificació actuals, tant als països desenvolupats com en els que es troben en procés. Les ciutats del primer món han de redissenyar els seus conceptes de planificació i reinventar-se a si mateixes, donades les transformacions actuals relacionades amb els canvis tecnològics i demogràfics, així com l'impacte en el desenvolupament urbà i la planificació i infraestructura del transport. Les ciutats en desenvolupament necessiten generar una nova concepció de la planificació, adequada a la seva realitat. És més, han d'integrar la planificació urbana i la del transport, per tal de produir solucions més efectives per l'accessibilitat urbana i reduir els costos de la implementació d'infraestructures i el manteniment de les ciutats. A més, els plans implementats podrien reduir el cost d'operadors i usuaris, així com l'impacte mediambiental.

Basat en això, les estratègies de planificació del transport urbà tant al primer món com als països en desenvolupament són temes rellevants per a la recerca i la cerca de mètodes que recolzin i fortifiquin el desenvolupament de polítiques i plans públics, aprofitant-se dels avanços ja aconseguits per les escoles expertes en planificació. D'aquesta manera, el tema principal d'aquesta tesi és l'anàlisi de la planificació de transport urbà (UTP: Urban Transport Planning) en ús en ciutats d'Europa i Amèrica Llatina, focalitzant l'atenció en la comparativa entre les estratègies de les ciutats seleccionades, preses com a àrees d'estudi de cas (CSAs: Case Study Areas) amb l'objectiu de recolzar les conclusions i les recomanacions per a construir l’estratègia d'un pla de transport urbà integrat en ciutats accessibles, d'acord al desenvolupament tant individual com a col•lectiu en aquestes.

Com expliquem les estratègies de transport urbà en pràctica a les ciutats europees i llatinoamericanes? Quin és el principal marc d'actuació que influencia aquestes estratègies a ambdues àrees geogràfiques? Quins són els resultats de les estratègies de planificació i el marc d'actuació sobre la concepció de la mobilitat a les àrees d'estudi?

L'anàlisi considera el rerefons de l'estratègia de transport urbà en Amèrica Llatina al costat de la tradicionalitat de les planificacions europees. Analitza les deficiències del transport urbà, els reptes als que s'enfronten els planificadors i les solucions desenvolupades a les ciutats d'Europa i Amèrica Llatina que són part del present estudi. L'estudi descriu les similituds, diferències i incongruències de l'estratègia de planificació urbana des d'una perspectiva multicultural, així com la seva interrelació amb els actuals conceptes de desenvolupament urbà en aquestes ciutats. Basat en això, un model és proposat amb la intenció de contribuir a la millora de les estratègies de planificació de les ciutats europees i llatinoamericanes. Efectivament, la comparació pretén donar idees contributives als planificadors del transport urbà que busquen solucions per al desenvolupament de polítiques públiques i per al disseny i implementació d'estratègies de transport urbà.

RESUMO

Como Ribbeck (2005) escreveu em seu livro: “Die Welt wird Stadt”[2]. Hoje a cidade é de fato o coração das atividades humanas e o espaço mais dinâmico, onde os mais altos níveis de pressão social, econômica e cultural acontecem. A fim de satisfazer as necessidades humanas, as cidades devem oferecer infra-estrutura eficiente e serviços urbanos. Além de habitação, energia e abastecimento de água, uma parte essencial da infra-estrutura e equipamentos urbanos está relacionada à mobilidade.

A proposição de soluções para qualquer demanda humana hoje significa trabalhar em um ambiente complexo e multicultural. As crescentes preocupações com o meio ambiente, as alterações climáticas, produção e consumo de energia, o desenvolvimento urbano, a demografia e as mudanças de poder político e econômico em diferentes regiões do mundo são alguns dos desafios que os planejadores enfrentam hoje na concepção de projetos, definição de políticas e medidas, bem como o desenvolvimento de novos conceitos de mobilidade urbana para o futuro. Considerando um modelo de desenvolvimento sócio-econômico em um ambiente globalizado, com intensa movimentação de pessoas, produção, sistema financeiro e bens, ações a nível local podem ter impactos, ou pelo menos repercussões em escala global. Portanto, medidas em relação ao desenvolvimento, relações públicas e planejamento devem seguir estas mudanças sociais

O mundo de hoje é urbano e também online. Esse padrão de desenvolvimento socio-cultural provocou uma grande transformação nas formas como as pessoas vivem, ocupam o espaço, produzem, consomem, se comunicam, se deslocam em ambos os territórios, locais e globais. Juntamente com o avanço da globalização, apoiado pelo desenvolvimento tecnológico na comunicação, a educação se potencializou, capacitando as pessoas a formarem teias de interconexões em ambiente global. Esta comunicação global em tempo real cria a possibilidade, e, assim, a necessidade de se mover rápido: de fato, dentro do menor tempo possível.

O desafio para os planejadores de transporte urbano hoje é apresentar soluções otimizadas de acordo com as transformações que estão acontecendo nas cidades. Os atores envolvidos na governança local, os diferentes níveis de governo e a população enfrentam o desafio de desenvolver ações construtivas e coordenadas. Por outro lado, têm-se que enfrentar questões relativas ao meio ambiente, à produção e ao consumo de energia, bem como à capacidade de financiamento. Estes tópicos podem ser tomados em conta tanto para as cidades européias como para as latino-americanas ao planejar seus territórios e os seus sistemas de transporte e serviços publicos.

Após a década de 1970 as cidades da América Latina passou por um processo de rápida urbanização devido à transformação econômica e à intensificação na mudança da base agricola para a produção industrial. Este processo moveu um grande volume de pessoas

[2] “O mundo se torna cidade“.

para as áreas urbanas, que à época, não possuía a infra-estrutura para recebê-los. O desenvolvimento urbano foi fortemente afetada pela administração do território e pela necessidade da implementação de infra-estrutura para acolher esta nova população. O crescimento das cidades aconteceu de forma descontrolada nas areas periféricas, particularmente em áreas chamadas 'informais' ou subnormais. De fato, para estas cidades, o principal desafio hoje é aumentar os investimentos em infra-estrutura, por um lado, a fim de oferecer serviços à população, e por outro lado conseguir planejar o território e estabelecer um padrão de administração e governança.

Considerando-se as afirmações acima, percebe-se que hoje existe uma forte necessidade de reavaliação das abordagens de planejamento atuais, tanto em países desenvolvidos como naqueles em desenvolvimento. Cidades do mundo desenvolvido precisam reformular conceitos de planejamento e reinventar-se devido às transformações atuais relacionados à evolução tecnológica, à demográfica e os seus impactos no desenvolvimento urbano, no planejamento de transportes e na infra-estrutura. Cidades em desenvolvimento precisam gerar um conceito de planejamento adequado à sua realidade. Além disso, estas cidades precisam integrar o planejamento urbano e de transportes a fim de produzir soluções mais eficientes para a acessibilidade da cidade de froma a reduzir os custos para a implementação de infra-estrutura e a sua manutenção. Além disso, deve-se ter o foco na redução dos custos para os operadores de transportes e os usuários, e ainda diminuir os impactos ambientais.

Considerando os aspectos mencionados acima, tanto nos países em desenvolvimento como nos países desenvolvidos é relevante a busca por métodos para apoiar e fortalecer o desenvolvimento de políticas públicas e de planejamento de transporte urbano, aproveitando os ganhos já obtidos pelas escolas mais tradicionais. Portanto, o objetivo principal deste trabalho é analisar as abordagens de planejamento empregadas atualmente no transporte urbano em cidades europeias e latino-americanas, enfocando a comparação entre as abordagens de planejamento de cidades utilizadas como estudos de caso, de forma a apoiar as conclusões e recomendações de uma abordagem de planejamento de transporte urbano integrado para a construção de cidades acessíveis, objetivando formar uma das bases de sustentação para o desenvolvimento individual e coletivo.

A análise considera o planejamento de transporte urbano da América Latina, confrontando-o com as tradições do planejamento europeu. Adicionalmente, analisa as deficiências do transporte urbano, os desafios enfrentados pelos planejadores e as soluções desenvolvidas nas cidades europeias e latino-americanos que fazem parte do presente estudo. O estudo descreve as semelhanças, diferenças e incongruências de abordagens de planejamento de transporte urbano dentro de uma perspectiva multicultural e sua interface com os atuais conceitos de desenvolvimento urbano nessas cidades. Com base nisso, foi proposto um modelo objetivando dar suporte aos planejadores de transporte urbano na organização do processo de planejamento e na busca de soluções para o desenvolvimento de políticas públicas e para a concepção e execução de um conceito integrado de mobilidade urbana.

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DEDICATION

To God, in Jesus Christ: everything comes from you and returns to you.

To my father João Gonçalves (in memoriam): the most extraordinary person I have ever known; an example of wisdom and dignity. It was in your eyes, years ago, that I found the encouragement to go and live my dreams. And to my mother Carolina Martins (in memoriam), who still had time before leaving this earth, to teach me to read, to introduce me to the world of books and to search for knowledge, when I was still very young.

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1 INTRODUCTION

"The problem for planners is that society is changing and changing quickly, while planning as a practice and as a collection of process remains wedded to ideias and procedures from a different age"

(Allmendinger, 2009)

1.1 PROBLEM STATEMENT

With around 50% of the world population living in urban areas (United Nations, 2007), cities are the economic and cultural heart of human activity today. In order to supply human needs, cities must provide an efficient infrastructure and urban services. Besides housing, energy and water supply, an essential part of this urban infrastructure and facilities is related to mobility.

According to the United Nations (UN), a rapid urbanisation of the world's population is still in progress. The urban proportion of the global population increased from 13% in 1900 to 49% in 2005, and 65% of the global population is expected to live in cities by 2030 (United Nations, 2007). In addition "mega-cities" with over 10 million inhabitants are emerging and growing fast. The expectation is that in 2015 the number of "mega-cities" will amount to 23 cities worldwide (Hall, 2007; Siedentop, 2008).

As Ribbeck (2005) has coined it, "Die Welt wird Stadt"[3]. Therefore, the city has become the most dynamic space, where the highest level of social, economic and cultural pressure takes place. The dynamic towards the development of all these areas brings together a great impact on environmental, cultural and economic affairs, social organisation, the architectural aesthetics of the cities and, consequently, planning. What will cities be like in 2030? For Ribbeck (2009) "this is an open question". With an increasing percentage of the entire world population living in cities, planners face a double challenge: they should expect a great transformation of their country's territory, the infrastructure needed for this and the services available for the population in the future. Moreover, they need to plan the supplying of the current demand.

Addressing solutions for any human demand today means working in a very complex and multicultural environment (Perrone, 2010). Within a globalised socioeconomic development, with its intense movement of people, production, financing and goods, implementing measures on a local level can have impacts, or at least repercussions, on a global dimension. Giddens (1990, p.64) defines globalization as "the intensification of worldwide social relations which link distant localities in such way that local happenings are shaped by events occurring many miles away and vice versa". Therefore, attitudes regarding development, public affairs and planning must follow those societal changes (Hall, 2002; Allmendinger, 2009; Rothfuß, 2006; Castells, 2004, 2009). We are living in the age of information. The world today is urban and also online. This pattern of development in human affairs brought about a great transformation in the ways of living, occupying space, producing, consuming, communicating, transporting and moving around in both the local and global territories. As globalisation moves forward, supported by the

[3] In English: "The world becomes city".

breathtaking speed of technological development in communication, education has improved and people form webs of interconnections in a global dimension (Gonçalves, Rothfuß, & Morato, 2012), creating a networking society[4] (Casttels, 2004). This global real-time communication creates the possibility, and then the need, to move very fast: in fact, within the shortest possible time (Gonçalves, Rothfuß, & Morato, 2012). Ribbeck (2005, p.19) estates in that context:

> „Als wäre die allgegenwärtige Kommunikation noch nicht genug, drängt es die Menschen zur totalen Mobilität, die jeden Ort beliebig verfügbar macht. Konsum- und Freizeitwünsche, Übermotorisierung, schnelle Zuge und billige Flüge bringen ein „modernes Nomadentum" hervor, das die Verkehrsflut unaufhaltsam anschwellen lässt. Statt im vertrauten Quartier zu verharren, driften die Lebenskreise immer weiter auseinander: wohnen in einer Stadt, arbeiten in einer anderen, kulturelle Erbauung und Freizeitvergnügen in einer dritten. […] die ganzen Welt wird zur eng vernetzten Städte-Stadt, die jedermann und jederzeit verfügbar ist."[5]

But in order to reach different places and promote universal access for all, it is necessary to deal with gaps and disconnections between spaces, and to overcome the cultural, social, economic, political and physical barriers that exist in the built and unbuilt environments (Gonçalves, 2012). Individual and collective development demand certain conditions for the choice of, and access to, various places such as services, centres of education, workplaces, or any destination of interest where people are active in some way (Gonçalves, 2011). Freire (1990; 2011) argues that conditions of the social, political and economic environment influence individual and collective development. Following this line of thought, accessibility must not be seen simply in relation to universal physical design, in order to provide special conditions for mobility and include people with disabilities and others who are not considered by standard architecture measures (Gonçalves, 2012). Accessibility must be understood as the facility to reach places of interest (Vasconcellos, 2001). Furthermore, the concept of accessibility must consider not only physical barriers, but also cultural, social, economic, political, educational, communication, technological, or any other constraints that hinder people (with disabilities or not) in the process of accessing places of interest, in order to confront these variables and include them in the planning process. Therefore, the concept of accessibility must incorporate

[4] "A network society is a society whose social structure is made of networks powered by microeletronics-based information and communication technologies. By social structure, I understand the organisation arrangements of humans in relations of production, comsumption, reproduction, experience, and power expressed in meaningful communication coded by culture" (Castells, 2004, p.3).

[5] In English: "As if the ubiquitous communication were not enough, it leads people towards total mobility, which makes any number of places reachable. Demands of consumption and leisure, overmotorisation, fast trains and cheap flights all bring about a "modern nomadism" that is swelled by the unstoppable flow of traffic. Instead of remaining in a familiar neighbourhood, the various areas of our lives drift further and further apart from each other: living in one city, working in another, cultural and leisure activities in a third. [...] the whole world turns into the closely-networked multi-city city that is available to everyone at any time."

environmental conditions in a broad dimension, such as cultural, social, political, physical, economic, educational and communication conditions, those concerning possibilities of participating in public affairs, and so on. Moreover, the environment must be prepared: barriers need to be broken in order to create access and promote individual and collective development. Within this networking society, “reaching places of interest” does not necessarily mean physical mobility, and planners need to be aware of current changes in order to look towards the advancement of methods and towards the improvement of planning approaches and urban transport practices. Based on these assumptions, public policies must be developed in order to promote accessibility, not just mobility.

How is it possible to ensure that people are served by decent urban transport and at the same time be sustainable?

Nowadays cities are not able to guarantee accessibility for all sections of society. Congestion, noise and air pollution, traffic accidents, overcrowding and less space for housing and for people moving around in the cities are some of the results of the current urban development pattern in cities from both the developed and the developing world, where individual motorised transport makes up a continuously growing share of the modal split. In addition, the high costs of constructions, maintenance and infrastructure make services more expensive, increasing costs for the users. Furthermore, within this development model, the accessibility for the population through the urban spaces affects social cohesion. In developing countries costs and the lack of adequate infrastructure can exclude parts of the population from public services.

Urban development and the current urban form result from the different concepts of planning implemented over the years (Grant, 2006) – or a lack of them – produced in the cities with the aim of supplying multifarious services to the population and producing conditions needed for development. The abovementioned problems occur with greater intensity in cities that present low population density, where the form of land development is known as urban sprawl. This pattern of development is current in several cities around the world. Lower density means a higher demand for motorised transport and higher fuel consumption per capita. McElfish (2007, p.5), discussing urban sprawl, highlighted that:

> “A better approach is recognizing that we have real problems ahead if the current development patterns continue to prevail. Only such recognition will enable us to take steps to reform the laws and policies that hold us back – and enable us to find places and provide choices for new neighbourhoods.”

According to McElfish (2007), urban sprawl increases societal costs for transport and for providing infrastructure, consuming more resources than other developmental patterns do, such as the compact city for example. Sprawl separates and excludes poor people from jobs due to the large distances between settlements, and in many cases they will need to cross large parts of the city in order to reach their workplaces. This way, more time is spent on commuting considerable distances “on the normal bad traffic” (McElfish, 2007, p.3) in sprawling metropolitan areas.

Beyond that, in some developed countries today the phenomenon of urban shrinkage can be observed. This is a result of the decreasing population (Häußermann, 2009). This phenomenon has implications for the costs of urban transport, due to underuse of the existing infrastructure (Siedentop & Fina, 2008). Although several cities in the developing countries of Latin America still face population growth rates, the growth in some of them is showing decreasing trends too. Nevertheless, these cities are still staunchly committed to investing in the expansion of the transport network and in the infrastructure, in order to supply the current demand and to overcome the lack of public services in these areas. In many cities the basis of urban and transport planning techniques and the organisation of the planning process need improvements relating to data management, technology, sustainability and the design and the implementation of plans. Additionally the coordination of spatial planning and urban transport planning is still deficient. Furthermore, besides the planning techniques, the organisation of the planning process, considering the way the society influences the process and the institutional and political position of government on planning, are being strongly questioned by a great part of the population today. As people have more education and information they want to be involved in the management of public affairs and influence the design of the environment where they live.

The challenges faced by public administrators, planners and politicians to develop policies and to co-ordinate the process of urban and transport planning for the cities is more complex when it involves metropolitan areas with different sorts of administration, decision makers, political interests and levels of government organisations. According to Innes & Gruber (2001a, p.2), “one of the greatest challenges of urban and regional public policy today is to develop constructive and coordinated action across the fragmented and often warring jurisprudence in metropolitan areas.” The governance of fragmented territory, as it is related to built, unbuilt and cultural landscapes, or to political or social lack of cohesion, requires communication and collaboration for the organisation of the planning process, in order to be able to cope with the problems that emerge from these complex environments and to propose more sustainable spaces (Innes & Gruber, 2001; Healey, 2006; Hall, 2002; Almendinger, 2009; Rothfuß, Perrone, & Mororó, 2012).

The activities of planning are considered by several authors as a multidisciplinary topic. Different studies and researchers have presented theories and approaches to set out solutions for this task. For instance, Krizek & Levinson (2003, p.3) are of the opinion that planning has to be discussed focusing on interdisciplinary topics in an integrated and synergetic manner:

> “Many planning strategies hinging on "sustainable development", state-wide growth management or “smart growth,” require integrated approaches, combined methods, and synergy between specializations. Affordable housing by itself holds little merit without roads (transportation), public services (land use), employment opportunities (economic development), clean water (environmental), or other amenities.”

Beyond its characteristics of complexity and multidisciplinarity, urban transport planning can present different cultures and concepts in design and implementation of transport measures. It depends on a series of technical, cultural, political and organisational aspects. The challenge for any urban and transport planner is to find optimal solutions considering the requirements of the

inhabitants to easily access places and the requirements of moving towards sustainable development. This optimisation process must take into consideration the characteristics of each city. For instance Figure 1 below shows the mode choice in the cities of Gröningen (the Netherlands), Zürich (Switzerland), Bochum (Germany) and Perth (Australia). In terms of general economic development these cities are quite similar. However, the modal split shows a different configuration of the urban transport network and a different behaviour regarding mobility in each city. “While in Gröningen approximately 4 out of 10 trips are made by bicycle and in Zürich public transport modes account for four out of ten trips, the private car still occupies a dominant position in Bochum and Perth (three out of four trips)” (FGM-AMOR, 2007, p.11).

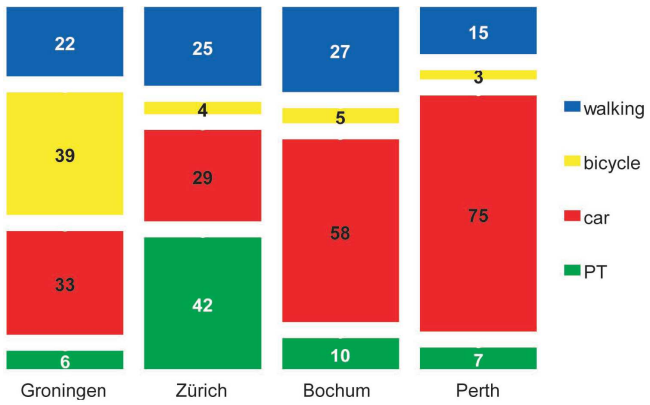


Figure 1: Modal split: A comparison of four cities. Source: FGM-AMOR (2007, p.11).

Besides the particularities of each city regarding mobility behaviour and the planning traditions of the regions where they are located, planning can also be influenced by experiences and concepts developed and implemented in other cities and other countries, which have presented good results. In a global economic system, knowledge sharing and transferability have long played an important role in several areas throughout the world. In case of transport planning, the concepts developed in Europe were incorporated by several cities on the American Continent in the past century. Also over the last few decades concepts which developed on the American Continent and were more specifically related to public transport, started to become incorporated by other regions in the world. Internationally-recognised cases can be found in a vast literature.

For example, the concept of bus rapid transit (BRT) developed in Curitiba in the seventies, was analysed in many different studies (Cervero, 2007; Golub, 2004; Ardila-Gomez, 2004; and others). The urban transport planners inspired by the London “tube” developed a bus system running in segregated corridors with special facilities related to platforms, boarding and alighting, in an integrated network for the whole city. They were innovative in their creation of a solution with fast implementation, at a relatively low cost, using local technology for the development of the equipments (bi-articulated buses, for example) and using the design of transit-oriented urban development based on bus system in spite of rail system. In subsequent years the BRT has been studied by several technicians and has been implemented in cities from all continents. For instance, the well-known Transmilenio implemented in Bogotá, or the bus systems implemented recently in Chinese cities or those on the African Continent.

Considering the above statements, it can be assumed that today there is a strong need for a re-evaluation of the current planning approaches, both in developed and developing countries. Cities from the developed world need to redesign planning concepts and reinvent themselves due to the current transformations related to technological and demographic change and the impacts on urban development, transport planning and infrastructure. Developing cities need to generate a planning concept appropriate to their reality. Furthermore, they need to integrate urban and transport planning, in order to produce more efficient solutions for city accessibility and reduce costs for the implementation of infrastructure and maintenance in the cities. In addition, the implemented plans can decrease costs for operators and users, and also reduce environmental impacts.

Urban transport planning approaches from both the developing and developed world are relevant issues for the researching and seeking of methods to support and strengthen the development of public policies and plans, taking advantage of the gains already obtained by the mature planning schools.

1.2 OBJECTIVES AND JUSTIFICATION

Which aspects of the city have an impact on mobility and accessibility? To what extent do the territory, governance, institutional organisation and participation of stakeholders influence planning design and its outcome? In what ways does the organisation of the space and the urban form determine and influence mobility and accessibility? For instance, must the territory be considered as a multidimensional whole, or only the built environment?

Furthermore, how should transport issues and proposals be addressed specifically for developing countries? Which issues are relevant when considering the framework conditions of cities in developing and developed countries? Are there differences in the chosen approaches of the planning process? Can the planning approaches used in developed countries be transferred to the developing regions? Why is it necessary to categorise and compare the urban transport planning approaches of cities from different continents, cultures and levels of economic development?

The main issue of this thesis is to analyse urban transport planning (UTP) in use in European and Latin-American cities, focusing on comparisons between the planning approaches of selected cities used as case study areas (CSAs), in order to support the conclusions and recommendations of an integrated urban transport planning approach towards accessible cities meeting the demands of individual and collective development. Specifically, the study has the following objectives:

a) To discuss the current challenges for and influences on UTP;

b) To revise prevalent urban transport planning approaches in Europe and Latin America;

c) To propose a model for the discussion of different approaches of urban transport planning;

d) To contextualise (by exploring and describing) UTP in the case study areas (CSAs);

e) To identify similarities, differences and incongruities among UTP in the CSAs;

f) To examine various results of implemented planning on current passenger urban transport networks in the CSA's, using selected criteria and indicators;

g) To evaluate planning processes in the CSAs on the basis of an Analytical Hierarchy Process (AHP);

h) To frame the strengths, weaknesses, opportunities and threats involved in planning approaches in the CSAs by SWOT analysis;

i) To propose strategies for the transfer of social learning and best practices of urban transport planning between European and Latin-American cities.

The challenge for urban transport planners today is to present optimal solutions in accordance with the transformations taking place in cities: technological and economic aspects, demography, multiculturalism, governance and administration of the territory, for instance. The actors involved in local governance, the different levels of government and the population themselves all face the challenge of developing constructive and co-ordinated actions. On the other hand they have to face concerns of environment, energy production and consumption, as well as financing. These topics might be taken into account for both European and Latin-American cities when planning their territory and transport services and facilities for cities.

After the 1970s the cities of Latin-America underwent a process of fast urbanisation due to economic transformation and the intensification of change from agricultural to industrial production and the service sector. This process pushed a great volume of people into urban areas, which at that time did not possess the infrastructure to receive them. Urban development was strongly affected by the administration of the territory and the implementation of infrastructure to settle the new population. The growth of cities was nearly uncontrolled, particularly in areas along their peripheries, called 'informal' or 'unruly' cities or settlements. Indeed, for those cities the main challenge today is to increase investments in infrastructure, on the one hand in order to offer services to the population, and on the other hand to plan the territory and establish a pattern of administration and governance. Together, the developing cities face problems caused by the trends of the development pattern of today:

- Decreasing general population rates versus the increasing urban population: Where is the equilibrium point? Will the developing world simply repeat the tendencies which arose in the developed world in the past?
- Disconnection between urban planning and urban transport planning: What solutions can be found for the organisation of urban transport planning and operation?
- Deficiencies in acquiring and using new technologies for organising the data basis and information needed for planning.

- For most of the developing cities there is no definition of an integrated overall concept of urban and transport planning, and they simply undergo spontaneous and sprawling growth regardless of the consequences for the transport sector.

European cities have traditions in planning and in the administration of their territories. However, a number of European cities are today facing a great transformation of their technological development patterns and their demographies. As Häußermann (2009) said, “die Bevölkerung wird weniger, älter und bunter”[6]. The population is decreasing and aging, in a multicultural environment. These changes can on the one hand increase transport costs for its users, considering that the existing infrastructure is underused (Siedentop & Fina, 2008). On the other hand the existing infrastructure cannot be adequate for the needs of this new pattern of population and for the new technological pattern that is arising. As claimed by Häußermann (2009), the planners should work on the re-invention of planning concepts, in order to develop optimal solutions for cities in the future.

The analysis considers the background of Latin-American urban transport planning alongside European planning traditions. It analyses the deficiencies of urban transport, the challenges faced by planners, and the solutions developed in the European and Latin-American cities which are part of the present study.

The study seeks to identify the similarities, differences and incongruities of urban transport planning approaches developed in different environments over the years, and their interface with the current urban development concepts in these cities. Based on that, it aims to identify perspectives on the enhancement of the planning approaches in the European and Latin American cities. Moreover it analyses the actors framework that participates in the process of planning and focuses on the decision processes in the CSAs. Indeed, the comparison aims to give contributory ideas to urban transport planners in the search of solutions for the development of public policies and for the design and implementation of urban transport planning.

The planning process should address the modernisation of old development patterns affecting current transport infrastructures and propose new methods of development to create an environment of transferability and cooperation among societies and states. Therefore, the results of the analysis should form a basis of sharing knowledge of solutions between cities on the European Continent and cities from developing countries.

1.3 OUTLINE OF THE THESIS

The thesis is organised in seven chapters, as described below:

Chapter 1 (this chapter) introduces into the problem of urban transport planning today and the motivation for the research. It also defines the objectives and the justification of the thesis.

[6] In English: “The population is becoming smaller, older and more colourful.”

Chapter 2 discusses the current challenges for and influences on UTP, the theoretical basis for the research, and the thesis approach. It examines the background of urban transport planning and develops a discussion on the prevalent planning approaches and processes in use in Europe and Latin America. At the end, a model for urban transport planning is proposed.

Chapter 3 presents the methods and research design used to develop the study.

Chapter 4 contextualises (by exploring and describing) UTP in the CSAs selected in Europe and Latin America. It gives a basic overview for each city and a description of passenger urban transport, including the organisation, actors framework involved in UTP, planning background and characteristics of the transport network. In addition, it gives an idea of the urban transport planning process of each of the CSAs.

In chapter 5 the analyses of urban transport planning in the five case study areas are presented. Similarities, differences and incongruities among UTP in the CSAs are identified by comparison, followed by an analysis of the employed planning approaches for urban transport. An analysis of the various results of implemented planning on current passenger urban transport networks is carried out using selected criteria and indicators. An evaluation of planning processes is conducted at the end of the chapter, using the Analytical Hierarchy Process (AHP), aiming to understand the level of influence of some elements of the actors network on the process of urban transport planning.

Chapter 6 identifies urban transport planning strategies in Europe and Latin-America, and frames strengths, weaknesses, opportunities and threats involved in planning approaches in the CSAs using SWOT Analysis and proposes strategies for the transfer of the best practices of urban transport planning between European and Latin-American cities. The study proposes to identify past experiences, opportunities and strategies for social learning in urban transport in the case study areas.

Chapter 7 presents the final considerations of the thesis. Furthermore, it discusses its limitations and sets future possibilities of research.

1.3.1 Thesis summary

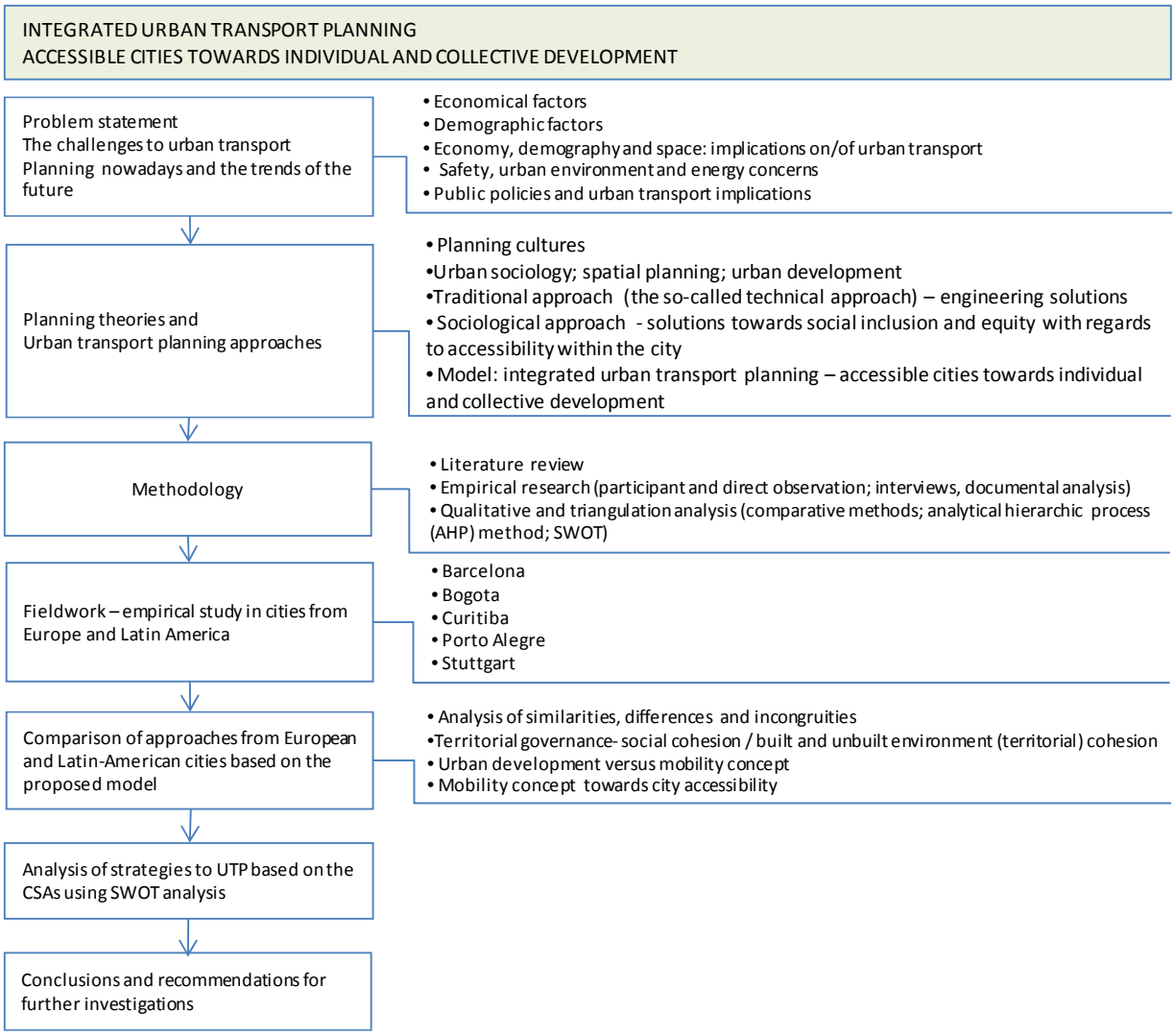


Figure 2: The Thesis summary

2 URBAN TRANSPORT PLANNING THEORY AND THE THESIS APPROACH

"Every field of endeavour has its history of ideas and practice and its traditions of debates" (Healy, 2006).

Planning is a multifaceted issue. Its discussion has required the attention and the efforts of manifold fields of knowledge and encompassed a great range of diverse ideas and debates. Urban transport planning has been formally evolving as a particular issue since the beginning of the twentieth century, along with the expansion of urbanisation and as a consequence of industrialisation and rationalisation of public policies. The industrial age expanded the urban areas and also increased the need for the transportation of goods and passengers, which caused various impacts and negative externalities in the urban spaces. Urban transport planning, as a field of study, was developed in order to propose solutions to the urban function of circulation, as cited in the Athens Charter of 1933, to cope with the problems caused by uncontrolled development, and to give support to the expansion of the automobile as leading means of urban transportation.

The rapid growth of urbanisation and its consequences, combined with the transformation of contemporary society, indicate a need for rethinking the methods and practices of urban planning, and in particular, the field of urban transport. The urbanised world enriched some sectors of society, improving their standards of living and making their lives more complex, so that they acquired various new choices in terms of consumption, jobs, education, leisure, investments and business. But it has also produced gaps in the space, and produced social and cultural segregation, as can be seen at the current patterns of development. Today most people live in societies experiencing a very fast and dynamic transformation of worldwide social and production relations, the potential of which can be seen in increasing standards of education, information and communication. Under these conditions, the planning methods suggested by the Athens Charter can no longer fulfil the population's needs for mobility. Solutions based only on infrastructure for the fulfilment of the urban function of circulation cannot cope with the problems of mobility and accessibility in this "network society" (Castells, 2004).

Therefore, based on these assumptions, in order to rethink and understand the current social transformations, and to propose new ideas or even new approaches, or simply to propose the improvement of existing ones, it is necessary to instigate a deeper, wider and transdisciplinary discussion considering various fields and scholars of various sciences, not simply scholars of planning. In this chapter the discussion starts by addressing the challenges to be faced today and the trends of the future. These relate to economic development, income, financing capacity, demography, urbanisation and various externalities that are produced by the current pattern of development such as pollution, traffic accidents and land consumption. Furthermore, it contextualises the urban problems, governance and policies of urban transport. It also goes through the planning theories used most widely on the European and Latin American continents, focusing on those that are most relevant to urban transport. Towards the end, a model for urban transport planning is proposed.

2.1 URBAN TRANSPORT PLANNING: THE CHALLENGES OF TODAY AND THE TRENDS OF THE FUTURE

"The future is the only topic that other professionals have ceded to planners as relatively uncontested turf"
(Myers, 2001)

The world today is under strong transformation not only related to conjuncture aspects that lead to solutions in short and medium terms, but also on the structural basis of the economy, the demography, society, world politics and environmental concerns. The world map of socioeconomic development is being re-designed and the population's way of life in the future will be directly affected. The growing concerns about the environment, climate change, energy production and consumption, urban development, demography and the political and economic power shifts in different regions of the world are some of the challenges that planners face today to design projects, to propose policies and measures, or to develop new concepts for urban mobility for the future. Therefore, to start the discussion about transport planning some questions within the broader and transdisciplinary research framework of transport geography must be addressed:

- How should we plan mobility for the future, considering the changing world economy, world investment capacity, demography, energy production/consumption, transport technology?
- What will cities look like? Which kind of urban development will be designed under those conditions?
- How should we provide accessibility for the population to services, working, leisure, school and shopping in the new city development shape?
- To what extent will the accessibility for the population be met by transport facilities and to what extent will they be met by social reorganisation of housing-working-education-services-leisure and supplying systems?
- Which transport facilities will be adequate to meet the needs of the population?
- How will the urban transport network be composed?
- Which type of transport infrastructure will be designed?
- Which transport technology will be available, considering all concerns about energy, population patterns and environment?
- How and by whom will these potential infrastructure investments be financed?
- Who will be in charge of the urban transport planning, management and operation?
- Who will be the main players involved in the urban transport planning process?
- Will urban transport be more regulated or de-regulated in the future?
- Which mobility concepts will be more convenient to cover all of the questions above?
- Are the planning approaches of today adequate to answer all the above questions?

- Are the planning approaches of today adequate to answer the questions for developing countries as well as for developed countries?

2.1.1 Economic factors

Data from the World Bank shows that the world Gross Domestic Product (GDP) grew fast in the past century within the primary growth poles of the planet. Furthermore, towards the end of the century, economic development and world investment capacity evolved also beyond the traditional limits of the USA, Europe or the developed areas of Asia. It is important to remark on this movement of worldwide capital, that recently in the developing regions the expansion has happened faster than in the traditional developed economies, decoupling the path of joint development of the developed and developing regions (Canuto & Giugale, 2010). This movement of capital and income also impacts directly on the capacity of investments for the transport sector. Moreover, as argued by Vasconcellos (2001), mobility increases in any society when incomes rise. Therefore economic development, financing capacity and the income of the population are influencing factors on urban transport planning.

2.1.1.1 Gross Domestic Product (GDP) growth in the world

The trends for socio-economic development in the world for the next decade, presented by the reports of the United Nations (UN) and The World Bank (WB), highlight figures and factors that affect urban development and mobility. Some of the major trends are the following (UNCTAD, 2010; World Bank, 2011; Canuto & Giugale, 2010):

- Strong conjuncture changing with the world economy: the mature industrial economy has had a decreasing growth rate of GDP while some new regions are emerging with a continuous economic growth trend.
- The capacity and structure of investments are changing, due to investors, the potential of investment, and the time needed for the realisation of the investments.
- Almost all regions of the world have seen a reduction in poverty, an improvement in the quality of products and services and an increased consumption of these products and services.

According to figures provided by the World Bank, the developing countries[7] have performed best with regards to relative GDP growth, and their percentage of total global investments in

[7] According to the United Nations Statistics Division, Standard Country and Area Codes Classification. Composition of macro geographical (continental) regions, geographical sub-regions, and selected economic and other groupings, as per April 2011 “there is no established convention for the designation of developed and developing countries or areas in the United Nations system. In common practice, Japan in Asia, Canada and the United States in northern America, Australia and New Zealand in Oceania, and Europe are considered developed regions or areas.” The designation of “transition countries” is used to indicate the "countries in transition from centrally planned to market economies" as a “grouping used for economic analysis” (United Nations Statistics Division, 2011).

recent years is what helped them to overcome faster and easier the financing-trade crises of the end of the 2000s.

> "Developing countries as a group have been recovering faster than advanced economies while also maintaining the positive growth premium that emerged prior to the crisis. Indeed, growth in developing countries is projected by the World Bank to reach 6.1% in 2010, 5.9% in 2011, and 6.1% in 2012, while corresponding figures are 2.3%, 2.4%, and 2.6% for high-income countries. Almost half of global gross domestic product (GDP) growth is currently coming from developing countries" (Canuto & Giugale, 2010, p. 31).

The graph in Figure 3 illustrates the World Bank's predictions for trends of GDP growth in the world's for different regions. While the 30 Western European and Western offshoot countries[8], the most developed countries in the world, grew about 0.5% in 2008, the Latin-American, African and Asian countries reached a growth of about 5.0% in the same year. Among the developing countries are highlighted the four nations of the 'BRIC' group (Brazil, Russia, India and China) (Armbruster, 2010) who have been leading in trading and investments in their own territories as well as overseas through their transnational corporations and investment banks (UNCTAD, 2010).

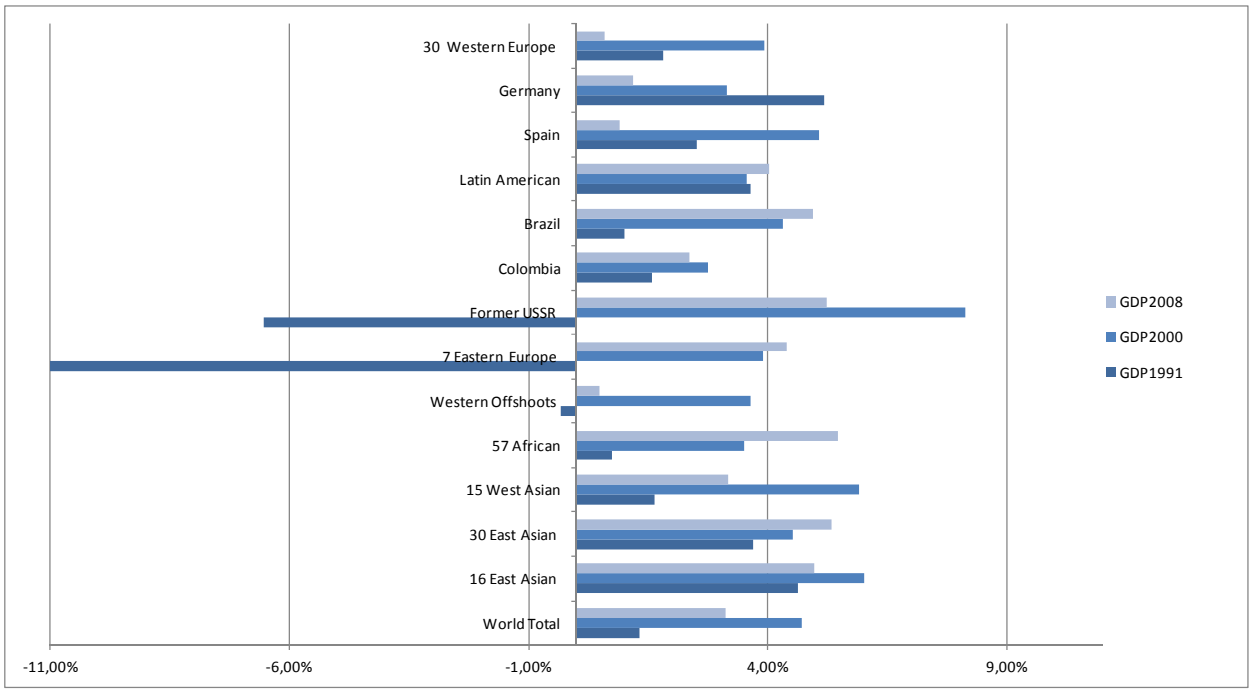


Figure 3: The GDP growth rate in the world as per the years 1991, 2000 and 2008. Source: designed on the basis of data from the World Bank (2010).

The data also shows the changing pattern of economic development growth since the 1990s.

> "The short-term economic cycles of developing countries have for decades been, and will continue to be, correlated with those in the G-7. [...]. However, long-term growth trends did separate (decouple), almost 20 years ago. In the mid-1990s, developing nations began to

[8] The Western Offshoots countries are the following: USA, Canada, Australia and New Zealand

> grow at their own, much faster pace. Part of this had to do with technological convergence ("catching up" is relatively easy). But mostly it was due to better policies" (Canuto & Giugale, 2010, p.3).

According to the World Bank (Canuto & Giugale, 2010), the developing economies will continue to grow faster than the developed ones in the coming years due to opportunities opened in the global framework setting which have unlocked the potential for economic development and for the improvement of productivity (labour and capital). For instance, the reduction in costs of information and of communication technology, the development of specialised local technologies and "the expansion of South-South trade (since 1990, at twice the speed of global trade) increase the availability of technologies that have been tested and adapted to developing-country settings" (Canuto & Giugale, 2010, p.4).

Although the process for the adoption and adaptation of better technologies to raise productivity is beginning to break even, there is still a huge opportunity for learning and for transferability for developing countries. Therefore, methodologies to support this process should be developed and public policies could be proposed to break down the inefficiencies accompanying the introduction of those technologies.

2.1.1.2 World income trends

Figures related to the growth of income have also had a positive trend in recent decades, according to the World Bank. The graph in Figure 4 shows that the GDP has grown faster than the population since 1990. Considering the growth as per world regions, the 16 countries located on the Asian continent have had the greatest improvement of relative income for the population.

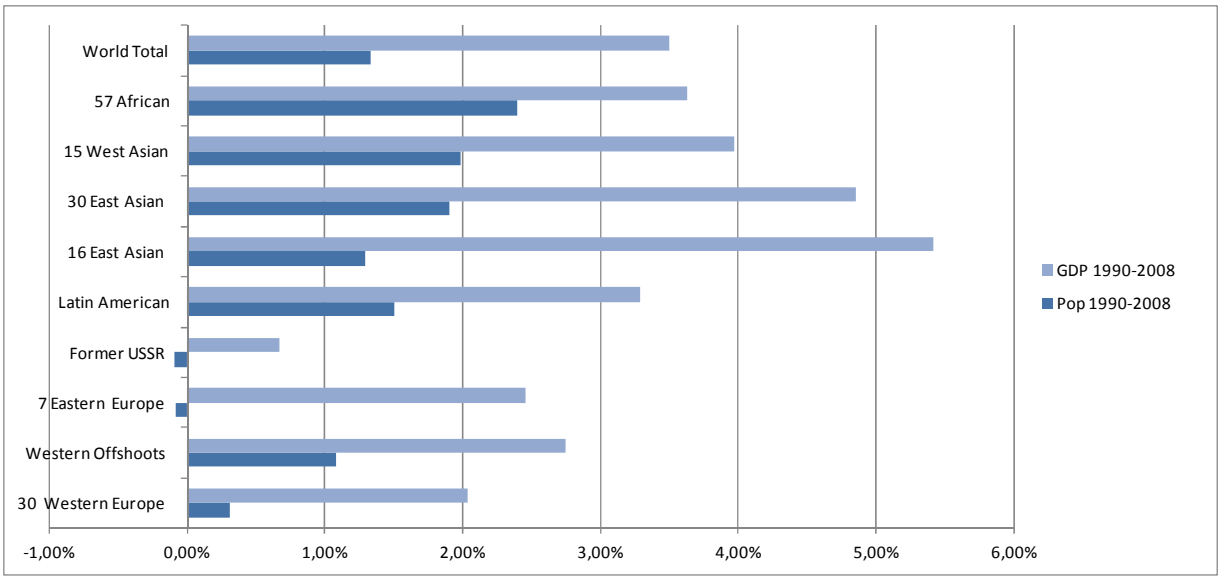


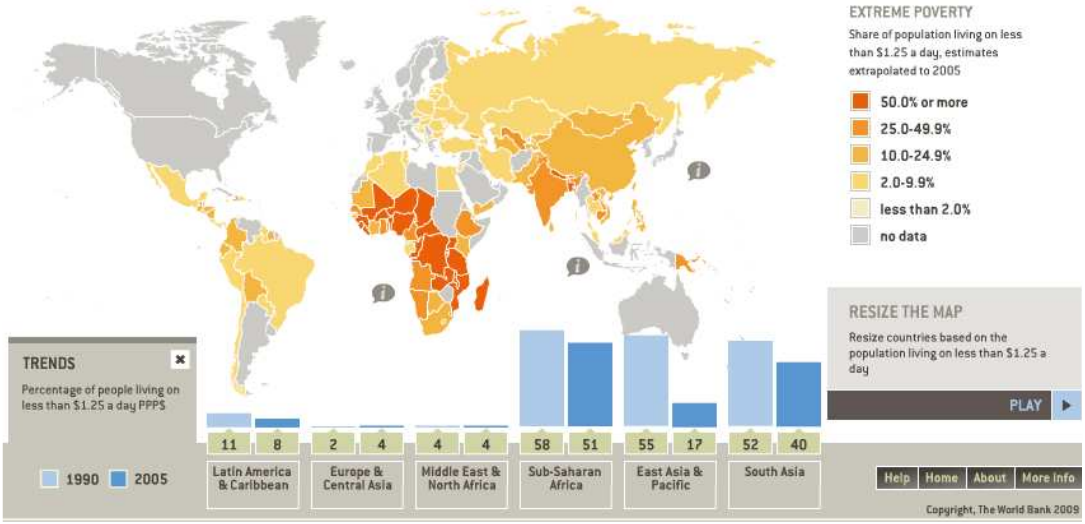
Figure 4: The population and the GDP growth as per world region from 1990 to 2008. Source: designed on the basis of data from the World Bank (2010).

The increase of income and the mitigation of poverty have impacts on the performance of socio-economic development. The improvement of income levels has raised people to the

consumption and education group. That strengthens the internal market of any country and has positive impacts on the production sector. Additionally, it has direct impact on transport infrastructure and services, as the population starts to have access to jobs and to city life.

Seeking the mitigation of major world development problems, the World Bank set the "Millennium Development Goals" where the reduction of poverty is a central issue. "Fundamentally, poverty is a denial of choices and opportunities. It means lack of basic capacity to participate effectively in society" (World Bank, 2011, p.na). Poverty reduces access to basic facilities, reduces the productivity of a society and excludes individuals, households and communities from consumption. Often it implies living in marginal or fragile environments (UN Statement, 1998). Based on those statements "a framework for development planning for countries around the world, and time-bound targets" were proposed under the principles of sustainable development, along with the "vision of a world partnership involving developed and developing countries to work for the betterment of all" (World Bank, 2011, p.na). Therefore, there is expected to be a flow of investments and a positive impact on development for the regions where the programmes are taking place.

Figure 5 illustrates the reduction of poverty in the world. The figures show that, measured at the US$1.25-a-day line, global poverty has decreased since the 1990s. The biggest number of poor people lives in Asia, but poverty rates are highest in Sub-Saharan Africa.



Note: The 'Millennium Development Goal' on poverty reduction: halve, between 1990 and 2015, the proportion of people whose income is less than US$1.25-a-day.

Figure 5: The poverty world map. Source: adapted from the World Bank (2010).

The reduction of poverty has reached different countries in different ways, based on their local public policies. For instance Brazil in Latin-America and China in Asia have sharply decreased their levels of poverty. Brazil has decreased the figures from about 30% in the 1990s to about 8% in 2010. These results have been reached based on a major policy in those countries to expand the middle class and to strengthen their internal markets, and at the same time to increase food processing and trading of commodities between the two countries reflecting on the growth of the GDP and on the internal reserves.

2.1.1.3 Investments as per world regions and in the Brazilian transport sector

The volume of world private and public investments has presented an important differentiation in the last three decades as per regions, volume, the nature of investments and the type and origin of the investors, all of which partly result from the economic globalization process and the new geopolitical organization of the regions across the globe. During this period the growth of the transnational corporations (TNCs) and the formation of fixed capital abroad has reached the highest level in history. Through merging and acquisition, the privatization of public companies, and investment in new business, powerful corporations developed. Their influence on the development of countries and cities has been remarkable, and this is recognised through the governments' decisions and policies. According to the UNCTAD (2010) the TNCs are responsible for about four per cent of global employment and an estimated amount of investment in 2010 totalling $1.346 billion (American Dollars) (UNCTAD, 2011).

The transnational companies (TNCs) have business in all the different sectors of the economy (primary, industry and services). It is important to note the growth of participation in the construction of public infrastructure and also in the operation of public services through privatization or the different mechanisms of public investments opened by the public sector to the private one (for instance the so-called public-private partnership, PPP, the concessions of public services, among others). Transport infrastructure and operation, and energy production are on the list of preferences for investment by the private companies.

Figure 6 shows the evolution of the world's foreign direct investments (FDI) made by the TNCs from 1980 till 2009. The volume of these investments is an important indicator of the expansion of the globalised economy and of the movement of capital from/to developing and developed countries. As pointed out by the United Nations 2010 Report "the global financial and economic recovery remains fragile, threatened by emerging risks, constraints in public investment and other factors. For the recovery to remain on track, private investment is crucial for stimulating growth and employment. Foreign direct investment (FDI) has a major role to play" (UNCTAD, 2010, p.iii).

It is interesting to note that foreign direct investments have continually increased in the developing countries since the 1990s. Those economies have become increasingly important to investors in the global economy. The share in world outflows has grown from about 10% in 2000 to about 28% in 2009 and the FDI inflows have raised from about 18% to 50% in the same period –"for the first time, developing economies accounted for more than half of global FDI inflows" (UNCTAD, 2010, p.3).

> "Outward FDI flows from developing and transition economies picked up strongly, reflecting the strength of their economies, the dynamism of their transnational corporations (TNCs) and their growing aspiration to compete in new markets. FDI outflows from developed countries grew more modestly, reflecting the subdued investment drive of European TNCs" (UNCTAD, 2011, p.2)

The crisis of the end of the 2000s has reflected what Canuto and Giugale (2010) called the "decoupling" of the long-term economic growth trends for the developing countries (Figure 6 below). The recovery of the crisis has been at different speeds for the developed and the developing countries. The second group was the first to overcome the effects of the financing and trade crisis and has shown a strong recovery since 2010.

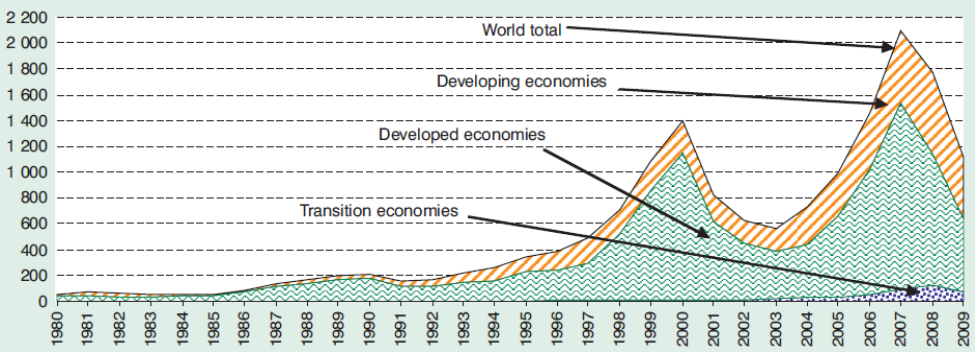


Figure 6: Foreign direct investment (FDI) inflows, globally and by groups of economies, 1980–2009 (billions of dollars). Source: (UNCTAD, 2011, p.2) based on annex table 1 and the FDI/TNC database (http://www.unctad.org/fdistatistics).

The positive trend for the economic growth of developing economies is based on the fact that the developed countries had deeper impacts on financing and on the income that affected the results of the TNCs at home, while "many TNCs in developing and transition economies are investing in other emerging markets, where recovery is strong and the economic outlook better" (UNCTAD, 2011, p.2). The figures for 2010 show that about "70 per cent of investment by developing and transition economies are directed towards other developing and transition economies compared with developed countries where the share of these economies is about 50 per cent" (UNCTAD, 2011, p.2) (see Figure 7).

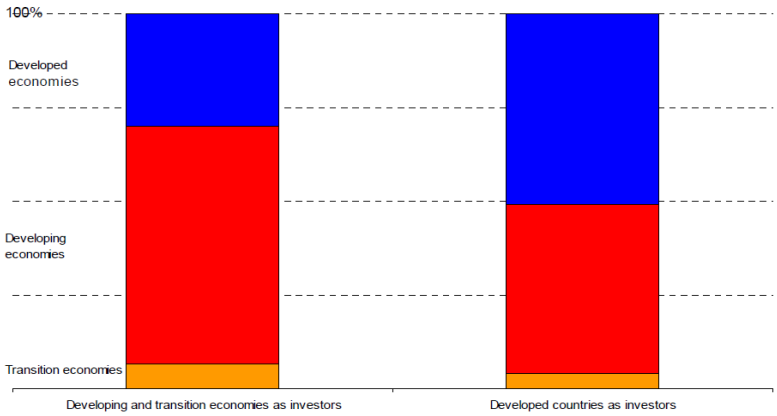


Figure 7: Distribution of foreign direct investment (FDI) projects concluded by developed and developing and transition-country Transnational Corporations (TNCs), by host region, 2010 (per cent). Source: UNCTAD cross-border M&A database and information from the Financial Times Ltd, fDiMarkets (www.fDimarkets.com), quoted by UNCTAD (2011, p.3).

Among the developing countries the 'BRIC' group (Brazil, Russia, India and China) had the best performance in economic development over the last three decades (UNCTAD, 2011, p.5). According to the UNCTAD world investments prospects survey report 2010-2012, the countries in the world that would attract the highest amount of direct investment, together with USA in the

fourth position, are the four major emerging markets: China, India, Brazil and the Russian Federation, “all ranked among the top five investment destinations” (Top priority host economies for FDI for the 2010-2012 period, UNCTAD, 2010, p.13). Furthermore, the BRIC nations have continually raised their position as worldwide investors. UN data points China as among the five biggest investors (FDI outflows) in the world (UNCTAD, 2010, p.6). Figure 8 shows the performance of the BRIC for the years between 1998 and 2009 for FDI outflows and the TNCs stock of capital.

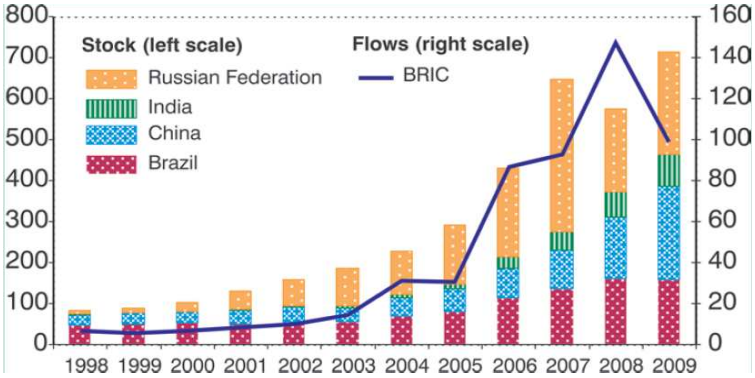


Figure 8: Outward FDI flows and stocks from BRIC (Billions of dollars). Source: UNCTAD (2011, p.7), based on the FDI/TNC database (www.unctad.org/fdistatistics).

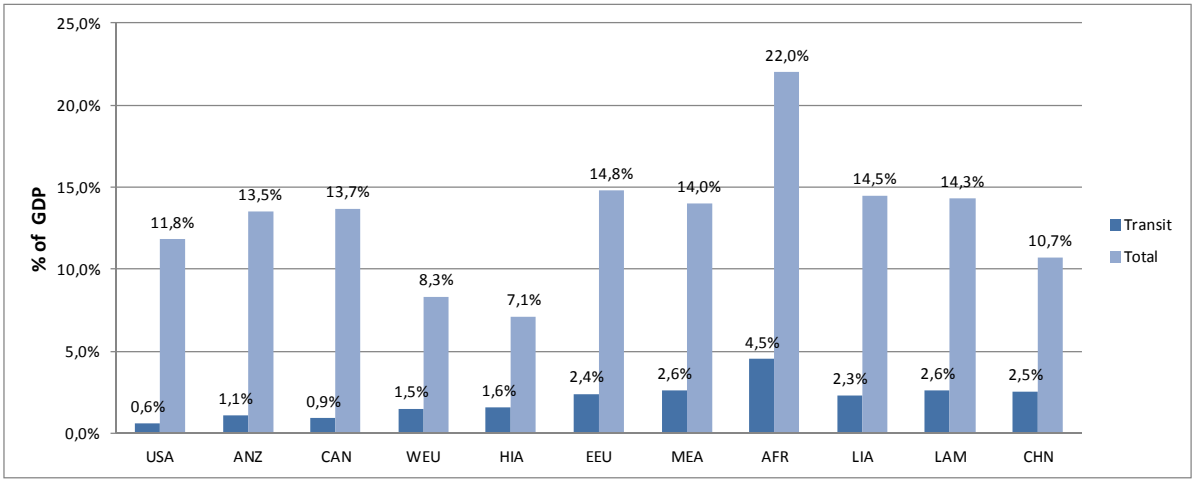
According to the World Bank’s data, Latin America had the best performance in investment in 2010 using its positive economic growth at home. While the developed countries suffered the effects of the financial-trade crisis harder, since 2008 Latin American TNCs have had the largest growth of outward FDI flows, taking opportunities in cross-border ‘Mergers and Acquisitions’ (M&As) purchases. The region’s TNCs “have increased their acquisitions abroad, particularly in developed countries where investment opportunities have arisen in the aftermath of the crisis” (UNCTAD, 2011, p.4; UNCTAD, 2010, p.7). For instance, Mexican TNCs have invested in the USA and Brazilian companies also in Africa.

In Brazil the results on outflow investments are also supported by the government (UNCTAD, 2010, p.7). For instance, the state development bank “Banco Nacional de Desenvolvimento Econômico e Social” (BNDES) supported projects overseas, where the Brazilian companies were contracted. The bank bears the confidence of investors, public and private companies and institutions from other countries. As cited by the German magazine Spiegel, overseas the “BNDES is highly regarded. It is believed to be largely corruption-free” [and it is one of the] “nerve centres of the country's economic policy” (Glüsing, 2009, p.na). The Bank was one of the columns to support Brazil’s economic stabilization process over the last three decades. In the 1990s the BNDES successfully handled the privatization of many government-owned companies and since 2008 the Bank has controlled the internal reserves to face the international crisis. For this purpose “the BNDES had set aside 100 billion Real in additional reserves [and in the same year] the bank issued more loans and loan guarantees than the World Bank and even turned a respectable profit. […]. Today it provides assistance in corporate mergers and acquisitions helps ailing companies and finances the government's strategic investments” (Glüsing, 2009, p.na) in the country and overseas. For instance, the bank financed

the infrastructure construction of the project 'Bus Rapid Transit' implemented in the city of Johannesburg, South Africa.

The public investments under the effects of the crisis were strongly discussed in the Western world, mainly focussing on the financial sector. However the public sector has played a fundamental role in the globalisation process with regards to monetary stabilization, strengthening of democracy to create an adequate environment for the growth of trading, and the guarantees and regulations as per infrastructure investments. Even though the developing world saw, in the 1990s, the privatization of most of the public companies, public investments still remain very important for those countries (for instance, China and Brazil). The growth of the internal investments in Brazil was strongly supported by the government programmes following different public policies whose objectives were to strengthen the local market, to build the public infrastructure of the country, to incentivise the growth of local and transnational companies and support the development of local technology.

It is important to note that public investments on infrastructure make up a considerable percentage of the total government wealth. Figure 9 gives the percentage of passenger transport infrastructure (PTI) in the total investment volume, and proportion of the GDP, in world cities. The graph points out that the developing countries invest the highest proportion of their GDP in PTI and highlights the biggest figures for public transport (PuT). The lowest investments on PuT are found among developed countries, with the exception of some European nations that have the highest figures among that group of countries. For instance, while African countries invest 22.0 per cent of the GDP on PTI, 4.5 per cent of which on PuT, the USA invests 11.5 per cent in total, 0.6 per cent of which on PuT.



Note: ANZ=Australia and New Zealand; CAN=Canada; WEU=Western Europe; HIA=high-income Asia; EEU=Eastern Europe; MEA=Middle East; AFR= Africa; LIA=low-income Asia; LAM=Latin America; CHN=China.

Figure 9: Proportion of city wealth spent on passenger transportation and the transit component in world cities as per 1995. Source: dsigned on the basis of Schiller, Bruun, Kenworthy (2010, p.12).

In spite of figures pointing out that the highest proportion of total investment in PTI comes from the developing countries, the volume of investment and their application has not been adequate to tackle the need for infrastructure to support their current socio-economic development (Canuto & Giugale, 2010; Vasconcellos, 2001). In Latin America even if the percentage of

investments in PTI stands at 14.3 per cent, the transport infrastructure in the area presents a high deficit with regards to the construction and maintenance of the existing infrastructure.

Because of economic growth the situation is critical in countries like Brazil that have a continental territory, fast urbanization process and a number of cities with more than a million inhabitants. For this reason the Brazilian federal government launched in the term 2007 – 2010 (President Lula, Workers Party) the "Programa de Aceleração do Crescimento", PAC (growth acceleration programme). The objective of the programme was to build a new infrastructure, to increase capacity and to repair the existing infrastructure. Across the country an amount of 444.0 billion R$[9] was invested to the end of 2010, out of the 660.0 billion R$ previously planned for the programme. The investments were applied to the construction and development of transport and logistics (about 70.0 billion R$ was spent on 6.4 thousand kilometres of roads, 1 thousand kilometres of railways, and also waterways, harbours, airports, aviation and public transport), energy production and distribution (about 148.0 billion R$), housing and urban infrastructure (about 230 billion R$) (Brasil, 2010). For the current government term (2011 – 2014) the investments continue with a surplus for urban infrastructure. The so-called PAC II has planned an investment of 18 billion R$ for the implementation of urban transport infrastructure with preference for the projects of BRT, LRT, Metro and traffic facilities, and more than 6 billion R$ for urban road construction with preference for roads served by public transport (trams and buses) and for the improvement of public spaces, seeking universal accessibility for all (Fortes, 2010).

Considering the investments for high capacity public transport there are differences as per the capital costs for infrastructure implementation regarding the developing and developed countries. The graph (a) on Figure 10 shows the range of costs, taking into account the level of GDP per capita. Moreover, graph (b) shows the correlation between the passenger transport capacity of each system and the implementation costs is an important feature for the decision makers, especially for those countries in the developing regions. Most of them have a high deficit on transport supply and a limited budget available. Furthermore, they need to deliver fast solutions for the population. For this reason, solutions found in developing countries, like the Bus Rapid Transit (BRT), have been largely applied across the world for the improvement of public transport.

[9] 1 Real (R$) was approx. 0.5 US$ in 2010

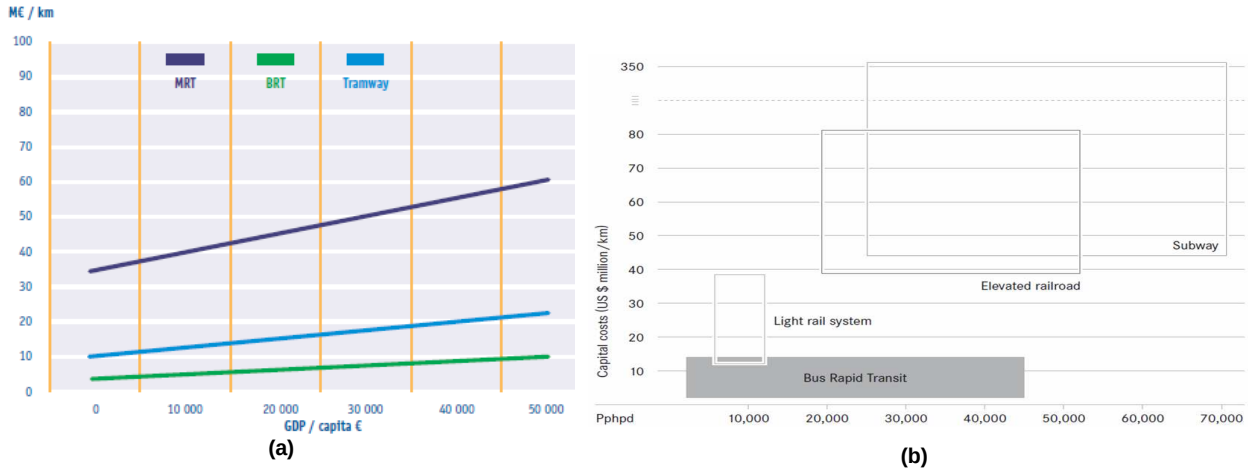


Figure 10: (a) Average investment costs based on transport modes and GDP per capita Source: MEEDDAT (2008), quoted by Agence Française de Développement (AFD, 2009, p. 13). (b) Capital Costs for high capacity public transport and the average capacity for each transport system in PPHPD (passenger per hour, per direction). Source: ITDP (2007).

Another important factor to consider for the investments on urban transport infrastructure is the time needed for their implementation, especially in the case of developing countries which are under pressure to deliver fast solutions mainly for public transport, taking into account the speed of their development and the lack of adequate services to support the economic growth and the socio-political change. Figure 11 illustrates a time estimation for planning and implementation of different high capacity public transport: BRT, light rail and metro (as an approximation, the income levels as per world regions were not considered).

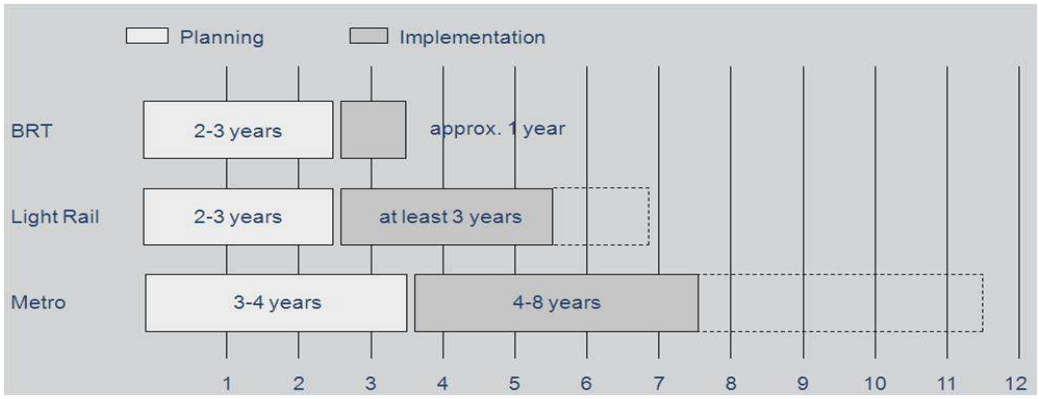


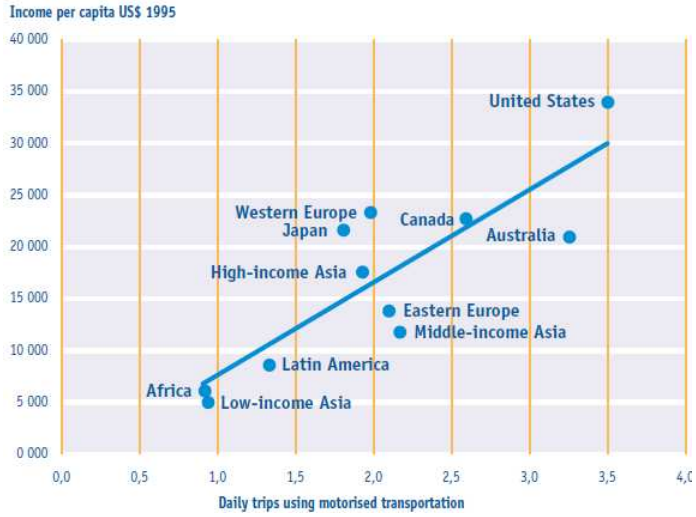
Figure 11: Planning and implementation time estimation for high capacity public transport (metro, light rail and BRT systems). Source: ITDP (2007).

2.1.1.4 Income and mobility

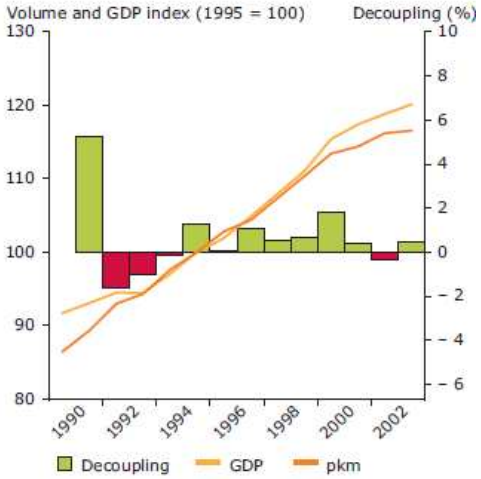
Different studies assert that mobility is a function of income. “Within any specific society, mobility increases with income” (Vasconcellos, 2001, p.167). The graphs in Figure 12 show that passenger volume and the number of daily trips by motorised means of transport increases as the GDP and the income grow.

Based on the figures of Graph (a) it is possible to pick up the differences in the mobility of the population as per world regions, considering the developed and the developing world. For

instance, while in the USA the population make on average 3.5 motorised trips per day, in Africa the figure is lower than one daily trip.



Graph (a) – selected world regions and countries



Legend: pkm (passenger volume per kilometre)

Graph (b) – European countries

Figure 12: Co-relation of income and mobility. Source: (a) Cox (2007), quoted by the Agence Française de Développement (AFD, 2009, p. 11). (b) Eurostat (2006, in: European Environment Agency, 2006, p.15).

Table 1 is a result of studies conducted in the São Paulo Metropolitan Region to investigate the level of mobility in correlation to income strata. The figures confirm the trends illustrated in the graph above (Figure 12) as per developing countries, taking into consideration the fact that São Paulo is actually one of the richest cities in Latin America. The figures show that the number of trips made per person per day increases along with income.

Table 1: Mobility and income, São Paulo Metropolitan Region, 1997.

Family monthly income (R$)	Number of trips per person per day
< 250.00	1.16
250.00 – 500.00	1.47
500.00 – 1,000.00	1.76
1,000.00 – 1,800.00	2.07
1,800.00 – 3,600.00	2.34
> 3,600.00	2.64
Average	1.87

Source: designed on the basis of RMSP data quoted by Vasconcellos (2001, p.167).

The graphs on Figure 13 illustrate the growth of world GDP (a) and the transport and communication costs indexes for the years between 1920-2000 (b). “Transport and communications costs have considerably declined during the 20th century, notably with technological improvements and through the application of economies of scale” (Rodrigue, Comtois, & Slack, 2009, p.na).

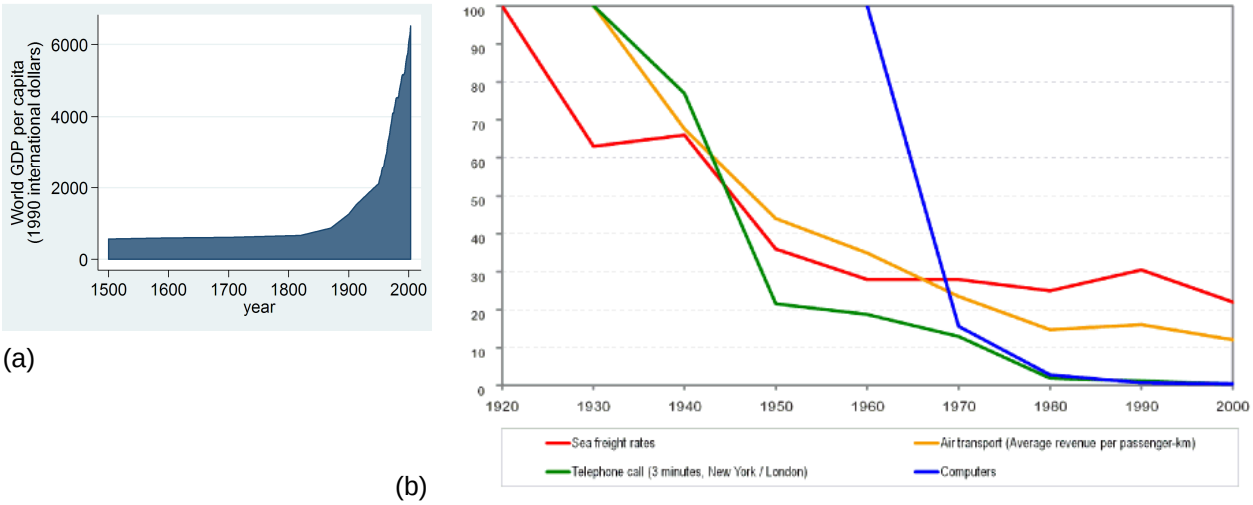


Figure 13: (a) World GDP growth from 1500 to 2000 and (b) transport and communication costs indexes from 1920 to 2000. Sources: World Bank (2010); Human Development Report (UNDP, 1999, p. 30, in: Rodrigue, Comtois, & Slack, 2009).

Based on the assumption that mobility increases positively with the dropping of transport costs and also with the increase in personal, national and world income, as illustrated in Figure 13, conclusions can be drawn that the transport investment figures may have a positive trend for the coming decades. Taking into consideration the stronger figures for economic growth in the developing countries, as has already been mentioned in this chapter and the lack or the poor infrastructures, those countries tend to attract more investments, which can improve mobility for the population and improve transport facilities.

2.1.2 Demographic factors

Passenger transport is closely related to population structure, in terms of things such as growth rates, age differences, incomes, migration, conditions of settlements in the territory and socioeconomic development. Since the UN declared that 50% of the world's population currently live in cities, and showed its estimations for a continuous growth of urbanisation in the future, debate has started among planners, sociologists, developers and experts in other diverse areas of knowledge, in the search for perspectives on the new human settlements and for views on development, in order to deliver public policies for the different public areas. Demography directly influences urban transport planning. It is necessary to understand the structure and the movement of the population, their way of living and their production and reproduction, in order to design concepts for urban mobility in each society.

2.1.2.1 Population growth

Data from the World Bank shows that world demography has changed over the last three decades related to patterns and structures, like the growth rate, where some mature economies have experienced shrinkage and developing regions have had positive growth trends. As illustrated in Figure 14 countries like those of the former USSR and Eastern Europe or Germany have had negative figures for growth in the year of 2009. At the other extreme are the 30 East Asian countries with the highest population growth, followed by West Asian and African

countries. Latin America and the Western Offshoots are positioned on a medium term between the extremes, since it is worthwhile to highlight that those countries have a descendent trend and the growth figures are below 1.0 (Figure 14).

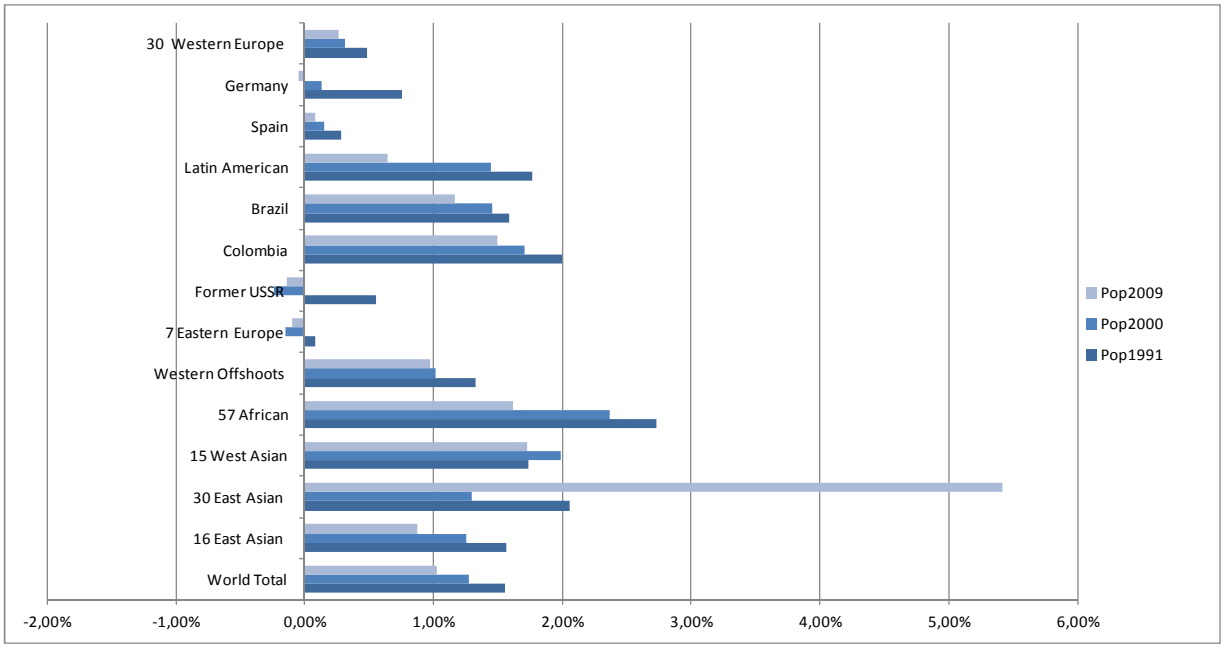


Figure 14: World population growth in percentage in different world regions and in Brazil, Colombia, Germany and Spain. Historic data as per 1991, 2000 and 2009. Source: designed on the basis of data from the World Bank (2010).

For the countries of Latin America the analysis of population features is very important, taking into consideration the current economic growth and the need for investments on urban and transport infrastructure. The question of how much infrastructure is needed today under those conditions and the amount of investments for the future based on the expected demand becomes highly relevant. The growth is still positive, but the fertility rate is declining. The question is how these countries will deal with migration, as one aspect of their increasing population, on their path of economic growth. Will the public policies be like those of the past century? Considering two countries in Europe (Germany and Spain) and two in Latin-America (Brazil and Colombia) and comparing the growth of the population figures over the last century and the projection for 2030 (Figure 15), it is possible to come to a significant understanding of the difficulties the Latin American countries faced with regards to public policies and planning in the past century.

In a century, while Germany grew in average 0.3% per year, Spain about 1.0% per year, Brazil and Colombia grew approximately 8.0% per year in average. This growth was a result of their fertility rates and also due to the migratory stream during the past century. Therefore, for Latin-American countries providing housing, health care, education and transport infrastructure in a context of constant population growth, multicultural environment and low budget has been a challenge. The results are seen in the lack of adequate public services and the poor infrastructure.

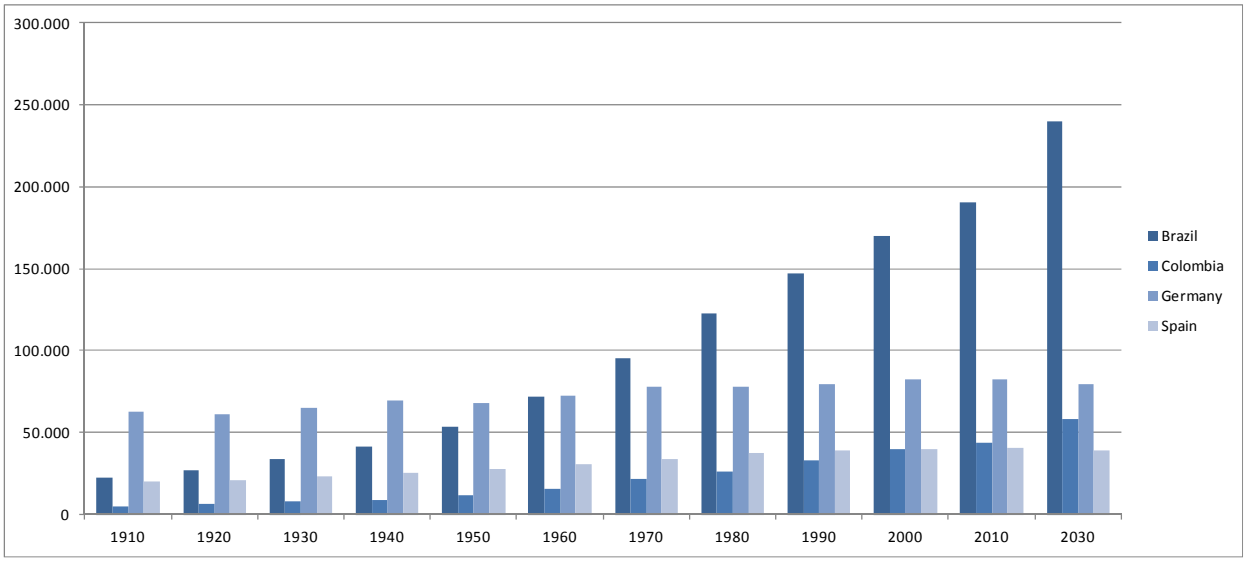


Figure 15: A century of population growth in Brazil, Colombia, Germany and Spain: historic data as per the decades from 1910 till 2010 and the estimation to 2030. Source: designed on the basis of data from the World Bank (2010).

On the other hand Germany and Spain could manage population growth with public policies, but also they benefited from stabilising populations caused by emigration to other countries, the economic crises and, in the case of Germany the two world wars, and in the case of Spain, the Civil War and the rule of General Franco. Also their populations were kept stable by immigration into Germany and Spain, when the imbalance needed to be addressed, for instance for the reconstruction of Germany after the Second World War. The graph in Figure 15 shows that the population growth in Germany across the century always had a variation below 0.5% per year. These figures reflected positively on public policies and planning, on the implementation of measures and on the operation of transport infrastructures in the past century.

2.1.2.2 Household structure and population aging

Along with the population growth trends, the number of people and the structure of the household have also changed substantially in the last thirty years. Today the number of single households is increasing and the number of family households is declining (Canuto & Giugale, 2010). Additionaly, the new constructions offer smaller flats and houses in response to this demand. As disccussed by Piorr, Ravetz, & Tosics (2011, p.56):

> "Self-determined lifestyles result in increasing household numbers, accompanied by a growth of smaller households with a corresponding decline in larger ones. To change these trends would require various interventions. The housing market can be one instrument. For example, by building larger flats, couples may be compelled to live together instead of in separate households. Sufficient social infrastructure is another way of improving the quality of life for all population groups in all quarters of a city."

Social transition in terms of birth rates, aging and household structure also contribute to change of land use. The change in family structure has implications on urban development and, consequently, on the planning of urban transport infrastructure and facilities.

Figure 16 illustrates a comparison of the figures for age groups in Brazil, Colombia, Germany and Spain as per the years 1990, 2000 and 2010. Generalising the figures, the four countries had a decreasing growth rate for the age group 0 to 14 years old and an increasing one for the 65 and over group. For the age group of 15 to 65 Germany presents decreasing figures for the last two decades and Spain maintained constant figures, while Brazil and Colombia had a sharp growth for that age group.

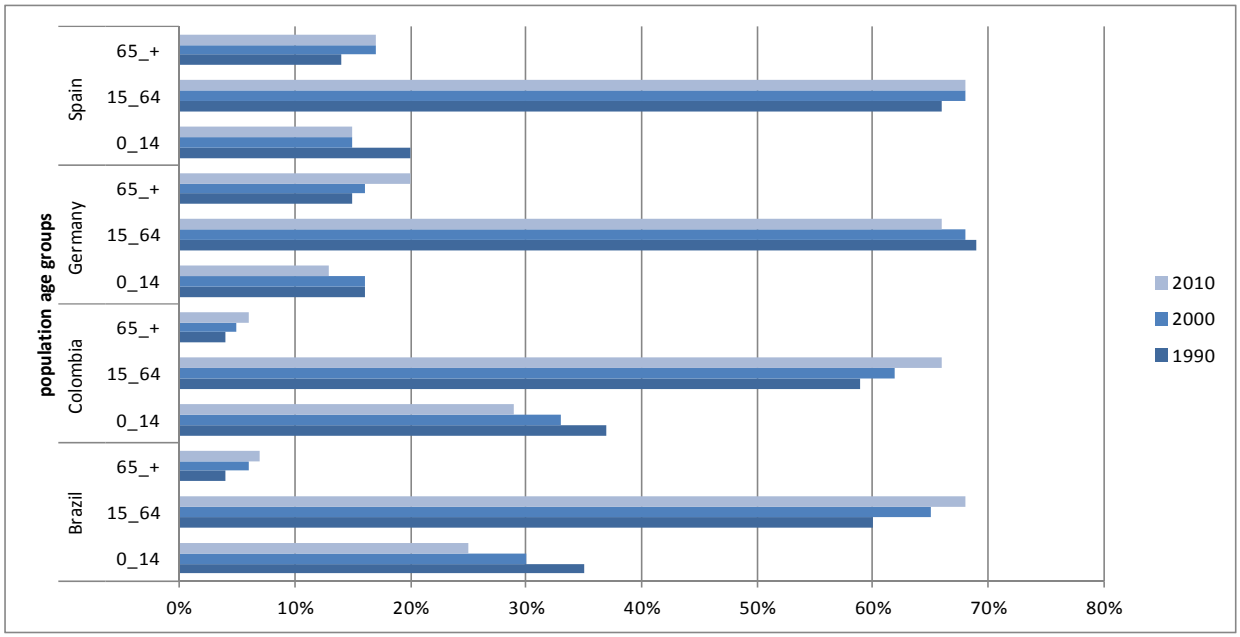


Figure 16: Population per age groups in Brazil, Colombia, Germany and Spain a comparison of the percentages as per 1990, 2000, 2010. Source: designed on the basis of data from the World Bank (2013).

The growth of the 15 to 64 age group as a percentage of the population, the sharp decrease of the fertility rate and the relatively low percentage of the elderly group over 65 in the Latin American countries, have had implications on labour, internal markets and in business. The most optimistic specialists have called this 'the times of the population's bonus', because the number of people at the age of employment and highest consumption are high, while the dependent groups (children and elderly people) are relatively low. On the other hand this condition leads to more activities and consequently to the increasing need for mobility (Gonçalves, Rothfuß & Morato, 2012). In Brazil the number of people at school and in universities has raised sharply in the last decade, resulting in the rising of income, public investments and the demand for qualified people to work (BRASIL; INEP, 2010; BRASIL; MinF, 2012). These features generate the need for mobility and therefore, as people need to reach schools and workplaces, bring problems of transport requirements for the governments of those countries where infrastructure and transport services are very poor.

For Germany it is worth highlighting the co-relation of the figures for the three age groups. While the percentage for the group 65 and over reached 20% of the population in 2010, the percentage for the 15 to 64 years old group has had sharply decreasing trends over the last three decades and the figure for the 0 to 14 years old group shows one of the lowest figures in the world. In a country like Germany with a high level of transport infrastructure and services

available, those trends can be a problem for the future. The operation and maintenance costs of the existing infrastructure and services can raise the fare costs for the population and the need for more subsidies from the government to make the transport services work (Siedentop & Fina, 2008). Additionally, the high percentage of elderly people requires, in the short term, the improvement of infrastructure to serve the needs of this group. Häußermann & Siebel (2004) argue that the trends lead to an irreversible transformation of German society, where the population changes its structure not only related to age patterns but also because it is becoming more multicultural than ever. The change of age structure and costs, together with transformations of family behaviour due to culture, and of culture itself, will imply different needs for mobility in the future.

2.1.2.3 Urbanisation trends

Data from the United Nations points out that in 2007 about 50% of the world population was living in urban areas. The challenge that the scientists of various areas, the urban and transport planners, the politicians and the policymakers have on their table is “Die Welt wird Stadt” (Ribbeck, 2005), that is to say, “the world is becoming a city”. “The move towards urbanisation is progressing and more than half of the world population is today living in cities. By the 2030s, five of the world’s eight billion people will live in urban areas” (European Commission, 2010, p.5). For this reason, many researchers are focussing their attentions on analyses of this issue today, considering that “managing urban population change will be one of the most important challenges during the next decades, along with moderating the impacts of climate change” (Piorr, Ravetz, & Tosics, 2011, p.20).

The graph (a) in Figure 17 show that by 2025 in all world regions more than 50% of the world population will be living in urban areas. The figures for developed and developing countries in the graph (b) show that the urbanisation process after 1975 has seen the highest growth in the developing countries. This fact has had important and negative consequences for the expansion of urban areas. The demand for space has grown faster than local governments can provide adequate infrastructure for (due to the low budget available and the weakness or lack of planning).

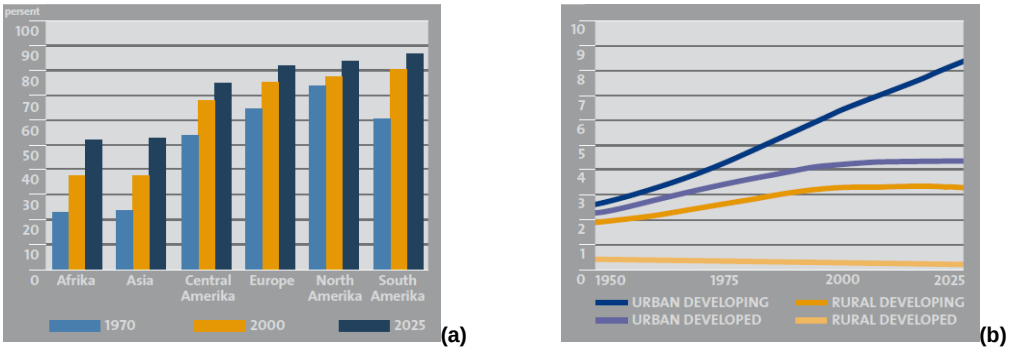


Figure 17: (a) Urban population as per world regions for the years 1970 and 2000, and the estimation for 2025, in percent; (b) population growth rate from 1950 to 2000 and its projection till 2025, by world region, in percent. Source: Figures from the World Resources Institute (2001), quoted by the European Union Project PLUREL (Piorr, Ravetz, & Tosics, 2011, p.20).

In the last century the continuous movement of people in the migratory process in all regions of the world, as well as the flow of the rural population towards the urbanised areas, was remarkable and intense. With this process the urbanisation rate has grown continuously and, as written by Edward Glaeser, this era is marked by the "triumph of the city" (Glaeser, 2011).

> "How can this continuous urbanisation trend be reconciled with the "Rio+ 20" Earth Summit hopes and the [...] commitment towards a smart, sustainable and inclusive growth by 2020? A greater understanding of the dynamics of urban societies will allow instability and risks within cities in humanitarian, economic and security terms to be better managed" (European Commission, 2010, p.38).

The migratory process influences the population growth of both countries and cities. Consequently the socio-spatial, economic and cultural aspects are all affected. The regions that attract immigrants receive impacts on the organization of their territory and on the availability of land, infrastructure and public services. On the other hand the loss of population can imply increasing operational costs for the regions where infrastructure is available (Siedentop & Fina, 2008).

Movement of population on a regional or continental basis can affect the population density of both urban and rural areas. The immigration to nations with high density can also affect urban expansion due to the difficulties of finding affordable housing in the city centres. The change in land use in rural areas can contribute to environmental pressures and social fragmentation. Additionally, immigration stimulates social transition in terms of birth rates, aging and household structure (Piorr, Ravetz, & Tosics, 2011).

Migration was encouraged over the twentieth century in various parts of the world due to war, economic crises and changes of political regimes. Latin America, especially Brazil and Argentina, have received millions of European immigrants during and after the first and second World Wars. The growth rates of Latin-American cities were strengthened together with their industrialisation. Latin-American countries like Brazil started their industrialisation on a late industrialisation age or the so-called late capitalism[10] at the late end of the nineteenth century and the beginning of the twentieth (Mello, 1998). Before that their production was based on rural areas and on slave labour. Therefore, the immigrants coming from European countries, areas already industrialised and urbanised, would have the basic knowledge and the preparation to work in the nascent industries. At that time the doors were open to immigrants.[11] The

[10] The industrialisation of Brazil started at the late end of the 19th century and laid the foundations for growth after the First World War. Therefore, it was called by theorists like João Manuel C. de Mello *"Capitalismo tardio"*, because it happened later than in the cases of Europe and the USA, on different conditions (labour, technology, type of production and market) and on a different path of world development (Mello, 1998).

[11] The late industrialization and the lack of education for the population had historical foundation on the politic of Portugal to the colony: any industry initiative was forbidden until the nineteenth century. Education was controlled by the State. In Brazil was allowed only to teach basic education to a selected group. To who were allowed going to University had to go to Coimbra University in Portugal. Already in

industrialisation and the arrival of the immigrants transformed the rural and urban areas, and accelerated the growth of the cities.

On the other hand during the crises of the 1980s and 1990s the migration happened in the inverse direction, from Latin-America to Europe. Changes of political regimes in Latin America, as well as in the Eastern Bloc and parts of Africa, together with the economic crises, has attracted a considerable number of people to the more wealthy and democratic nations. According to United Nations data, today developed countries plus Argentina continue to attract immigrants. In Brazil and Venezuela immigration is equal to emigration. The rest of the developing countries in Asia, Africa and Latin-America are emigrant countries (United Nations, 2011). Nevertheless, in spite of the immigration the European countries continue with low population growth.

Figure 18 shows the population densities of Brazil, Colombia, Germany and Spain in 2010. Germany has the highest population density among the four countries. Comparing those figures with those of Figure 15, we see that Germany and Spain, with the highest population densities, had the lowest population growth rates in the last century, but on the other hand the European cities have expanded on average by 78% in the last 60 years (Piorr, Ravetz, & Tosics, 2011). Therefore, the densities of the cities will decline if the current pattern of urban development persists.

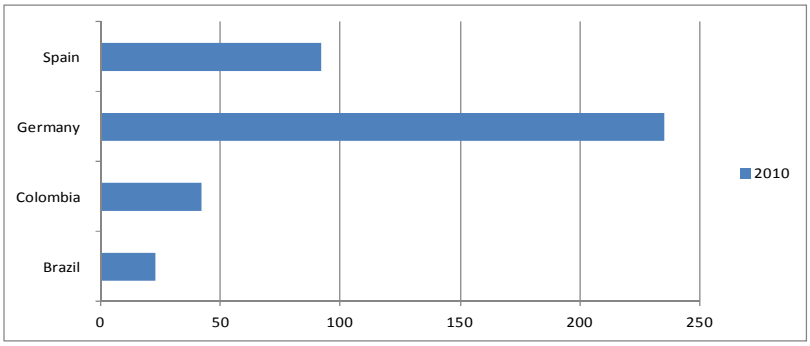


Figure 18: Population density (people per sq. km of land area) in Brazil, Colombia, Germany and Spain. Source: designed on the basis of data from the World Bank (2013).

the nineteenths started the faculties of engineering in Rio de Janeiro and medicine in Salvador, but the first University in Brazil was built-up in 1920; therefore, the immigrants were the fast solution for the lack of workforce because there were few people with at least basic qualification already in the twentieth century. However, the lack of investment in education of the local population has had consequences that remain until today. Data from IBGE shows the differences in education and social integration between the black and the white populations (IBGE, 2011). The lack of integration and the economic segregation is reminiscent of the days of slavery. An example is that one of the reasons for the building of the slums in Rio de Janeiro was that, when slavery was abolished and the former slaves were freed from their owners, they did not have any property, housing was not provided for them and they were not incorporated into the workplaces of the nascent industries or services, because they did not have any education or qualifications. Therefore, they occupied places on the hills and other free ground without any infrastructure. The growth of slums was reinforced with the fast urbanization in the second half of the twentieth century, what expanded the socioeconomic gaps between rich and poor in Brazil.

The graph in Figure 20 below shows the percentage of the population living in urban areas in Brazil and Colombia in Latin-America, and Germany and Spain in Europe. Brazil had the fastest urbanisation for the four decades: approximately 20.0%. This means about 5.0% per decade, while Germany remained unchanged or with slight growth like in Spain. Colombia also had positive growth but a smaller amount than Brazil: about 3.3% per decade.

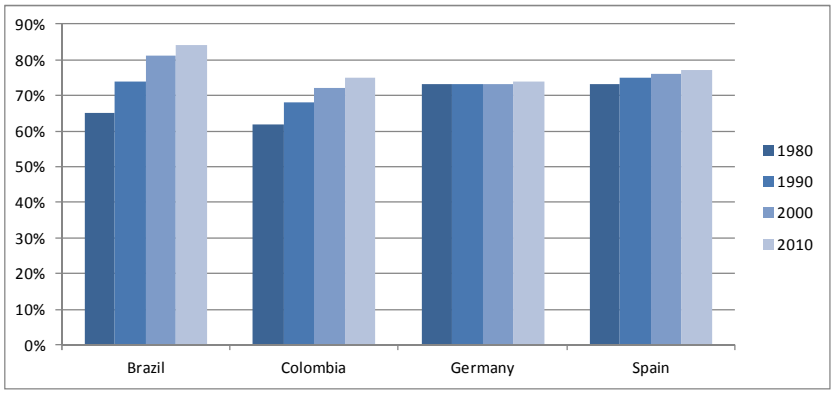


Figure 19: Urban population in Brazil, Colombia, Germany and Spain a comparison of the percentages as per 1980, 1990, 2000, 2010. Source: designed on the basis of data from the World Bank (2013).

Comparing Figure 18 with Figure 19 shows that the nations with the highest population densities experienced the lowest movements of people from rural to urban areas. For instance Brazil has the lowest population density among the four countries and the fastest urbanisation. A first analysis can indicate that where there is more availability of land, people move faster in that territory, also it can be related to the agricultural production model that was introduced. On the other hand, these figures could possibly indicate weaknesses or a lack of planning. However, to understand the urbanisation process it is necessary to include other features and this is not the purpose of this study.

European Union projects analysed the urbanisation trends and the driving forces of urban expansion.

> "Since the mid-1950s, European cities have expanded on average by 78%, whereas the population has grown by just 33%. This is not a surprise in densely populated regions like the Randstad in the Netherlands, but even in regions where the population is decreasing, notably in Spain, Portugal, Italy and eastern Germany, urban areas are still growing. Leipzig-Halle is an example of a region which suffers from both the problems of a shrinking city and urban sprawl. The same trend – that urban areas expand faster than the population – can be seen in the United States and China" (Piorr, Ravetz, & Tosics, 2011, p.21).

The planners working on the PLUREL Project argued that "urban areas are expanding due to a combination of population growth and outward spread of urban activities. The result is that urban and rural areas are no longer separate territories" (Piorr, Ravetz, & Tosics, 2011, p.20). The transition area between the rural area and the consolidated built-up areas of the city is the so-called 'peri-urban' area. This area emerges as the most dynamic site of the city territory and where the strongest transformations in the territory take place today.

> "The peri-urban may be the dominant urban design and planning challenge of the 21st century. It is not only an in-between fringe, but a new and rapidly growing multifunctional territory, often with globalised industries, high mobility and transport dependence, fragmented communities and degraded landscapes" (Piorr, Ravetz, & Tosics, 2011, p.30).

Globalisation and the movement of people resulting in the movement of capital production and in new and various production patterns, bring about substantial impacts on the organisation of the city territory. European Union researchers analysed this situation and searched for an understanding of the dynamics of growth and change, in order to propose a range of alternative scenarios for future planning and development (see Figure 20).

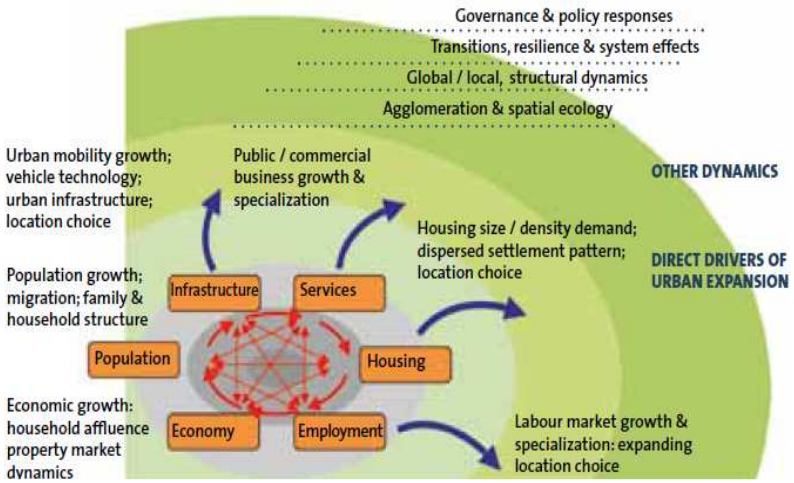


Figure 20: Driving forces and dynamics of urban expansion: European analysis. Source: European Union Project PLUREL (Piorr, Ravetz, & Tosics, 2011, p. 32).

The direct driving forces for urban expansion pointed out by the PLUREL Project were:

- Population and demographic change: these depend on the long-term fertility rate, on household structure, on the volatility of international and interregional migration, migration from rural to urban areas, the perception of the quality of life in these areas, and public spatial policies.
- Economy: employment pressures can move people from rural to urban areas and from the outskirts to the centre of a city or vice-versa. This is based on availability of mobility, on business technology, on the production and management of supply chains, on public/commercial and business growth and specialization, on the real estate market and on the possibility of low prices for expansion areas.
- Infrastructure and housing: an increasing personal mobility and need for mobility, and improvements of transport technology, linked with the infrastructure available in the cities, give the citizens more choice of where to live and the freedom to search for housing on the fringes of cities where the prices are normally lower and where there are desirable green areas. All of this leads to the construction of dispersed settlements.

The change in the peri-urban area can imply spatial and social segregation of communities in the city outskirts. Therefore, the EU project PLUREL proposes a set of cross-cutting policy agendas based on the main driving forces of urban expansion and the change of peri-urban

areas, to control the environmental impact and social segregation caused by the urban sprawl, without stopping the goals for development. Among others are the following:

- "Globalisation and innovation as the forces for economic development: The direct effect of this is peri-urban expansion for business parks, housing, roads and other urban infrastructure;
- Demographic change: The shrinking of some regions, the aging of others, and the migration of people all bring challenges to the stability and cohesion of peri-urban areas;
- Climate change and energy: This will bring physical impacts and the need for adaptation in the peri-urban. Decarbonising energy sources will also require land for renewable energy, and may change peri-urban transport and settlement patterns" (Piorr, Ravetz, & Tosics, 2011, p.106).

The issues of urbanisation addressed for European cases have several similarities to the Latin-American (LA) cases cited by other studies. Even though there are differences of patterns and extent, the implications of urban expansion found for the European cases can also affect development in the Latin American cases. The effects of globalisation on urban expansion are visible in several cities across LA countries – for instance Mexico City Santa Fé District, or São Paulo, just to mention well known international cases (Ribbeck, 2005) where TNC´s constructed their bases on expanded settlements, attracting services and requiring infrastructure and mobility. Therefore, managing growth towards sustainability requires approaches for planning, focusing on the concentration of needs and services in a way to avoid new forms of poverty and exclusion from the expanded urban settlements.

2.1.3 Economy, demography and space: the dichotomy of economic development and spatial/mobility implications

> "Whenever and wherever societies have flourished and prospered rather than stagnated, creative and workable cities have been at the core of the phenomenon. […] Decaying cities, declining economies, and mounting social troubles travel together. The combination is not coincidental."
> (Jacobs, 2011)

Following the ideas of Jacobs (2011) and Glaeser (2011), urbanisation can create innovative environments, resulting in positive impacts on the population. But in order to be innovative, these urban systems need to be prepared. Economic development involves direct implications for spatial development, and consequently for mobility. The accelerated economic growth that accompanies globalisation is driving the movement of goods and passengers and changing patterns of logistics and transport around the world. Due to this pattern of development, cities are the core and the most dynamic space. They are where great transformations occur across the territory, due to the occupation of settlements and the construction of business plants, and their required infrastructure. The efficiency of this system requires the construction of infrastructure that has an impact on land consumption. The local communities have developed their socioeconomic conditions, generating jobs and improvements in their lifestyle. But on the other hand, the ongoing development also brings negative impacts on local communities when

they are unable to form decent plans to drive development in the direction of the interests of their own rights. In this way it is imperative to understand the correlation between the variables of designing mobility concepts that serve socioeconomic development and those that preserve sustainability for the local communities.

2.1.3.1 The city as an innovative environment

Rothwell (1991) defines innovation as "a complex iterative process involving multiple links between new science and technology, potential producers and consumers."

Schumpeter (1939) explains in his theory the cyclical nature of Capitalism's evolution and the role of innovation in the process of change and economic development. The theory was developed on two fundamental bases: first it "stressed the role of the entrepreneur and the small innovative enterprise", second it attempted to show the "role of the big, monopolistic firm and the bureaucratised process of technical change" (Simmie, 2001, p.15). Schumpeter's ideas and legacy can be summarised in four main statements as written by Simmie (2001, p.18):

> "First, innovation is the main source of dynamism in capitalist economic development. Second, the importance of the historical perspective in understanding long-term economic change. Third, that it is essential to distinguish conceptually between invention, innovation and diffusion of innovations. Fourth, the importance of the links between organisational, managerial, social and technical innovations."

Today cities are the core of human activities, concentrating more than 50% of the world's population. It is not a coincidence that at the end of the 20th century innovation and changes in technology and society were remarkable. Edward Glaeser (2011) in the book 'Triumph of the City´ claims that the city is the perfect environment to develop innovative ideas and to promote fast technological growth. But what kind of city would fulfil these parameters?

For Himanen and Castells (2004, p. 61) innovation develops under certain conditions:

> "Innovation operates in three dimensions: thecnology, process, and product. By process, we mean organizational networking, both intra-firm and in the relationships with other firms, providers, and clients. Thecnology refers to microelectronics-based information and communication technologies. Product innovation refers to the specific production line of each firm. We content that, for innovation to enhance productivity and competitiviness, the three dimentions of innovation must proceed together, and interact in a positive feedback loop."

Therefore, the environment conditions of the city or region will strong influence upon innovation. That's because it must be able to provide support for the many interactions, relationships, contacts networking required to process an innovative environment.

Jane Jacobs (2011, p.315) suggests that cities need a diversity of people, cultures, land use and companies, all intricately working in mutual support to develop the city. Then "city life can work decently and constructively, and so the people of cities can sustain (and further develop) their society and civilization." For the author public, quasi-public, different types of people and

private organisations “with vastly differing ideas and purposes” make up diversity in cities. This moving environment can be the place where the small entrepreneurs could create innovation as told by Schumpeter (1939).

Therefore, for Jacobs (2011, p. 315):

> “The main responsibility of city planning and design should be to develop – insofar as public policy and action can do so – cities that are congenial places for this great ranges of unofficial plans, ideas and opportunities to flourish, along with the flourishing of the public enterprises.”

Jacobs (2011) argues that city districts where there are good mixtures of primary uses will have a high concentration of people, and the streets will be frequented by people of different ages. In these environments there will be creativity and innovations. Diversity and liveable cities that are explorable on foot bring about development and innovation. For Simmie (2001, p. 43) innovation has the tendency to be “path dependent”.

On the other hand, today globalisation contrasts with the local level and at the same time it is associated with producing innovative environments in cities. More people from different regions and nations are coming together through new and different means of communication, such as the Internet and transport technology. The direct investment of global companies has a local impact on both labour and market. The multiplier effect of investment by global companies promotes dynamism in local economic sectors. The today TNCs invest in Research & Development (R&D) and generate innovations and change in local production and development what agree with Schumpeter (1942) idea about the role of big monopolistic firms.

Nevertheless, as pointed out by European researchers, globalisation has a downside for local communities. The change of local communities without sufficient plans for the future can damage their current structure and lacks vision of sustainable development based on the combination of the new production patterns and the potentialities of the city and the region.

> “The benefits of globalisation are the goals of economic policy, businesses and consumers. There is also a downside however, which is becoming increasingly topical in the economic situation post-2010. The downsides include restructuring and obsolescence, redundancy of labour and skills, and the impacts on vulnerable industries and economies at the local and regional level” (Piorr, Ravetz, & Tosics, 2011, p.106).

Changing production patterns also imply changes of the city landscape and of land use. The TNCs’ plants need local public investment to provide infrastructure for the new urbanised areas. Therefore, each city needs to evaluate their own potentialities to drive city development on Jane Jacobs’ model of neighbourhoods, or to intensify the development of attracting big investments, or to look for a model that can meet the balance of sustainable development based on planning perspectives of what that specific city will (or want to) be like in the future,to be able to create an innovative environment, to enhance productivity and at the same time to promote sustainable individual and collective developement.

2.1.3.2 The global, the national, the regional and the local in the city territory

The city territory (both rural and urbanised areas) is where people live and develop their social and economic relationships. Thinking in this way, the other dimensions and levels of governance of the territory, such as state, national or supranational spheres, remain on a non-tangible perspective for most of the citizens in their daily life. Additionally, consumption, business and social development were most linked to the internal or regional structure and market before the 90s. But that lifestyle has been changed since the globalisation of the economy at the end of the last century. At this time the global had come to meet the local on their own territory in many ways, as through sold products, global companies where local people work, or through technology and communication.

Today the world is urban. The centre of human production happens in the urbanised territory, making cities the core of the current development pattern. Moreover, the world is online. The age of information and communication has made people reachable around the globe in real time. Our way of life needs more speed to react to all communicants either by electronic signals or by travelling. These impacts on mobility are very strong and visible on the daily lives of cities: there are costs, congestion, time losses and a lack of clear vision of how to improve mobility for the population. The extreme need for mobility produced the contrary effect.

Globalisation expanded the city far beyond its own boundaries on interregional, national or supranational relations (Rothfuß, 2006). Today cities are connected and depend on each other, exchanging their wealth and problems with their neighbours. Therefore, the negation of city boundaries by populations who come to work, study or do other daily activities, demands services and infrastructure. The expansion of cities into regional landscapes is now imposing a new perspective for planning and for the management of services and urban infrastructure to meet the needs of the population beyond the legal established territory government levels and boundaries.

Aspects related to employment and to people's access to jobs are major issues regarding the current urbanisation trends. The co-relation between economic development and patterns of types of settlement has impacts on the time needed for travelling, on costs and on the comfort of the population. Research developed in European cities shows the co-relations between settlement patterns and the probable numbers commuting to the city centre according to the typology of the city's shape, and the distance that may be covered (see Figure 21).

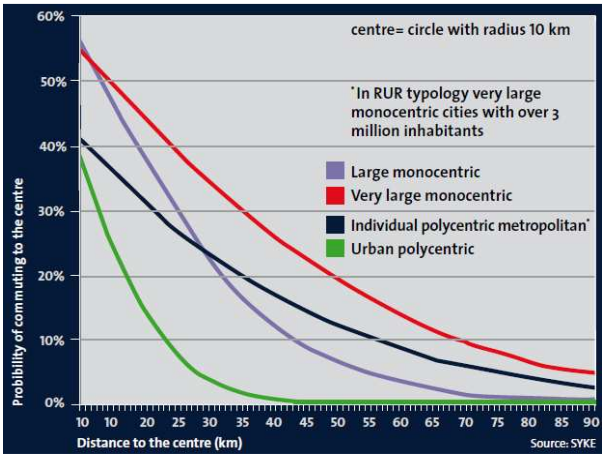


Figure 21: Typical commuting curves for different types of settlement patterns in rural-urban regions: European analysis. Source: Skyke, quoted by (Piorr, Ravetz, & Tosics, 2011, p.62).

What we can see from Figure 21 is that the polycentric urbanised areas produce less attraction to the city centre, even though the distances covered are shorter. At the other extreme are the very large monocentric cities. In these settlements the pattern is that the distances covered are high but people continue travelling to the centre of the city. The travel behaviour in these cases result from the concentration of services and commercial and working places in the core of the city, and therefore result also from land use planning and urban form. The concentration of demands of travel to the centre, linked with the increase of distances covered, will require a transport infrastructure capable of meeting the demand. Unfortunately this pattern leads detrimentally to congestions, environmental pollution, traffic accidents and further externalities coming from the inefficiency of the mobility concept. However, it is very worthwhile highlighting that mobility in itself cannot provide a solution based only on its own instruments and concepts. The solutions that need to be developed are beyond mobility itself. It is necessary to look at governance, development patterns, economy, demography and space.

2.1.3.3 Urban environment, energy concerns and traffic safety

Transport is associated with a large range of impacts on the built and the unbuilt environment. Those are “energy and mineral resources, land resources, water resources, air quality, solid waste, biodiversity, noise and vibration, built environment impacts and health effects” (Banister, 2000, p.71). Additionally, transport is also associated with economic and social impacts, for example those resulting from traffic accidents (Vasconcellos, 2001). So, on searching for better understand the issue, working on mitigation of impacts and developing liveable cities, based on sustainable mobility, it is necessary to observe that “sustainability is not about threat analysis; sustainability is about systems analysis. Specifically, it is about how environmental, economic, and social systems interact to their mutual advantage or disadvantage at various space-based scales of operation” (TRB, in: Toutanji, Anderson, & Leonard, 2013, p.iv).

Climate change and the expected exhaustion of fossil fuels as energy bases in the coming years are concerns that require a new platform for energy production and consumption, and consequently, new transport technology must be developed. Furthermore, it is presumed that a

new energy matrix and technological basis also require governance adjustments and the revision of urban and transport planning for cities. Seeking solutions, various institutions and governments in the world are conducting studies and providing global scenarios (Intergovernmental Panel on Climate Change (IPCC, 2012), PLUREL Project (2011); Local Governments for Sustainability (ICLEI, 2012); European Cities and Regions Networking for Innovative Transport Solutions (POLIS, 2012)).

The changing of transport technologies can influence the urban form, the city size and urban travel patterns. Furthermore, changing energy patterns bring about several kinds of concerns to be overcome: political, economical, technological investment capacity, and urban development. And it is also *si ne qua non* condition to fulfil the expectations for having environmentally sustainable transport systems, where the transport modes proposed follow the principles for the development "that does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources at below their rates of regeneration, and (b) use of non-renewable resources at below the rates of development of renewable substitutes." (OECD, 1997, p.12).

2.1.3.3.1 Mobility and environmental concerns

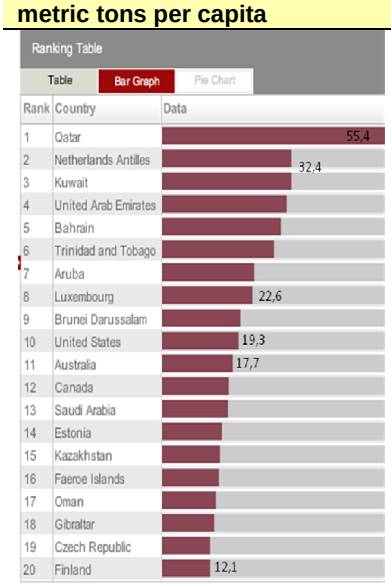
For Banister (2000, p.79) "transport is the most pervasive source of noise for many people in Europe. [And] the most common sources of transport noise (in order of importance) are road traffic, aircraft and trains." Noise pollution can affect health and to some extent "discourage social interaction in streets and reduce the attractiveness of walking and cycling" (Banister, 2000, p.79). Moreover, there are economic impacts due to investments for mitigating noise pollution.

The concerns about air quality are directly associated with energy consumption and the resulting emissions of greenhouse gases. The growth of urbanization, coupled with world economic growth, increases energy consumption, as "cities, and the population and economic activities supported within their boundaries, use tremendous amounts of energy" (Beatley, 2000).

The level of energy consumption is a function of income (Schiller, Bruun, & Kenworthy, 2010, p.8). Therefore the developed countries are more sensitive to the increasing of energy and consequently to the impacts of the externalities of greenhouse gas emissions (see Table 2). CO2 Emissions, which contribute to global warming and climate change, with a relative contribution of 50% to total emissions (Tolley & Turton, 1995), are the biggest concern. In this case the transport sector is directly affected, as "carbon dioxide emissions are those stemming from the burning of fossil fuels" (World Bank, 2011).

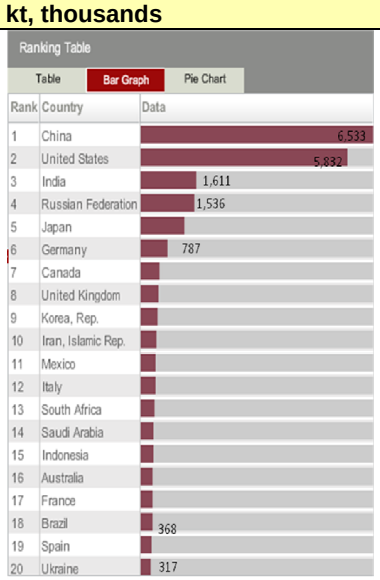
Table 2: CO2 Emissions in the world and comparisons between world regions as per the years 1990 and 2005.

CO2 emissions metric tons per capita

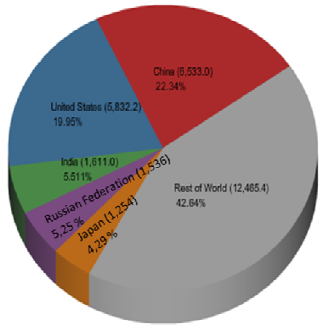


World aggregate as per 2007: 4,6 metric tons per capita

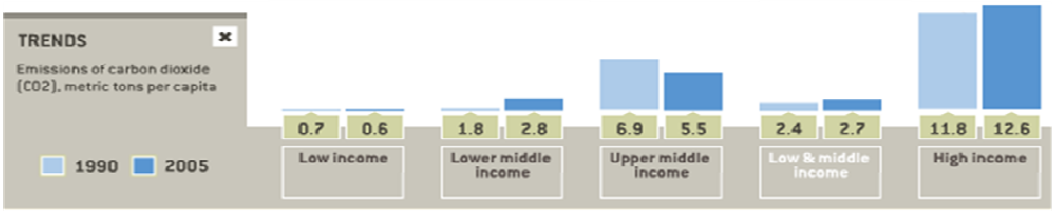
CO2 emissions kt, thousands



World aggregate as per 2007: 30,650 thousands



The 5 countries with the highest emissions – China, USA, India, Russia and Japan: 57,36 %
Against the rest of the World: 42,64 %



Note: carbon dioxide (CO2) emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.

Source: adapted from the World Bank eAtlas of the Millennium Development Goals (World Bank, 2011).

On the basis of the World Bank “Millennium Development Goals”, countries around the world agreed on the development of policies and actions to reduce greenhouse gases (World Bank, 2011). Both developed and developing nations must accomplish tasks and invest in meeting those established targets. Among the many options there is no clear direction for which energy sources will be the basis to support development for the future or to be used for transport, or which technologies will be available. The various world regions and countries have started searching for proposals and investments in R&D.

Europe decided to invest in electro mobility. Among the different projects and proposals within the European framework for energy research, electro-mobility is the one that has gained the most support from the government boarders and from the researchers. The project Green eMotion is one of them (Claris, 2011). Figure 22 shows the concept of the project.

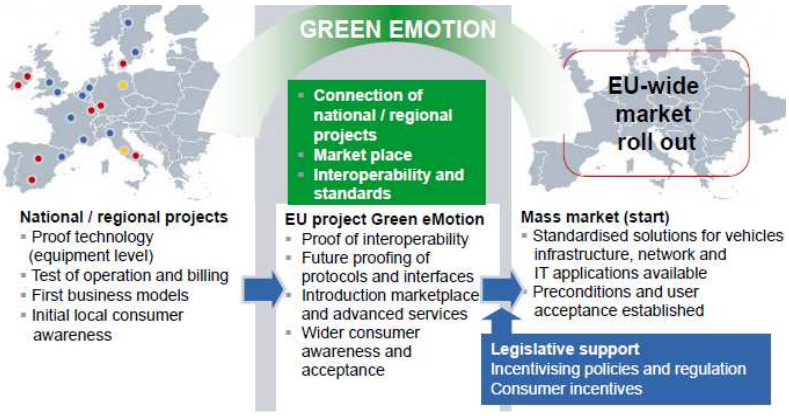


Figure 22: concept of the project Green eMotion. Source: European Union (in: Claris, 2011).

As shown in Figure 23 the project is supported by a consortium involving various research institutes and universities, the industry, vehicle manufactures, energy distributors and the different levels of government in the countries of the European Union (Claris, 2011).

Figure 23: European network for the development of electro mobility. Source: European Union (in: Claris, 2011).

Especially in Germany, the year 2011 started with a vigorous discussion about energy production and consumption and most of the concerns about the energy basis, as a result of the earthquake and the catastrophe at the atomic power plant in Japan. The impacts of the catastrophe in Japan opened various discussions. On one hand, an important consequence of the catastrophe was on transport technology development and production, which therefore had negative results on the economy and on trading. On the other hand a heated discussion started, especially in Europe led by Germany, about energy production, on the basis of commodities. German government decided to increase investment in research and in development to support electric mobility. The State programme “Mobilität von Morgen” (Mobility of Tomorrow) was presented by the Chancellor Angela Merkel and the Research and Development Ministry. Electric Mobility is the centre of research and development for Germany. However the technology has no clear plan for the future and also no idea of when the electric car will be affordable for the population in Europe or in other developed and developing countries. This is the main concern for the industry and their representatives. It is necessary for governments to

invest more money in the development of these technologies, according to representatives of the motor industry. It is necessary to invest in production and to give subsidies for customers, in order to encourage the sale of electric cars. Otherwise the product of the electric car cannot reach the market in the coming years, either in Europe or in the other developed countries worldwide.

The USA has invested in local and global networks to promote hybrid and electric mobility (Electric Vehicle Initiative - EVI). According to Claris (2011) the US Department of Energy has so far invested an amount of US$2.85 billion in the "Clean Cities – Transportation" projects, that focus on developing a new generation of advanced fuels and vehicle technologies to reduce dependence on foreign oil, and more than US$400 million on the revitalisation of domestic manufacturing and on creating demand for new organisms and forms of fuel.

Figure 24 illustrates the cities participating in a global network for the development of electric mobility, the 'C40 Electric Vehicle Network'. With the support of governments and research institutions, the developed and developing world's largest cities (the so-called climate leadership group) are testing technology and developing studies to promote the electric car.

Figure 24: Global network for the development of electric mobility: joint project "C40 Electric Vehicle Network". Source: Claris (2011).

2.1.3.3.2 Urban Form, mobility and environment impacts

The design of the transport network has a direct co-relation with the urban form and consequently has negative or positive impacts on energy and land consumption, and the externalities related to those issues. Table 3 shows the level of consumption and emission of different transport modes.

Table 3: Levels of land and energy consumption and emission of different modes.

Characteristics	Car	Train	Bus	Bike	Foot
Land use [1]	120	7	12	9	2
Energy use[2]	90	31	27	0	0
CO2 emission[3]	200	60	59	0	0

Units: 1) m²/person; 2) grams of coal equivalent to units per passenger-km; 3) grams/pass-km

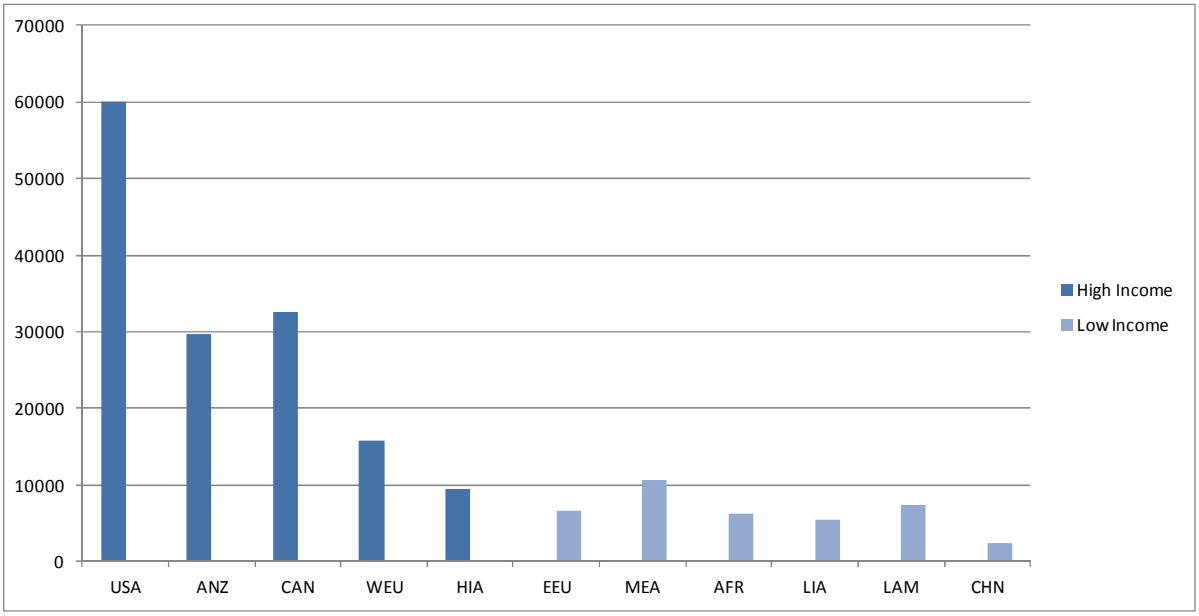
Source: Whitelegg (1997).

The growth of urban areas has a positive impact when it provides a productive and innovative environment, conditions required for today's economic development pattern. However, with the increasing growth of the cities, suburbanisation of the population has taken place, and car ownership and use have risen dramatically (Nijkamp, 1994).

> "The automobile facilitated the uninhibited outward expansion of the city because people and business were no longer constrained to the fixed-track public transport systems or walking-scale environments of earlier times. […] The automobile's much greater speed allowed the city to get much bigger again, and densities of development dropped dramatically. Through the exercise of modern town planning principles, land uses became segregated into zones, and travel distances for all trip purposes incresed dramatically. [As a result] the car began to replace public transport and non-motorised modes" (Schiller, Bruun & Kenworthy, 2010, p.27).

The expansion of cities because of suburbanisation, facilitated by the use of the automobile, has consequences on land and energy consumption. It also produces externalities resulting from the uses of land and energy, such as pollutant emissions and the need for appropriation of productive rural or natural areas for the settlements and transport infrastructures.

Car ownership and energy consumption is a function of income (Figure 25). Therefore, the developed countries are more sensitive to the increasing of energy and consequently to the impacts of the externalities of increasing emissions and the need for more available land. Under these conditions, accurate urban planning is needed to mitigate those impacts. For example, land availability for new development and road construction are problems for most of the European cities, and these problems are due to natural constraints or to land regulation.



Note: ANZ=Australia and New Zealand; CAN=Canada; WEU=Western Europe; HIA=high-income Asia; EEU=Eastern Europe; MEA=Middle East; AFR= Africa; LIA=low-income Asia; LAM=Latin America; CHN=China.

Figure 25: Private passenger transport energy use per capita in world cities, 1995. Source: designed on the basis of Kenworthy & Laube (2001, in: Schiller, Bruun & Kenworthy, 2010, p.8).

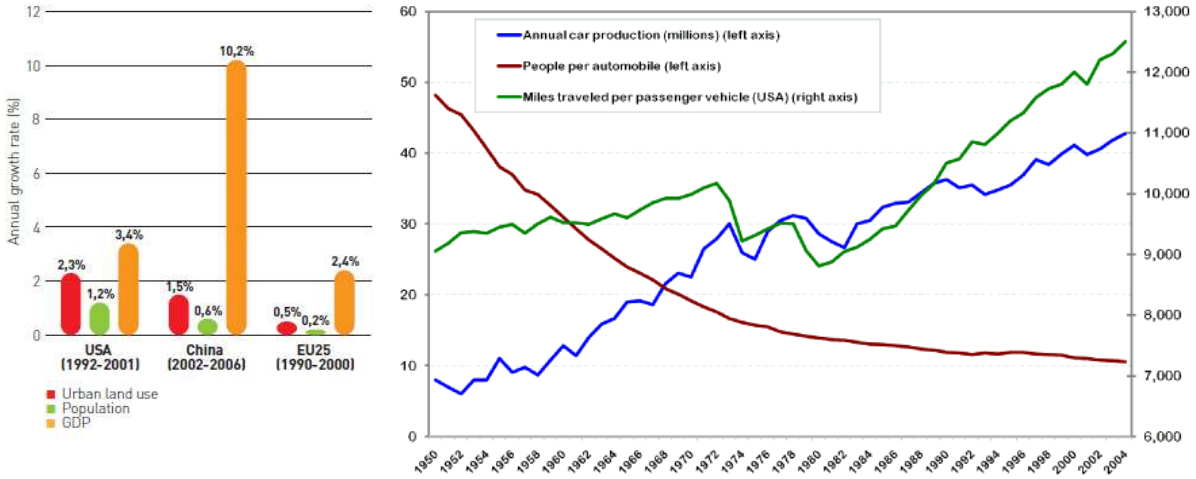
Studies developed by Australian researchers illustrate the relationship between the expansion of cities and the growth of car ownership. A total of 32 global cities were surveyed on the issues of transport practices and urban structures, and analysis was conducted in order to explain the relationship between urban density and energy consumption. The results show that "American cities are much more dispersed than European and Asian cities, and consume significantly higher amounts of energy for transport", which confirmed that "cities with sprawling suburbs led inevitably to a growth in car use" and to "automobile dependence" (European Commission, 2010, p.27). On the other hand, as shown Figure 26, high density cities are more efficient in energy and land consumption.

Figure 26: Energy consumption and urban density. Source: Newman & Kenworthy (1999, in: European Commission, 2010, p.6).

The worldwide car fleet has grown steadily through the years. Figure 27 (b) shows the level of car production, motorisation per capita in the world and the average distances travelled in the USA, from 1950-2004.

> "Since the 1950s, the number of automobiles has considerably increased, especially in developed countries. This process of motorization involved a significant reduction in the number of people per automobile, from 48.2 in 1950 to 10.6 in 2004. There are consequently more vehicles per capita, which is a good indicator of potential mobility. In 2004, the global automobile fleet was estimated to be around 603 million vehicles, with an annual car production in the range of 40 million cars. There are more registered vehicles in the United States than there are licensed drivers. Along with the number of vehicles and their production, the distance travelled per vehicle is also on the rise. In the United States, each passenger vehicle travels around 12,500 miles (20,000 km) annually (2004 figures), up from about 9,000 miles (14,400 km) in 1980. This growing mobility reflects ongoing spatial changes in terms of the size and density of urban areas" (Rodrigue, Comtois, & Slack, 2009, p.n.a).

The direct correlation of automobile and land consumption can be drawn up from Figure 27 below where at (a) there is a comparison of urban land use expansion, population and GDP in Europe, the USA and China.



(a) (b)

Figure 27: Driving forces of urban expansion: (a) Annual growth of urban land use, population and GDP in Europe, the USA and China; (b) World annual car production and people per vehicle, and miles travelled per passenger vehicle in the USA. Source: (a) European Commission (2010, p.26); (b) Worldwatch Institute and BTS, in: Rodrigue, Comtois, & Slack (2009).

For all cases the GDP and the land consumption grew faster than the population growth rate, which indicates that the population is living in more sprawling areas. Additionally, the comparison of the graph (a) with graph (b) illustrates the correlation of the growth of urban land use and car ownership: while the number of cars has positive figures, the number of people per car decreases. Furthermore, the expansion of land use in sprawling cities leads to more miles travelled per passenger vehicle and more energy consumption and consequently contributes to the increasing of greenhouse gas emission. This condition also has a negative impact on financing, as it leads to more investment in infrastructure and costs for its operation.

2.1.3.3.3 Traffic safety

The expansion of urbanisation has an effect on built-up and natural environments as well as on people's lives. Figure 28 shows the co-relation between numbers of disastrous events and the world population growth from 1950 till 2004. The figures confirm a direct co-relation between positive growth of urbanisation and the growth in number of disasters, including natural and technological disasters, for instance traffic accidents. Based on the figures it is possible to assume that the intensification of urbanisation after the year 2000 and the growth of road transport, coupled with poor infrastructures in developing countries, are positively associated with the sharp increase in disasters related to road traffic.

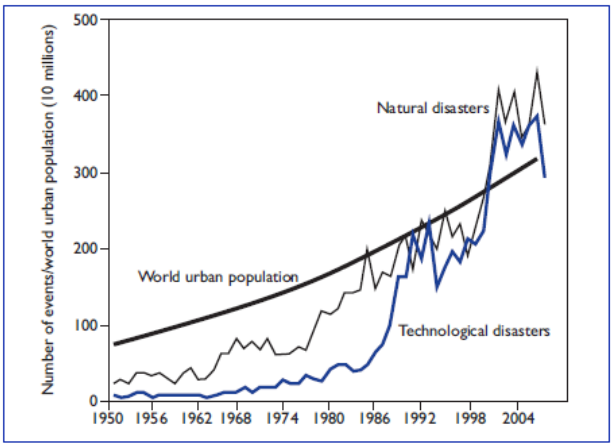


Figure 28: World population and recorded natural and technological disasters (e.g. industrial and transport accidents) (1950–2005). Source: UN-Habitat (2011, p.88).

The World Health Organization (WHO, 2012), reporting on road traffic injuries, listed these key facts to make planners and policymakers focus on the issue:

- About 1.3 million people die each year as a result of road traffic accidents.
- Road traffic injuries are the leading cause of death among young people aged between 15 and 29.
- Over 90% of the world's fatalities on the roads occur in low-income and middle-income countries, even though these countries have less than half of the world's vehicles.
- Nearly half (46%) of those who died on the world's roads were "vulnerable road users": pedestrians, cyclists and motorcyclists.
- Without action, road traffic accidents are predicted to result in the deaths of around 1.9 million people annually by 2020.
- Only 15% of countries have comprehensive laws relating to five key risk factors: speeding, drinking and driving, and the use of motorcycle helmets, seat-belts and child restraints.

The impact of traffic accidents on the built-up environment mainly consists of damage to private property, to transport infrastructure and to public equipment and facilities (Banister, 2000, p. 80). This results in economic costs for people and for public administrations, for the reparation of damages and for reconstruction of infrastructures. Furthermore, traffic accidents raise costs of health care and insurance in both the public and private domain. Human productivity can also be reduced, due to physical disabilities caused by road accidents. Global estimates of the cost of traffic injuries cannot be taken as conclusive, due to there being few surveys and studies on the matter, but according to the WHO (2012), rough calculations made in 2000 indicate that the economic cost of road traffic accidents could amount to approximately US$ 518 billion.

Urban design and mobility affect and are affected by traffic accidents. The urban spaces and transport facilities must be adequate to serve people with disabilities or reduced mobility as well as the most vulnerable transport users and to provide them with the right conditions for moving around and for reaching the private and public spaces (Gonçalves, 2012).

It is worthwhile to draw attention not only to the material damages and economic costs of traffic accidents. The WHO reports indicate that traffic accidents are the main cause for premature deaths in the world and that the highest numbers of these come from developing countries. This means that productivity will be affected in those nations in the future, diminishing their potentialities for socioeconomic development and for their rise out of poverty. Therefore, it is important to think about how urban transport planning can reduce traffic injuries, and seek mobility concepts that keep up with concepts of sustainable development.

An example of the features exposed by WHO (2009) can be seen, taking the cases of Brazil and Colombia in Latin-America, and the European countries Germany and Spain (Figure 29).

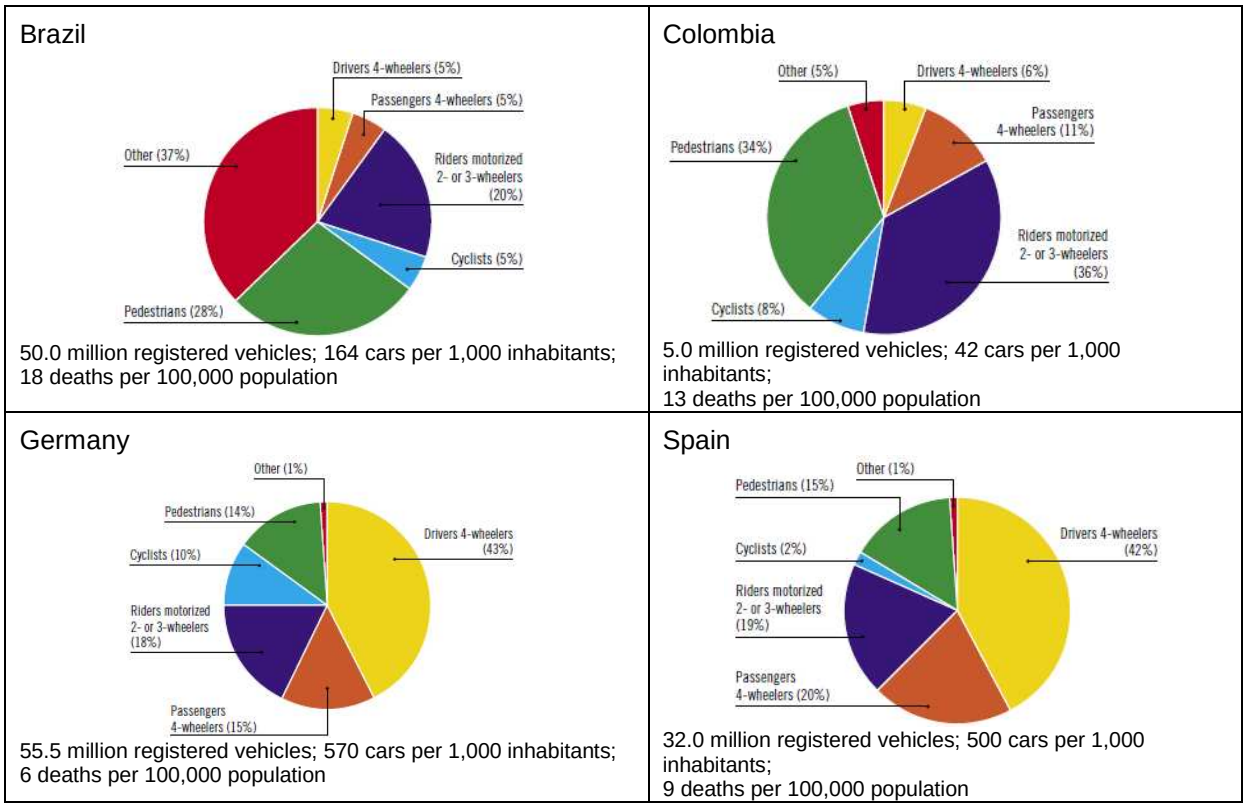


Figure 29: Deaths by road user category, selected countries, 2006. Source: estimation calculated for the year 2006 on the basis of WHO (2009).

The graphs show that the highest percentages of deaths in the two Latin-American countries are related to vulnerable road users like pedestrians, users of public transport and others. Meanwhile, in the two European countries, private car users are the most vulnerable to deaths.

These features illustrate the poor conditions of road infrastructure, traffic signalling and especially the unacceptable conditions of pavements, public transport stops, and cross-sections designated for pedestrians, cyclists and public transport users in developing countries.

It is interesting to note the condition of cyclists in Germany: they make up 10% of the total traffic deaths in the country. This can be related to the conflicts between cars and cyclists in traffic, and to the high traffic volumes on German roads.

It is significant to emphasise that the underprivileged conditions of transport facilities and infrastructure in developing countries are not only related to the low budgets available or the lack of technology. As pointed out in various studies, their precarious situations are more closely related to deficiencies in planning and public policies. The specificities of their transport planning do not take land use into consideration or the needs of various users, particularly pedestrians, cyclists and users of public transport. Their roads are planned and built to improve capacity and speed for motor vehicles, while the needs of the most vulnerable users are not taken into consideration in planning (Gonçalves, 2012; Gonçalves & Silva, 2007; Vasconcellos, 2001; WHO, 2009). Therefore, the deficiencies of road safety reduce the macroaccessibility and the microaccessibility of urban spaces and exclude people from city life (Gonçalves, 2012).

2.1.4 Urban development and urban transport policies

> „Städte sind Räume, in denen soziale und symbolische Konflikte ausgetragen werden. In ihnen treffen verschiedene Klassen oder Schichten, Lebensstile und ethnische Gruppierungen aufeinander, und eine wichtige zivilisatorische Leistung von Städten besteht darin, die Integration verschiedener Gruppierungen auf engem Raum zu ermöglichen – aber eine mögliche Wirkung dieser Koexistenz von heterogenen Gruppen kann auch in Marginalisierung und intensiven Konflikten bestehen“[12]
> (Häußermann & Siebel, 2004)

Sustainable urban development is defined by Camagni (1998, p.na) as follows:

> “A process of synergetic integration and co-evolution among the great subsystems making up a city (economic, social, physical and environmental), which guarantees the local population a non-decreasing level of wellbeing in the long term, without compromising the possibilities of development (Patton, Sawicki, & Clark, 2013)of surrounding areas and contributing by this towards reducing the harmful effects of development on the biosphere.”

The vision for the construction of a sustainable urban development proposed by Camagni (1998) when confronted with the complexity of the post-modern cities lay on the hands of policy makers a challenge to address the problems society faces nowadays. Patton, Sawicki, & Clark (2013, p.2), in agreement with other authors, point out characteristics for the problems of current society. They are “squishy”, “fuzzy”, “subjective”, and “wicked”, and most of the time they have attributes like those following:

> “1.They are not well defined.
>
> 2.They are seldom purely technical or purely political.
>
> 3.Their solutions cannot usually be proven to be correct before application.
>
> 4.No problem solution is ever guaranteed to achieve the intended result.
>
> 5.Problem solutions are seldom both best and chepeast.

[12]In English: Cities are spaces in which social and symbolic conflicts are carried out. In them meet different classes, lifestyles and ethnic groups. An important civil responsibility of cities is to enable the integration of different groups in a small space - but a possible effect of this co-existence of heterogeneous groups is that marginalisation and intense conflicts can also take place.

> 6.The adequacy of the solution is often difficult to measure against notions of the public good.
>
> 7.The fairness of solutions is impossible to measure objectively."

The problems related to urban mobility are a visible exemple of what Patton, Sawicki, & Clark (2013) discussed in their book about policy analysis and planning. Sustainable urban development is highly afected by urban transport policies and mesures. The definition of good policies for urban mobility is a part of an intricated network to reach the vision of sustainability for urban life.

For Brooks (1989, p.16) public policy is a "broad framework of ideas and values within which decisions are taken and action, or inaction, is pursued by governments in relation to some issue or problem." The government, whether it is city, state, or federal, develops public policy in terms of laws, regulations, guidelines, decisions and actions. Kilpatrick (2013) explains that "public policy can be generally defined as a system of laws, regulatory measures, courses of action, and funding priorities concerning a given topic promulgated by a governmental entity or its representatives." Policies are also open to interpretation by non-governmental actors, including those in the private sector. Public policy is also made by leaders of religious and cultural institutions.

Public policy can legally be understood as the manifestation of:

> "The common sense and common conscience of the citizens as a whole that extends throughout the state. It imports something that fluctuates with the changing economic needs, social customs, and moral aspirations of the people. Public policy enters into, and influences, the enactment, execution, and interpretation of legislation" (Legal Dictionary, 2012).

Healey (2006, p.72) wrote that there is a 'field' of public policy that is "an aggregation of formal organizations and informal relationships through which collective action with respect to a set of concerns is accomplished." Therefore, following this point of view, "it focuses attention not only on the formal organizations legally charged with policy responsibilities, but also on the relational webs which connect these to wider arenas and networks and the collective managing processes which occur in these arenas." The author affirms that spatial planning practices come from this field of policy.

2.1.4.1 Governance and planning

The cities of the twenty-first century are not single homogeneous bodies. On the other hand, the cities of today have highly complex social, political and cultural structures, social inequality and segregation, and inequity of distribution of public policies, infrastructure and services to their populations. As discussed by Ribbeck (2005), the socioeconomic model replaced the national and social solidarity found in society in the past (European model) with a model of society that the author calls "Zwei-Drittel-Stadt"[13], where a third of the people are living in conditions of deprivation and exclusion from development, urban infrastructure and services. This society is

[13]In English: Two-third city

split between the rich and the poor and sees segregation in microspaces. The demographic structure has also brought changes in the cultural patterns of consumption and occupation of spaces. The patterns of households changed, either in terms of their numbers of people, ages of members, or changing assumptions of responsibilities. The population has aged, reduced the number of children and become multicultural (Gonçalves, Rothfuß, & Morato, 2012).

According to Häußermann & Siebel (2004, p.139) a city can have functional segregation based on the type of spatial planning and land use. Indeed, "Man bezeichnet es als funktionale Segregation, wenn verschiedene Funktionen sich an verschiedenen Orten konzentrieren.[14]" Furthermore, social segregation results from and changes according to urban development.

> „Eine Stadt bildet einen *Sozialraum*. Ihre sozialräumliche Struktur ist das Ergebnis Komplexer Prozesse, in deren Verlauf die unterschiedlischen sozialen Gruppen und Milieus ihren Ort in der Stadt finden bzw. zugewiesen bekommen. Dabei spielen Marktprozesse ebenso eine Rolle wie Machtstrukturen, individuelle oder Gruppenpräferenzen ebenso wie historische Entwicklungen. […] Die verschiedenen Schchten und Gruppen der Stadtbevölkerung sind nicht gleichmäßig über die Wohngebiete der Stadt verstreut. Man bezeichnet diese Struktur als ‚residenzielle' oder ‚soziale' Segregation. Es gibt wohlhalbende und arme Wohngebiete, Arbeitervierte und solche, in denen sich die Zuwanderer konzentrieren. Neben solchen *sozialen* Ungleichheiten bilden sich aber auch Distinktionsbedürfnisse verschiedener Milieus im Stadtraum ab, die sich *symbolisch* voneinander abgrenzen. Milieus werden gebildet von Trägern eines bestimmten Lebensstils oder Angehörigen einer Subkultur"[15] (Häußermann & Siebel, 2004, p.139).

Following the ideas of Häußermann & Siebel (2004) the types of segregation in urban areas can be summarised in terms of a combination of cultural and economic distance (Table 4). For instance, in a slum there is high economic distance, but not cultural distance. Taking the opposite combination there is voluntary segregation or discrimination, where the groups keep distance based on ethnic-cultural values, even though there are no economic differences.

[14]In English: It is called a functional segregation when concentrating different functions in different locations.

[15]In English: A city is a social area. Its social structure is the result of more complex processes, in which the different social groups and backgrounds find or are assigned their places. Market processes play a role in this, as do power structures and individual or group preferences, as well as historical development. [...] The various social classes and urban populations are not evenly spread throughout the residential areas of the city. This is known as structural ´housing´ or 'social' segregation. There are wealthy and poor neighbourhoods, workers' districts and similar places in which immigrants are concentrated. In addition to such social inequalities there will also develop differences in the needs of various milieus in the city that set symbolic distance from each other. Milieus are formed by individuals with a specific lifestyle or by members of a subculture.

Table 4: Cultural and economic distance and segregation in urban spaces.

		Economic distance	
		High	Low
Cultural distance	High	1 Ghetto, enclave (convergence of cultural and economic segregation)	3 Voluntary segregation or discrimination (ethnic-cultural, but no economic segregation)
	Low	2 slum (cconomic, but not ethnic segregation)	4 Assimilation - mix (no segregation)

Source: designed on the basis of Häußermann & Siebel (2004, p.191).

Häußermann & Siebel (2004, p.193) attempted to put in plain words models for cultural integration and their consequences for the city (Table 5). Homogeneity can be achieved though assimilation; this means that the various newly-arriving groups leave their cultural differences aside and assimilate as much as possible into the host culture, so as to be integrated into that society. Moreover, homogeneity can emerge in a society where the groups, on both sides, evolve beyond their differences (social, cultural, ethnic, economic, etc) and a new culture develops as time passes. This is the American idea of a melting-pot. On the other hand the city of difference develops itself on a pattern of urban indifference or builds up the urban tissue in the framework of a mosaic of small worlds.

Table 5: Cultural model for immigrant integration and its consequences for the city.

Cultural model (Leitbild)	**City level (Stadtebene)**
Homogeneity	Assimilation Melting-pot
Difference	Urban Indifference
	Mosaic of small worlds

Source: designed on the basis of Häußermann & Siebel (2004, p.193).

Georg Simmel's idea about urban indifference (1992) was interpreted by Häußermann & Siebel (2004) as an observation of the modern great cities and the way they create space to solve the problems of co-existence and heterogeneity:

> „Simmel sah es als eine Aufgabe urbaner Individuen, sich gegenseitig in ihrer Fremdheit zu respektieren, also weder sich selbst noch den Zuwanderer zur Anpassung zwingen. In der Großestadt leben die Menschen in anonymer Distanz zueinander, ja sie ignorieren sich als individuelle Menschen wechselseitig, was zu der großstadttypischen Reserviertheit und Unpersönlichkeit bei alltäglichen Beziehungen führt“[16] (Häußermann & Siebel, 2004, p.192).

[16] In English: Simmel saw the city as an issue of urban individuals mutually respecting each other in their strangeness, neither adapting nor forcing the immigrants to adapt. In the large city, people live with one another at an anonymous distance, so they ignore each other reciprocally as individuals, resulting in typically urban reserved behaviour and impersonality in daily relations.

The mosaic of small worlds separates the different groups in terms of space and in terms of possibilites to interact with each other in ways by which they can maintain their cultural roots and also develop themselves in their own collective and similar group. Therefore, the urban spatial development is thought to keep a distance between the different groups to avoid conflicts and culture shocks.

The spatial analysis made by Ribbeck (2005) of the divided "Zwei-Drittel-Stadt“ can be explained on a sociological perspective based on the model of Häußermann & Siebel (2004) considering, using different scales and types, the cases of urban areas in Europe and Latin-America, for instance the ´gated communities´ (*condominios fechados*) on one side, very common in Latin-America, where there is economic and cultural segregation; and on the other side, the slums, where people constructed a built-up and cultural landscape based on their own possibilities and rules, disconnected from the planned ruled areas of the urban tissue. Inside these areas the so-called melting pot is visible; the social, ethnic and cultural barriers are suppressed by the need for solidarity to overcome the social and economic barriers. On the other hand the slums and the *condominios fechados* are antitheses on the same urban landscape, which is designed like a mosaic of small spatially and socially disintegrated worlds.

IBGE (2011) reporting on household surroundings conditions, stated that 12% of the whole population in Brazil live in neighbourhoods constructed and sold by the real estate market or proposed by social housing systems missing adequate infrastructure related to road network, water supply and sewage. Furthermore, 6% of the total population is living today in ‘subnormal’ areas or slums. The classification of these zones as ‘subnormal’ areas includes the conditions of the ground property; the way in which people acquired their accommodation, namely when it is not legalised or permitted by officials and regulation and they are squatting; poor construction quality in areas around hills, seashores, channels, rivers, preservation or contaminated areas; and the lack or poor conditions of infrastructure and services available (water supply, transport, health care, schools, e.g.). As well as having very low conditions for mobility inside the occupied area in general, these zones have restricted transport connections to the city centre and to more prosperous neighbourhoods. Most of all, they are restricted to a definite timetable mostly following working week days and schedules (Gonçalves & Novaes, 1996). Therefore, planning urban transport and accessibility for those areas is a real challenge considering spatial conditions and social possibilities for integration.

As urbanisation intensifies with socioeconomic and cultural transformations based on deep diversity and urban complexity, the government has the legal responsibility of proposing public policies aiming towards the organisation of urban space to ensure that human activities can be developed on the basis of sustainability and integration for the built-up and natural environment. The social, economic and spatial mobility of the population falls into the realm of public responsibilities and policies to support its development. The absence of these policies, or their implementation without adequate planning, has implications for the guarantee of fundamental rights, for addressing the issues of urban development and for the progress of social relationships and spatial integration.

The question is of how governments propose policies. One way to propose policies is to follow what the federal constitution and its regulations state for the different areas where it is expected that the public sector must act to cope with social and economic problems and development aspirations, accomplishing the administrative tasks. Another way would be, in a heterogeneous complex system where multiple stakeholders act and different groups must co-exist and develop themselves in a diverse environment, like in twenty-first century cities, to plan an approach where those aspirations are gathered together and solutions are developed. Additionally, "the government and governance analysis highlighted the importance of effective formal institutions, policies and regulations" as discussed at the European Project PLUREL (Piorr, Ravetz, & Tosics, 2011, p.87).

It is expected that the public administration will deliver services for the community and advocate the community's interests, where an administrative organisation is required, following the legislation within an idea of hierarchical command and control. This idea contrasts with the one proposed by Verma (2010, p.401) about governance and planning as a paradigm. For the author, "urban planning is a late entrant to discussions on governance", even though planning theories have long started to discuss issues and ideas that remain at the core of governance, like the ones of "collaboration, negotiation, civil society, communicative action, gendering, truth, participation."

Table 6 summarises the problem of governance and its contrasting paradigm within planning discussed by Verma (2010, p.402). On one side are command and control, whose fundamental principle is public administration, and on the other side the idea of governance in planning.

Table 6: Governance and its contrasting paradigm.

Command and Control	Governance
Advocacy	Civil society
Conservation	Sustainable development
Regulation	Collaboration
Competition	Cooperation
Carrying capacity / limits to growth	Growth management / smart growth
Ghettos and slums	Enclaves and informal sector
Hierarchies	Networks
Clients	Citizen planner

Source: designed on the basis of Verma (2010, p.402).

In public administration the government must perform, in order to sustain their mandate. If they do not perform, they run the risk of losing the confidence of the electorate, and ultimately of losing power. The administrative body is supposed to efficiently meet the interests of the clients. In a governance paradigm according to Verma (2010, p.402), the challenge of planning "is not just to deal with multiple constituencies or multiple publics each with a different set of preferences. It is not just to have a customer service attitude towards its clients or to increase efficiency of service delivery for its constituents. Rather, there is an epistemic need to see our constituents as citizen planners that deserve respect for their individual expertise." This is in agreement with Healey (2006, p.59), who says that governance, "the management of the

common affairs of political community, thus involve much more than formal institutions of government. It may occur in informal arenas too."

Healey (2006, p.206) suggests that the nature of planning must be seen in the light of a specific mode of 'policy-driven' governance approach:

> "The system of governance of a society or community refers to the process through which collective affairs are managed. Governance involves the articulation of rules of behaviour with respect to the collective affairs of a political community; and of principles for allocating resources among community members. [...] it legitimates initiatives taken 'on behalf' of political community and speak for the collective concerns of political communities in the language of collective interests and values, embodied in such terms as the 'common good' or the 'public interest'."

Innes & Booher (2004, p.11) suggest that governance "is no longer only about government but now involves fluid action and power distributed widely in society." They are of the opinion that complex systems would evolve in an adaptive way, requiring creativity and time, from an unpredictable perspective. Therefore, Healey (2006, p.205) proposes an institutionalist approach for governance where:

> "Its emphasises not only on the interactive nature of governance processes but on the way social networks weave in and out of the formal institutions of government and develop governance mechanisms within themselves, and through the recognition that reasoning is a much wider activity than is captured in the model of technical-instrumental rationality and rational planning processes."

In times of globalisation and information technology, e-commerce, e-governance can also be a way for shortening contacts and access to public services. E-governance is specially a discussion that can bring people together on a world, national or local level. The availability of information on-line for citizens can raise the access and also participation on planning. For sure there are differences between countries and geographical world regions on the level of internet access and technology inclusion (World Bank, 2013), but it is also true that internet and i-phones/i-pods are popular across the global today (Verma, 2010).

> "As a result of globalization, or at the least influenced by it, we see relative homogenization of preferences. I-pods and cell phones are just as popular in India, Africa and Europe as they are in the United States. At some level, however, these preferences can almost be seen as creations of technology. The technologies not only influence availability, clever marketing, and advertising, including images on television and the internet, create demand where none existed" (Verma, 2010, p.407).

Urban transport policies may account for planning and for the delivery of public services to the community.

2.1.4.2 Development policies: influencing framework on urban transport

The way urban development is carried out determines the spatial expansion over the territory and the way the city changes shape according to the spatial planning concepts or the possibilities of how the space is occupied, in the case of informal settlements.

Political and administrative organisation of cities depends first of all on the position of the city in the scope of federal/national legislation. The planning tasks are determined according to the laws behind the political and administrative structures and levels of government in each country. The responsibility for making decisions about the development of measures and for attracting investments for their implementation is affected by regulations and the political-administrative structure. For instance, who is the final decision-maker? For parliamentary countries the final decision for many investments is made by their House of Parliament, while for presidential countries many decisions are made in a unitary fashion, by the president, governor or mayor for example. This procedure can affect, among other things, the extension of realm for discussing the measures or the time taken to implement them.

The public policies coming from the various levels of government orientate the priorities for investments in diverse public areas. The results of these decisions in the long term influence the kind of measures that are implemented in the cities. Public policies can affect the performance of public services when they influence the design of the transport network and the services available through the approval or not of investments by the government. Figure 26 below shows a diagram proposed by the European Union to give an idea about the role cities play in their own development.

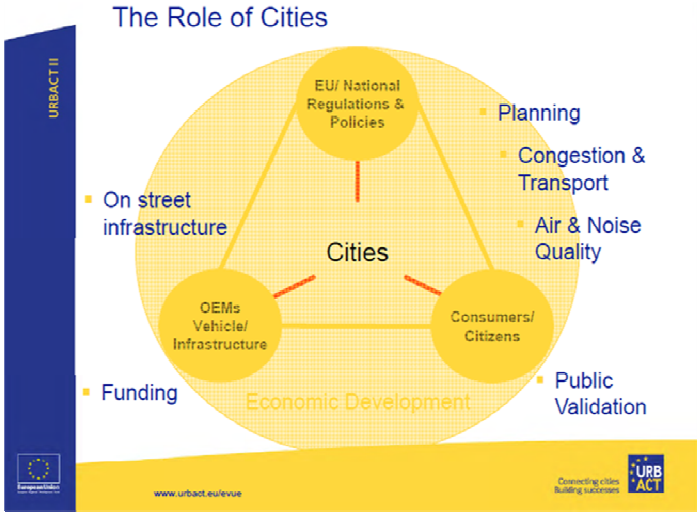


Figure 30: European initiative for the development of cities. Source: Claris (2011).

Demographic, environmental, social and economic factors directly impact UTP and also receive impacts from it. The growth or decline of the urban population and the changing of the age structure are important indicators for the re-thinking of planning concepts used by planners today. For instance, because of increasing numbers of elderly people, cities that strongly depend on motorised transport require the re-evaluation of their infrastructure, considering that older people have difficulties with driving for long periods, with congestion and with the stress of

looking for parking spaces. Such people need accessible transport facilities for their journeys. Furthermore, today UTP should incorporate concerns about environment, energy production and consumption, and financial restrictions. These factors will not be evaluated by this work in depth. Nevertheless, these aspects are all affected by the public policies developed by the different government levels.

The occupation of the territory by various social and cultural groups also dictates the conditions and possibilities for people moving throughout the spaces, and also indicates and sometimes sets restrictions on the possible design of a mobility concept for the city. In the face of urban and mobility (or immobility) problems, the governments, states and society at large are all being called upon to work on safety networks to support development, to tackle inequalities, and to raise the standard of living.

Urban development, urban transport and spatial organisation cannot be dissociated. The challenge is haw to provide urban mobility that meets the needs of the population in the present and the future, in a sustainable way. As Black, Paez and Suthanaya (2002, p.186) wrote:

> "A sustainable urban transport and land use system provides access to goods and services in an efficient way for all inhabitants of the urban area, protects the environment, cultural heritage and ecosystems for the present generation, and does not endanger the opportunities of future generations to reach at least the same welfare level as those living now, including the welfare they derive from their natural environment and cultural heritage"

In this sense, questions arise: What is the influence of public policies on urban space organisation in terms of ensuring the population's universal right to free movement? How could the guarantee of these rights impact on the social, economic and spatial mobility of the population and on accessibility to urban life? For example, given the right to spatial mobility, how do we view the 'Gated Communities', where the population is divided into homogeneous groups and segregated, which is related to the disintegration of a society? (Gonçalves, Rothfuß, & Morato, 2012).

Bertolini (2005, p.82) proposed a philosophy for attempting to enhance both accessibility and sustainability. He wrote that:

> "The central idea is thus not so much that of giving priority to the most environmental modes as such, but rather of limiting the number of situations in which the use of the least environmentally friendly modes becomes either a necessity or has unparalleled advantages. At the same time, and most importantly, this has to be obtained without diminishing the opportunities to participate in activities."

The diagram in Figure 31 shows that coupling transport use interventions with land use interventions (horizontally) must work logically, and realises all the available opportunities to link activities at the 'upper' levels of the scheme before moving on to the 'lower' levels of the scheme.

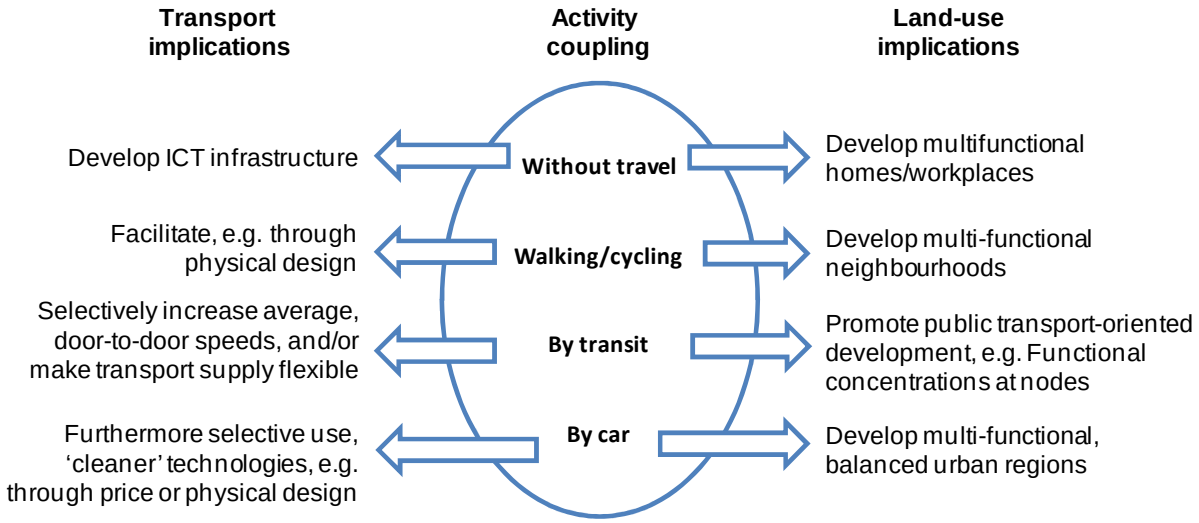


Figure 31: Policy implications of accessible and sustainable urban form. Source: designed on the basis of Bertolini (2005, p.82).

Figure 32 below illustrates how urban transport policies can affect urban expansion. The extension of a metro line to a district in the capital of Brazil where there had been mostly empty ground, transformed the area in less than 20 years into a densely populated urban agglomeration.

Figure 32: Driving forces of urban expansion: the 'Aguas Claras' Station – Metro of Brasília, Brazil. Source of the pictures: Metro DF.

Spatial planning influences the pattern of population concentration over the territory, and this has direct effects on urban transport policies and urban transport planning. Figure 33 below shows diagrams attempting to explain the co-relation of density and time-speed in different urban forms, from compact city to urban sprawl in (a) and the scenarios envisioning solutions for future urban developments in (b).

> "The density factor compares the impact of doing things 'alone' or 'together'. We do things 'alone' when we drive in our own car and live in low density suburbs or detached houses in peri-urban or rural areas. We do things 'together' when we live in compact villages or towns, or in the inner core of large cities, when we share collective means of transport (public transport or other forms, such as car sharing and/or pooling) or when we walk or cycle around a compact urban environment. 'Togetherness' is seen here as a condition where people live in greater physical proximity to each other, and when they travel, work or enjoy

leisure activities in compact city environments. Combining the two factors allows us to identify four archetypical urban forms" (European Commission, 2010, p.8).

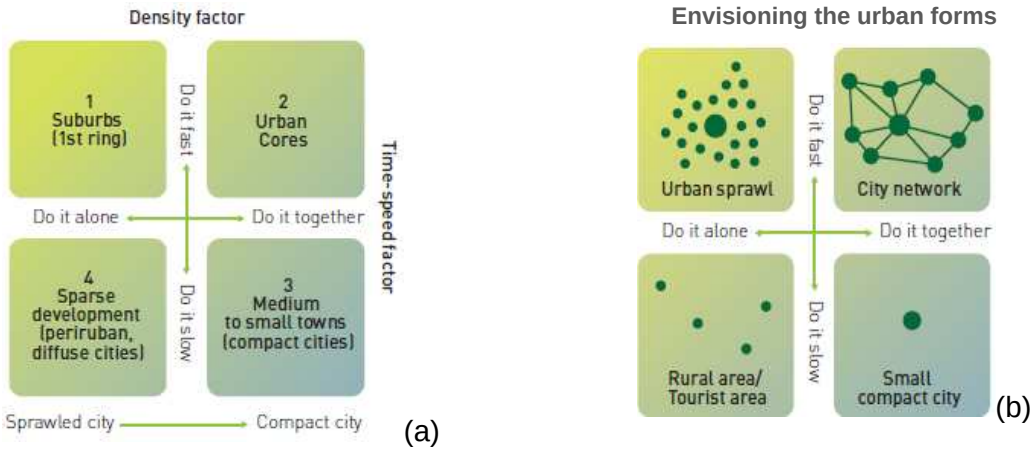


Figure 33: The land use – energy – transport nexus in different forms of settlements. Source: European Commission (2010, p. 7, 8).

According to the European PLUREL Project:

> "The ultimate goal of a transportation system is to be highly accessible. Optimal accessibility is usually reached at densely built areas where destinations i.e. workplaces, shops, services and activities, are all agglomerated. Urban sprawl and low density peri-urbanisation lead to longer commuting and higher emissions. It also tends to exclude low income earners and those without cars" (Piorr, Ravetz, & Tosics, 2011, p.61).

Each urban development concept incorporates a specific design for the urban infrastructure that supports the development of the urban functions and shapes the form of the cities. The urban form impacts on urban transport planning, considering that the transport infrastructure must connect the different areas of the city territory. For instance, in sprawling cities the population is strongly dependent on motorised transport connections (e.g. freeways and high capacity public transport) between housing and their workplaces. Additionally, UTP influences urban development through the impacts of transport measures affecting land use and other urban functions like education. The services available can spontaneously influence the behaviour of the population into changing their travel habits to meet their needs. Also, the planning strategies can use restrictive regulation or public incentives. For instance in transit-oriented cities and compact cities, pedestrian areas with restrictions for car use are measures used to control traffic, which has an impact on the land use.

For Bertolini (2005, p. 83):

> "Two features of activities are especially important: the spatial reach of an activity or function (or its spatial market or 'catchment' area e.g. expressed in kilometres) and its intensity and use (e.g. expressed in inhabitants, workers and/or visitors per unit of space and/or time). […] activities should be situated on and around public transport nodes, which have a spatial reach matching the scale of operation (and thus the speed) of the public transport infrastructure and the intensity of use (e.g. concentrations of office, leisure, shopping). Cycling and walking are the

most suitable travel modes for activities with a low spatial reach, say within the neighbourhood. Crucially, only activities with middle to high spatial reach and a low intensity of use (i.e. living, working or recreation in low-density areas) are best served by the car. This is because the speed and the flexibility of the car cannot be matched by the alternatives in these cases."

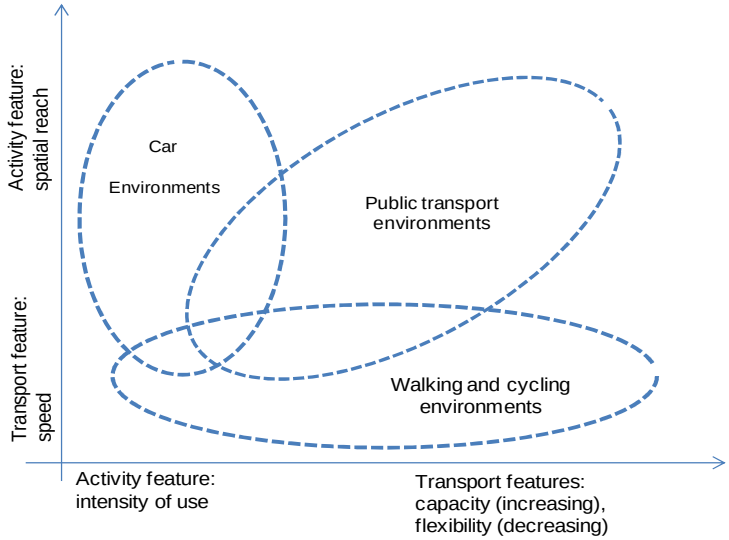


Figure 34: Principles of multi-modal urban and regional development, conceptual schema. Source: Bertolini (2005, p.83).

In some cities, activities can only be reached by car, like in the case of the urban sprawl (American cities pattern). Some are reachable by public transport (Freiburg, Zürich, for example), while others, like most historic European cities, are traditionally navigable on foot, and then there are cycling cities like those in the Netherlands, or Graz in Austria (Magistrat Graz - Stadtbaudirektion, 2001).

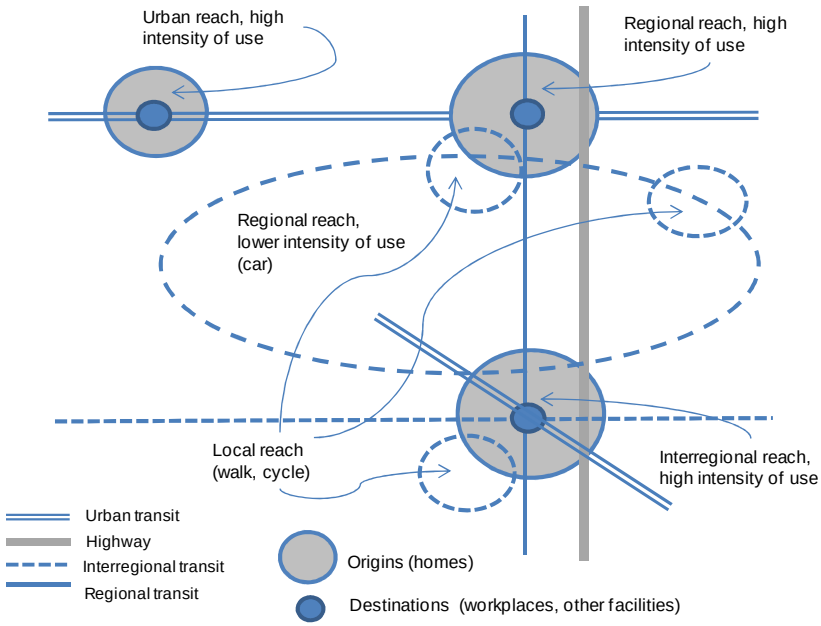


Figure 35: Principles of multi-modal urban and regional development, morphological scheme. Source: Bertolini (2005, p.84).

Figure 35 above illustrates the essential elements of the multi-modal urban and regional model proposed by (Bertolini, 2005) to design a transport infrastructure network based on the features described in Figure 34. For Bertolini (2005) the transport network must determine the location of activities according to their spatial reach and intensity of use.

> "Activities with a high reach and high intensity of use are located around transit nodes, activities with low spatial reach are within walking and cycling environments, and activities with middle to high spatial reach and low intensity of use would dependent on car use. In practice, both the spatial pattern of activities and the pattern of the transport infrastructure could be the starting point of development; it should be noted however, that such development would depend on the local context" (Bertolini, 2005, p.84-85).

The mobility concept should follow the principles previously stated in the public policies considering the especificieties of each city and the reagion it is associated. The urban transport planning process should work on the development of the mobility concept taking into account a in-depth study of socioeconomic, natural and cultural landscapes, together with the technical and technological concepts for urban and transport developments.

2.2 PLANNING THEORIES AND PRACTICE: A BRIEF OUTLINE

"Theory offers a means by which the regular infusion of new ideas can be understood by practice. Theory can be an early warning system preparing planners for new influences. It can also help to consider how these new influences can be absorbed into current practice, what the consequences could be, and what alternative responses are available"

(Thompson, 2000)

Peter Hall (2002, p.211) explains planning as "a continuous process which works by seeking to devise appropriate ways of controlling the system concerned, and then by monitoring the effects to see how far the controls had been effective or how far they need subsequent modification."

According to Friedrich (2007, p.na), planning "deals with the development of measures, which are supposed to change the current (or existing) state with deficiencies to an improved state which is as close as possible to a desired state".

For Kelly & Becker (2000, p.17) "planning involves making conscious choices about the future." In this way planning seeks "systematically improve the quality of decision making" (Levy, 2011, p.vii).

Healey (2006, p.82) defines planning as:

> "An approach to governance which embodies a policy-driven approach, a long-term and strategic orientation and which interrelates economic, social and environmental dimensions of issues in ways which recognise their complex space-time dimensions. […] The term planning is taken to mean efforts in the collective management of shared concerns about

spatial and environmental qualities, expressed in explicit policies which emphasize a strategic orientation to co-ordination between diverse actions and a relation between policy and action."

Allmendinger (2002, p.234) placed an useful table in his book "Planning Theory", that can give an overview of the most known epistemologies of planning theory.

Table 7: Unpicking epistemologies of planning theory.

	PURPOSE **What is the focus of planner decisions?**	**ROLE** **What is the role of the planner in making decisions?**	**ORIENTATION** **To what extent is planning oriented to the future?**	**FUTURE** **What does a planner know about the future?**	**PUBLIC INTEREST** **Is there one?**
Systems theory/Rational comprehensive	Control; scientific and objective	Planner-centric expert	Positivist; instrumental rationality	Can be predicted	Output: maximum utility
Critical theory	Accumulation, distribution, and the role of the state	Puppet of market	Means / ends	Market-driven	Capitalism
Neo-liberal	A combination of a market-oriented competitive state (liberalism) and an authoritarian strong state (conservatism)	Minimal; provide conditions for the continuation of the market mechanism	Via the market mechanism	Con foresee barriers to market functions	The market
Pragmatism	'Getting things done'	Act on ideas or beliefs that make sense and help others to act	Spontaneous order	The outcome of using an idea	Impossible to aggregate
Advocacy	Solutions to address power inequalities	Advocate	Outcome of competing ideas	A variety of futures	Pluralism
Postmodern	Focus on and release 'difference'	Narrator	Focus on day to day	Rejects objective knowledge	No great vision; fragmented and atomistic
Collaborative	Break down scientific objectivism; agreement through free and open discourse	Introduce other (non-instrumental rationality) ways of thinking and knowing	Pluralistic	Difference	No meta-narrative; lifeworld

Source: Allmendinger (2002, p.234).

2.2.1 Is planning necessary?

"Cities happen to be problems in organized complexity, like the life sciences. They present situations in which half or several dozen quantities are all varying simultaneously and in subtly interconnected ways. The variables are many but they are helter skelter; they are interrelated into an organic whole"
(Jacobs, 2011)

Why and to what extent is it necessary for the State to intervene in the development of human activities within a territory?

From the perspective of Hayek, the most influential of modern liberal thinkers, intervention prevents creativity. The author "views individual choice as a creative act, which takes place

under conditions of imperfect information, chronic uncertainty and with the distinct possibility of error" (Pennington, 2002, p.190). Thinking in this way, state intervention and central planning could undermine people's creativity and their motivation to act in positive and productive ways.

> "People should be viewed as purposeful actors who base their plans and decisions on subjective perceptions of the opportunities before them. Within this context, the market economy is seen as a profoundly social process of intersubjective trial and error, in which people learn about and at the same time shape one another's plans and preferences" (Pennington, 2002, p.190).

But would the market environment answer to the complexity of interactions that make up a city? Would the market solve all existing incongruities between the social, cultural and economic disparities that move urban development today? The followers of planning believe it to be the solution to the uncertainties left by the market, and that this has been justified since the 1920's economic crisis. On the other hand, opponents face the discussion by looking at the fall of the Soviet bloc nations with their planned state economies. Therefore, as argued by Campbell & Fainstein (1999, p.6) "the duality between planning and the market is a defining framework in planning theory." And in the environment of cities, this duality makes up the theory and practice on planning, and leaves its legacy on urban development over time.

For Jacobs (2011), cities are truly states of organised complexity. Cities are systems where combining elements evolve into organic whole, adapting and developing processes as they do so (Batty, 2007).

Simon (1962, p.na) defines a complex system as:

> "One made up of a large number of parts that interact in a nonsimple way. In such systems, the whole is more than the sum of the parts, not in an ultimate, metaphysical sense, but in the important pragmatic sense that, given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole."

For Mol & Law (2002, p.1), "there is complexity if things relate but don't add up, if events occurs but not within the process of linear time, and if phenomena share a space but cannot be mapped in terms of single set of three-dimensional coordinates" Hillier (2010, p.370) argues that complexity "focuses on the dynamical properties and structural transformation of non-linear, far-from equilibrium systems."

Cilliers (2005, in Hillier, 2007, p.43) describes some key characteristics of complexity:

- "Complex systems are open systems.
- They operate under conditions that are not at equilibrium.
- Complex systems consist of many components. The components themselves are often simple (or can be treated as such).
- The output of components is a function of their inputs. At least some of these functions must be non-linear.
- The state of the system is determined by the values of the inputs and outputs.
- Interactions are defined by actual input-output relations and they are dynamics (the strength of the interactions change over time).

- Components on average interact with many others. There are often multiple routes possible between components, mediated in different ways.
- Some sequences of interaction will provide feedback routes, whether long or short.
- Complex systems display behaviour that results from the interaction between components and not from characteristics inherent in the components themselves. This is sometimes called emergence.
- Asymmetrical structure (temporal, spatial and functional organisation) is developed, maintained and adapted in complex systems through internal dynamic processes. Structure is maintained even though the components themselves are exchanged or renewed.
- Complex systems display behaviour over a divergent range of timescales. This is necessary in order for the system to cope with its environment. It must adapt to changes in the environment quickly but it can only sustain itself if at least part of the system changes at a slower rate than changes in the environment. This part can be seen as the 'memory' of the system.
- More than one description of a complex system is possible. Different descriptions will decompose the system in different ways. Different descriptions may also have different degrees of complexity."

A city is a complex system that does not operate under conditions of equilibrium, thus meeting the characteristics described above by Cilliers (2005). Especially in this age with its multiple possibilities of communication and fast change, "pressures in urban regions demand a capacity to interrelate issues to do with economic development, environment quality and social quality of life within a framework which acknowledges the different and diverse stakeholders in the dynamics of urban region change" (Healey, 2006, p.82).

Planning theories attempt to deal with the complexities and diversities of urban systems by explaining them, by developing public policies, and by forming a basis for the practice of planning (Allmendinger, 2002). For instance, according to Campbell & Fainstein (1999, p.3), planning theory is placed "at the intersection of political economy and intellectual history." In this way planning theory may inform practice and be an interchange of ideas with other disciplines (Campbell & Fainstein, 1999).

In practice, planning seeks to deal with the interrelations between the functions of urban systems, and with the functioning itself. According to Klosterman (2008, p.86), in the USA planning emerged to cope with the urban problems of the industrial city.

> "Planning emerged [...] as part of a broader attempt to deal with the ugliness, inefficiency, disorder, and corruption of the new industrial city. Reflecting its roots in the professional fields of architecture, landscape architecture, and civil engineering, the early profession concerned itself with the physical city and the preparation of master plans laying out a long-range, comprehensive design for the city's future form."

Planning in practice systematically intervenes in public and private interests, and the decisions arising from the planning process can mean benefits or losses for different people or groups. This sometimes leads planning into a controversial realm and into political disputes (Levy,

2011). The way the planning process emerges, makes up its framework and evolves in each city is due to its culture and the culture of the individual city, and also due to the prevalent approaches and theories of each specific society, that enable planning activities.

2.2.2 Planning cultures

> "Comprendere le manifestazione della post-modernità richiede una governance multiculturale"[17]
> (Perrone, 2010)

What have philosophy, ideology and culture to do with planning?

The way urban settlements are designed is historically founded on the prevalent paradigms of the time, related to their understanding of life and its social, political and economic relationships.

Cuthbert (2006) discussed philosophy and urbanism by attempting to understand the relationship between urban design, socio-economic and spatial development, and the various philosophical schools across the ages. In the days of Ancient Greece, philosophers such as Aristotle, Plato, Zeno and Hippodamus stated their ideas about the *polis*, even if they did not intend to set urban planning rules, concerning themselves with the size of the cities and their organisation and supplying. Later on the philosophies of Hegel, Kant, Durkheim, Weber, Marx, Foucault and others, influenced the way that spaces and territories were occupied and settled. For Aristotle, cited by Morris (1979, p. 36), "a town should be built so as to give its inhabitants security and happiness" and during the industrial revolution Karl Marx discussed the development of cities from the point of view of the political economy and the struggle between classes. Yet in the twentieth century urban design theory and planning was strongly influenced by the Vienna school and the Bauhaus movement.

According to Cuthbert (2006) the spatial form is clearly influenced by philosophy and social sciences, but the issue is still not discussed enough in the light of urban design and planning.

> "While the masters of sociological thought during the nineteenth century were concerned with neither space nor form, the twentieth century generated several significant incursions into the relationship between socio-economic practices, spatial patterns and the built form of cities. There was a similar movement in methods of explanation, from the structuralist functionalism of Marx and Freud to their nemesis within the feminist critique of postmodernism. While the theoretical bridge has been made from social process to spatial patterns, connections to built form, usually seen as arbitrary, have only been given passing consideration" (Cuthbert, 2006, p.54).

Therefore, there are opportunities for more in-depth studies and applications to better understand the matter and its broad relationship to urban and transport planning.

[17] In English: The understanding of the manifestation of post-modernity requires a multicultural governance.

Levy (2011, p. vii) argues that "the study of planning quickly takes one into ideology. Planning issues and controversies inevitably raises questions about the proper role of government and the line between public needs and private rights." This means that planning is also a political problem involving all branches and political visions within an area, influenced by their ideologies towards the uses and the governance of the territory. Based on that, political and ideological arguments about the role of the planning process, within the planning process itself, can make big differences and lead the planning into all kinds of diverse directions. Rhetoric can change the course of action (Aristotle, 1985). The way planners act or intervene will betray their political position in some way, and influence the results of a plan. Forester (1999, p.176) points out that:

> "Planners need to solve analytic problems […] in spatial and political contexts in which the way in which they articulate their results will matter. Analytic techniques matter, but so do strategies of representation (visual and textual, graphical and electronic), and capacities of argumentation, mediation, and public deliberation – and all these can be done better or worse."

Culture is defined by Tylor (1873, p.1) as "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society." Culture is produced by humans and by their relationships between themselves and with the environment. Gullestrup (2006, p.57) describes culture as the way humans conceive of the world, mediated by their values, morals and behaviour in a given environment and time. In this way a generation has its own understanding of the world, producing material and immaterial results and trying to reproduce the patterns for the next generation. For knieling & Othengrafen (2009, p.41):

> "The essential of culture consists of traditional ideas, ideologies and the values attached to them. Culture consists of the derivations of experience, more or less organised, learned or created by the individuals of a population (socialisation), including images or decodements and their interpretations, from contemporaries, or formed by individuals themselves. […Therefore,] culture is never homogeneous, but heterogeneous. Because of its subtle and complex character, […and] because no population can be adequately characterised as a single culture, it is rather a collection of different subcultures. These subcultures may exist among occupational groups, social classes, genders, races, religions, professions, corporations and social movements."

Drawing on the main points of the above statements, culture is already highly complex in itself. We can see this complexity in any given time and place in human history, through the many variables influencing it. The complexity increases as it evolves over time, as in the case of planning. As told by Höcklin (1995, p.4), "the essence of culture is not visible on the surface. It is the shared ways groups of people understand and interpret the world. These differing interpretations that cultures give to their environments are critical influences on interactions between people working and managing across cultures." Therefore, the feasibility of a plan must be oriented according to the context of where, when and who are involved in planning and in wider society, and according to an understanding of the assumptions and values of the local culture.

Furthermore, societies are composed of different groups where exclusion can exist due to social, economic, territorial or ethnic factors. The planning cultures of each group are to be expressed and recognised on the landscape. Institutions also have their own cultures of planning (Innes & Gruber, 2001). Planning around the world is not standardised, which is why different planning approaches can be compared (Abram, 2011) and lessons can be learned. Planning is not universally rational but it follows the local history, the local context (Abram, 2011) and the story of people in a "multiethnic, multicultural contexts in which conflicting notions of identity are at play" (Sandercok, 2005, p.307).

In post-modern times governance has to lead multicultural societies, face different ideologies and ways of living, and deal with conflicts surfacing through differences of interest, particularly between the more extreme fringes of different cultural groups throughout the urban fabric. As claimed by Perrone (2010, p.100):

> "Le politiche per una governance multiculturale dovrebbero concentrarsi sulle relazioni tra le culture, piutosto che sulle culture e basta, e più precisamente proprio su quello spazio che sta nel mezzo fra le cultura […] un spazio intermedio, spesso aggrovigliato da relazioni interculturali, che diventa esso stesso sintesi culturale e che rende possibile la coesisteza e l'esistenza delle diverse culture, secondo rapporti di mutuo sostentamento e arrichimmento."[18]

As claimed by Friedmann (2005), planning cultures are in transition and this is a part of their nature. "The activity of planning is understood and practiced differently in different institutional settings that vary significantly across countries and even cities. Moreover, within any given setting, planning must continuously reinvent itself as circumstances change" Friedmann (2005, p.29). The changes seem more challenging and competitive within the current society, the so-called "information age" (Castells, 2005) or "network society" (Castells, 2004), where transformation in the territory impacts directly on the way people settle, engage in activities and move around, designing new "spaces of flows" and "spaces of places". Different from the past century where the discussions on physical, spatial, urban and regional planning were more related to the interrelation between "fixity" and "mobility", referred by Healey (2007, p.2) "as the relation between land uses and infrastructure channels". Castells (2005, p.46) argued that:

> "Spatial transformation must be understood in the broader context of social transformation: space does not reflect society, it expresses it; it is a fundamental dimension of society, inseparable from the overall processes of social organisation and social change. Thus, the new urban world arises from within the process of information of a new society, characteristic of the Information Age."

[18] In English: the politics towards multicultural governance must concentrate on the relationships between the cultures, more than on the cultures themselves, and that's it; and most precisely, on that space in between the various cultures. That intermediate space, ever tangled by intercultural relations, that becomes itself the cultural synthesis and makes possible the co-existence and the existence of the diverse cultures, according to a mutual support and enrichment.

Therefore, Castells (2005) defends the need of new theories to explain and plan spatial forms and processes, which can provide answers to the social and spatial contexts developed under these accelerated technological changes, which design new patterns of relationships and culture for social and political manifestations. The new configuration of society in the Information Age implies the need of a new culture of planning process and decision-making. Today the populations at large possess more information and a broad range of possibilities to intervene in public affairs. Decision-making has become much more complex in this new society (Hollnagel, 2007). Well-known cases described in the literature have mentioned contention within decision-making processes for planning urban and transport projects in the recent past. Public contestation can arise because "citizens obviously do not see themselves well enough represented through the elected politicians. Regular information and participation do not seem to offer satisfactory co-decision opportunities for including critical citizens" (Rothfuß, Perrone, Mororó, 2012, p.93). Due to abovementioned factors, a new culture of political and social relationships in public affairs is being designed, following the paths of the transformations within society, which call for different approaches for planning urban transport.

2.2.3 Planning styles

Planning culture is similar to the so-called 'planning styles'. In practice, for the case of transport planning, it is worth mentioning the experience of San Francisco Bay Area, in the USA. The planning styles approach was proposed within a study based on transportation decision-making in the San Francisco Bay Area. The research attempted "to develop a coherent and detailed story of the transportation planning process" (Innes & Gruber, 2001, p.8) in the area, to find out if the established collaborative planning group was producing results in order to strengthen regionalism or just to benefit individual jurisdictions, founded on the hypothesis "that genuine regionalism would require collaborative dialogue among the key players" (Innes & Gruber, 2001, p.6). The planning activities were the responsibility of the regional agency supported by technical staff, and involved 100 cities and the 28 transit agencies in the metropolitan region.

The approach was designed analysing the criteria related to:

- Information
- Public participation
- What a good plan would be like

The referred study in Bay Area concluded that planning development brings about contention during the process. It happens on one hand because "most of the time it involves many players and many interests all seeking different outcomes or protecting different turf" (Innes & Gruber, 2001, p.5). But, on the other hand, the most important aspects of the contention "can be due as much to differences in planning styles as to substantive disagreements or power struggles" (Innes & Gruber, 2001, p.5). The differences in cultures, in planning process organisations and in decision-making processes, based on the internal planning methodologies of the different institutions, can lead to disagreements among the actors and influence the results. The

explanation for these outcomes is that there are different planning styles competing in the process.

The findings of Innes & Gruber (2001, p.5) show that there were four dominating planning styles performing in the planning process of the metropolitan area: technical/bureaucratic, political influence, social movement and collaborative planning (Figure 36). For the authors each style has specific strengths and limitations, and each one is suited to different situations. The diversity of players and interdependence of interests in one area or between different areas can form the strength and weakness of each style and can determine the final results of a plan.

The planning style in use in each area in different time frames "was a product of at least two forces: the influence of long habits and expectations among the players.[...] State and federal legislation governing transportation decision making reinforced, and at times almost required particular planning styles" (Innes & Gruber, 2001b, p.5). Taking into consideration the second force, the authors point out that the direction of legislation to specific planning process patterns, which is raising political influence into the process, is a negation of the same legislation which states that planning must be developed on a collaborative basis. Following the ideas of Levy (2011), planning is always political. It is not possible to develop a plan without a political influence. Even though the position is not represented by a political party, the people involved in the planning process always have an ideological point of view.

Furthermore, the styles can be established and influenced by the existing political and organisational structures in the area. As shown in Figure 36, the level of diversity of players and of the interdependence of interests among them, move the organisation of the planning process in a particular direction. In one area where a high diversity of players and different objectives exist, the technical/bureaucratic style does not work, because this style needs unitary decision making and the convergence of interests on a 'best' proposal. On the contrary, the collaborative style is successful, considering that it works by co-involving the different players in designing a solution.

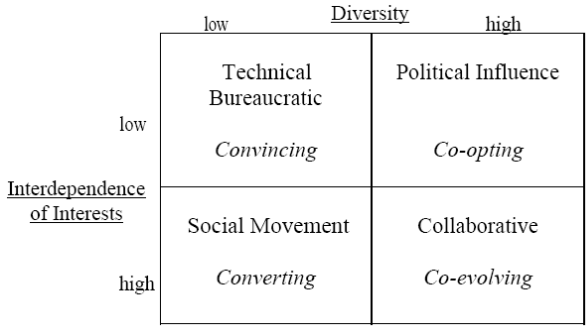


Figure 36: The four styles of planning. Source: Innes & Gruber (2001b, p.22).

Innes & Gruber (2001b) describe the four planning styles as follows:

- Technical/Bureaucratic Planning Style: represents the traditional plan style. In this case, the technicians are in charge of the process and decisions, and lead the other players into

adhering to their original proposal. The objective is to reach the best solutions, based on technical scope and scientific conclusions.

- Political Influence Planning Style: This planning style is not taught to professional planners or policy analysts, who do not even regard it as a proper planning style. However, in transport as in other policy arenas, this is the dominant approach in practice. In the political influence style, a leader or the public institutions work with players on a one-to-one basis, keeping them personally attached and cooperative with a larger agenda by offering each of them things they want.
- Social Movement Style: arises outside of public agencies, generally among groups who feel excluded from public decision-making processes. In this planning style, a set of interests join together around a vision. The goals of such groups are to convert people to their views and thereby mobilise public support to influence the decision process. The idea is to make the collective voice of the coalition so powerful that it has to be heard, typically through public demonstrations, media attention, direct democratic decision making – if the legal provisions in the respective country allow for – and litigation.
- Collaborative Planning Style: stakeholders formally representing differing interests in a shared problem meet for face-to-face dialogue and collective construction of a strategy to address the problem. Participants learn about each other's interests and the problem and, through joint fact-finding, agree on information they can all trust and use. They reach mutual understanding and shared meaning. The players learn and co-evolve in the process. Under the right conditions, this dialogue can produce results that are more than the sum of the parts and strategies that are only possible through collaboration (Connick & Innes, 2001). The stakeholders must represent diverse interests, and decisions must be taken only when all, or most, are in agreement. It may take the form of formal consensus-building or other types of collaborative discussion.

A relevance of the study developed by Innes & Gruber (2001) is they set a ground for a very complex topic of urban transport planning: planning process organization. The authors analyse the main actors involved in the process of planning when they are actually "in action", playing their role in a real environment. Furthermore, it was analysed if the "styles of planning" have important repercussion on the development and implementation of measures and in the decision process.

Table 8 below describes some characteristics of the planning styles based on: public participation, information and 'what is a good plan?' for each style.

Table 8: Planning styles characteristics.

PS	Public Participation	Information	What is a good plan?
Technical / Bureaucratic	• Very limited role. • Strict division of labour. • Citizens and elected officials provide the values and goals and review the alternatives to make decisions among them. • Planners develop the alternatives and conduct analysis. • Public workshops or hearings have the objective to ask for feedback and appraisal concerning predefined alternatives.	• Using mostly quantitative information developed by the planners or their consultants. • Using information on the status and characteristics of projects. • Information from sources other than government agencies are typically mistrusted and rejected.	A good plan from this perspective is one that meets all the requirements of the legislation, is consistent with the official goals, and has all the backup information required.
Political Influence	• Where public participation does exist, it ideally involves a blue ribbon committee of handpicked, trustworthy and well-respected individuals from different sectors.	• Political planners do not ask what will best solve the problems or what is most cost-effective. • Choices are not made based on data about a problem or project. • Good supporting data is necessary to fulfil the requirements of funding and to justify the choice of a project.	In the political influence style, a good plan is one that has the support of all the powerful players. It is the sum of the individual interests of the powerful players. The vision is that money would flow, funding would be compulsory each year, visible projects would be built, and the key players would be satisfied.
Social Movement	• Mobilisation of members for key meetings. • Networking among the interests. • Hiring of professional staff to represent their views in many arenas. • Attracting media attention to their issues.	• Primarily, use of data and stories to help dramatise the issues and persuade others to support their vision. • Using of academic studies or other existing research to help them decide what positions to take on specific topics. • Being selective in what they publicise and how they tell their story. • Using data for advocacy rather than to question or develop their vision.	A good plan is one that implements the group's vision.
Collaborative Planning	• Stakeholder participation is crucial. • But broader public participation is not important if all interests are represented at the table and all have the opportunity to be informed and listened to. • Conventional participation methods are necessary, but often counterproductive because they bring in people unfamiliar with the issues. These methods do not allow the sort of dialogue that creates in-depth understanding of the choices or informed participation.	• The information that counts in collaborative planning is what stakeholders agree is true, which may or may not include what experts or staff say. • In many collaborative processes, joint fact-finding is conducted, where experts are given careful instructions about what is wanted. • If stakeholders jointly construct information, that information becomes influential.	A good plan is one which responds to the interests of each of the players and which creates joint benefit. A good plan produces learning and positive working relationships along the way. Accommodating the interests of all stakeholders requires individuals to step back from parochial views to see how the actions of each affect the others. It also produces strategies that are designed to accommodate differences.

Source: designed on the basis of Innes & Gruber (2001b).

2.2.4 Urban and Regional Planning

Healey (2004, p.46) defines spatial planning as:

> "Self-concious collective efforts to re-imagine a city, urban region or wider territory and to translate the result into priorities for area investment, conservation measures, strategic infrastructure investiments and principles of land use regulation. The term 'spatial' brings into focus the 'where of things', whether static or in movement; the protection of special 'places' and sites; the intersections between different activities and networks in an area; and significant intersections and nodes in an area which are physically co-located."

The foundations of twentieth century planning theories were laid during the urbanisation process of the industrial revolution. The liberation of human beings and animals (such as horses and cattle) from a dependence on nature to generate energy for production and mobility after the invention of the combustion engine, created the conditions for new types of human settlements and for the growth of urbanisation. New patterns of socioeconomic organisation, based on industrial production, needed new spatial conditions to accommodate the power plants, the market, the government staff and the housing for the mass workforce. The dilemma for urban planning and design was already in place during the industrial revolution, even though theories of industrial city planning were far from conception. During this period the cities grew fast and mostly spontaneously, producing meaningful problems as the cities expanded, like unhealthy conditions, poor housing, and problems of supply. The United Nations Human Settlements Programme Report (UN-Habitat, 2009, p.5) points out:

> "'Modern' urban planning emerged in the latter part of the 19th century, largely in response to rapidly growing and polluted cities in Western Europe, brought about by the industrial revolution. The adoption of urban planning in this part of the world as a state function can be attributed to the rise of the modern interventionist state. Urban 'visions' proposed by the leading pioneers of urban planning in Western Europe and the US in the late 19th century were to shape the objectives and forms of planning, which in turn showed remarkable resilience through the 20th century. Planning was seen as a technical activity in the physical planning and design of human settlements, with social, economic or political matters lying outside the scope of planning. Planning involved the production of master plans, blueprint plans or layout plans, showing a detailed view of the built form of a city once it attained its ideal end-state. The legal tool for implementing these visions was the land use zoning scheme."

According to Grant (2006, p.29) "modern town planning had its roots in utopian communes. Through the last two centuries it gradually shifted its definitions of the problems of urban living and its options for solutions."

Grant (2006, p.32-33) summarised some models that influenced the shape of 20th century cities, as described in Table 9 below.

Table 9: Models that influenced the shape of 20th century cities in the Western world.

Movement	Defined problems	Dominant values	Proposed solutions	Fate of the movement
Utopian communes	Poor living conditions Inequality The greed of capitalism	Equity Participation Self-realisation Cooperation	New social order Ideal form of community Education Shared housing	Lack of funds Internal discontent Too radical Failed
Model factory towns	Labour unrest Poor housing Immorality	Hierarchy Efficiency Morality Amenity Cleanliness	Cleanliness Green space Spaciousness Good housing Education	Costly to implement Labour unrest continued Limited experiments
Technical and regulatory reform	Disease Land conflict Inefficiency	Efficiency Health Amenity Cleanliness	Separate uses Building codes Regulations	Became too bureaucratic Monotonous streets Successful
City beautiful	Ugliness Deteriorating city Competition Need for identity	Amenity Beauty Growth Competitiveness Urbanity Tradition	Gracious buildings Civic centres Classical architecture Boulevards	Costly Lacked popular support Scale too grand Popular for capital cities Limited experiments
Garden city	Sprawl Huge cities out of scale Separation from nature Costly housing Poor conditions	Equity Amenity Health Efficiency Family Community Nature Rural life	Develop on cheap land Control growth Limit density Emulate natural patterns Separate uses	Became dominant idea of twentieth century Simplified over time to mean wide lots, wide streets, parks
Neighbourhood unit	Car / pedestrian conflict Lack of identity and community	Amenity Family Efficiency Community	Separate traffic Separate uses School at centre	Became very popular Fused with garden city ideas
Modernist city	Sprawl Nostalgia Hierarchy Obsolescence Muddle	Technology Equity Efficiency Urbanity Functionalism	High rise High density Towers in parks Land use segregation Road hierarchy	Popular for city centres and public housing Some elements fused with garden city
New urbanism	Sprawl Car oriented Development Ugliness	Amenity Equity Walkability Community Tradition	Mixed use Increased density Mixed housing Urban standards Modified grid	New professional ideal adopted by local government in late twentieth century Popular with some segments of market
Urban village	Lack of character, sense of place and community Lack of affordable housing	Urbanity Amenity Equity Walkability Community Tradition Village life	Vernacular/classical style mixed use Increased density Mixed housing Village standards Vernacular style	Hard to achieve affordable housing Danger of reduction to design elements

Source: designed on the basis of Grant (2006, p.32-33).

Healey (2006, p.72) affirms that spatial planning is a field of public policy practice that has evolved in two levels of governance: one as a system of law and procedures, that determines the foundation and the guidelines for specific planning practices within the designing and

operation of planning systems; the second involves the design and operation of planning practices, where various parties are gathered together to carry out planning work. Following the thoughts of Healey (2006), most of the publications on planning have considered it an inherent public issue (e.g. Banister, 2003).

For Healey (2006, p.73):

> "Spatial planning systems have typically evolved in an urban context to set limits on what private owners can do with their sites and buildings. They are explicit recognition that spatial coexistence at high densities leads to tensions. These may be between one property owner and another, or between people for whom a property is an attribute of their local environment and the individual land and property owners."

Friedman (2005, p.213) wrote that "spatial planning is best viewed as a set of interdependent processes involving multiple actors that seek to create more liveable, life-enhancing cities and regions." The implementation of the different spatial planning models in Western cities, also with the adaptations for each country and region, shaped the cities of today. The legacy of these models in use over time for urban development and for urban transport is seen nowadays in good and bad results.

> "Unfortunately, experience shows that many of the initiatives taken to fix nineteenth-century problems launched the trajectory that generated twentieth-century problems. We can plan for the future, but we cannot control events. Heaven only knows what issues contemporary solutions will generate for our descendants. […] The garden city in its popularized form came under attack by the 1970s for generating sprawl and monotonous suburbs. Modernism carried the blame for generating ugly places with no character or soul. After 25 years of practice, new urbanism finds itself accused of promoting gentrification, enabling attractive sprawl, and reducing the availability of public housing" (Grant, 2006, p.30; 177-178).

The European continent developed different approaches to planning based on its traditions and cultures. The *Compendium of Spatial Planning System and Policies* (CEC 1997, p.36-37, in: knieling; Othengrafen, 2009, p.45) describes the EU members' four major trends of spatial planning:

- Urbanism tradition: strong architecture focus, based on urban design, townscape and building control; there is a lack of general public support and systemic coherence for the various laws and regulations (e.g. Mediterranean countries);
- Land use management: for these countries, planning is associated with the control of land use change, considering strategic and local levels (e.g. United Kingdom, Ireland and Belgium);
- Regional economic planning approach: pursues social and economic objectives, where central government and public sector investment provides the resources, considering especially the disparities in wealth, employment and social conditions between regions (e.g. France and Portugal);

- Comprehensive integrated approach: the focus is more on spatial coordination than on economic development; spatial planning is organised in a systematic and formal hierarchy of plans, coordinating public activities across different sectors (e.g. The Netherlands, Scandinavian Countries, Germany and Austria).

2.2.4.1 Urban design and land use

"Space has been shaped and moulded from historical and natural elements, but this has been a political process. Space is political and ideological. It is a product literally filled with ideology" (Lefebvre, 1976).

Frick (2006, p.19) describes the fundamental principles of urbanism as:

> „Städtebau bezieht sich – nach dem Wortsinn – auf das Bauen von Stadt. Stadt ist der Gegenstand, Bauen eine auf die Herstellung, Veränderung oder Beseitigung von Gebäuden, technischen Anlagen und Pflanzungen gerichtete Tätigkeit. Beim Städtebau geht es aber im Unterschied zur Einrichtung einzelner Gebäude nicht um das Bauen an sich, sondern um die *Anordnung* von Gebäuden und ihre *Beziehung und Verbindung* zueinander (Cerdà) und um die Koordination und Steuerung der Bautätigkeit in einem Gebiet. Das Bauen selbst ist Sache einer Vielzahl von Handelnden, privaten und öffentlichen. In einem allgemeinen Sinne muss es bestimmte Mechanismen der *Koordination und Steuerung* der Bautätigkeit gegeben haben, seit es Städte gibt, sonst hätten sie nicht ein Mindestmaß an baulich-räumlicher Organisation erlangt, die es den Einwohnern erlaubte, ihre Städte sinnvoll zu nutzen und wahrnehmen zu können"[19].

The garden city movement and the modernists designed cities that were supposed to be the opening of the progress and the expansion of industry, especially the automobile, in the twentieth century. Therefore, the open and expanded city was very attractive, with wide roads, separated traffic and urban functions. The Athens Charter of 1933 confirms those ideas referring to the orientation of land use planning, projecting the city into separated urban functions, especially those related to the main functions: work, housing and road infrastructure.

The philosophy for urban design and land use founded on separated functions was the basis of urban planning until the seventies for most countries, and for many developing countries this

[19] Urbanism - in a literal sense - refers to the building of a town. The city is the object; building is the activity of construction, change or removal of buildings and technical installations and the planting of gardens. Urbanism is not only about the construction of an individual building and not the building activity itself, but the arrangement of buildings and of their relationships and connections with each other (Cerdà) and the coordination and steering of the construction activities in an area. The building itself is a matter for a variety of actors, private and public. In a general sense, it must have specific mechanisms of coordination and control of the construction activities, since there are cities which have not attained a minimum level of structural and spatial organisation. Residents must be allowed to use their cities and feel a part of them.

pattern is still in use. The comprehensive plans, based on the reinforcement of legislation, formed the basis of urban design.

The criticisms of this model were strongly and openly raised at the beginning of the sixties by the American Jane Jacobs in the well-known book that inspires planners to this day, 'The Death and Life of Great American Cities'. She defended the idea of mixed-use to create liveable and vibrant cities, arguing that this pattern for land use could maintain the development of neighbourhoods and consequently of city life. For Jacobs (2011), planning and design would emerge in a bottom-up direction, the opposite of what was claimed by the Modernist technical planners.

Grant (2005, p.17) describes the benefits suggested by the proponents of mixed-use:

> - "Mix creates an urban environment active at all hours, making optimum uses of infrastructure.
> - Smaller, post-baby-boom households can have a greater range of options (rather than just detached homes).
> - Mixing housing types could increase affordability and equity by reducing the premium that exclusive, segregated areas enjoy.
> - By providing housing close to commercial and civic activities, planners could reduce the dependence of the elderly and children on cars.
> - Enabling people to live near places where they can shop, work or play could reduce car ownership and vehicle trips and increase pedestrian and transit use, thus alleviating the environmental consequences associated with automobile use."

2.2.5 Urban development and urban form

Over the centuries the settlement and organisation of communities gradually became the basis of current development. After the industrial age's growth of urbanisation and all its effects on the territory and on the lives of the population, urban development has become a matter for studies of political economy, planning and policy-making. The growth of cities also brought together the effects of disaggregation of the territory, suburbanisation, urban sprawl and regionalisation (Banister, 2003).

Figure 35 shows a diagram of urban development structures by number of centres and level of concentration: from compact-monocentric development to the dispersed-polycentric pattern.

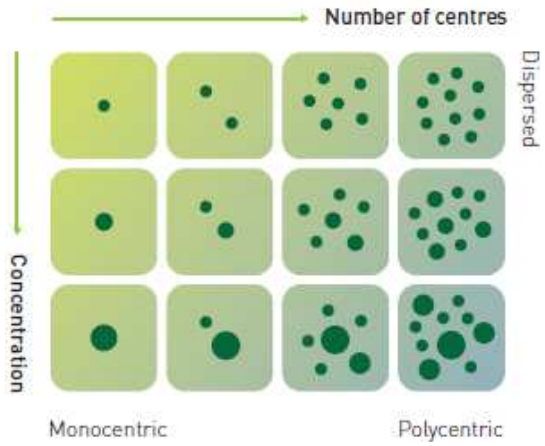


Figure 37: Urban structures by number of centres and level of concentration. Source: European Union PACT Research Project (European Commission, 2010, p.6).

Models for managing the development and growth of urban areas are abundant in development literature and in empirical cases presented around the world. For instance, New Urbanism suggests the idea of the smart growth of cities, and in European cities ideas of city-regions and clusters are proposed as methods of managing urban growth and economic development. European projects were developed intending to propose regional policies for territorial cohesion to reduce social disparities on their countries. Programmes were designed for regions under the "Convergence", "Regional Competitiveness and Employment" or "Territorial Cooperation" objectives (Piorr, Ravetz, & Tosics, 2011, p.91).

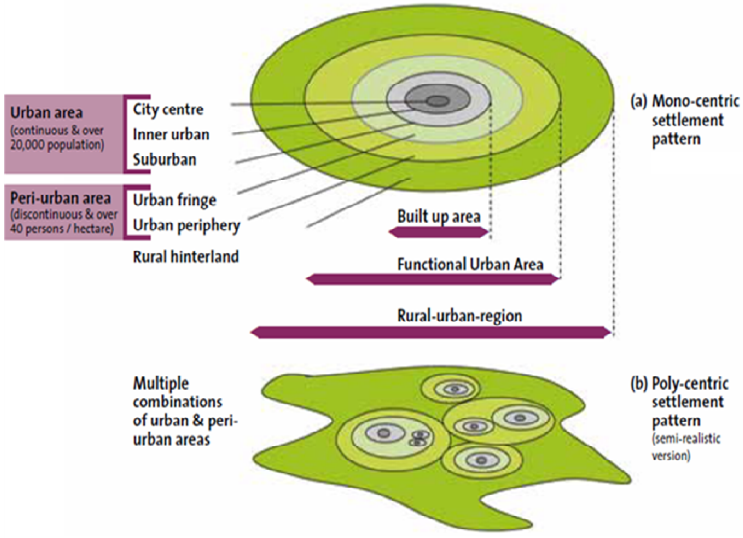


Figure 38: City shaping over the territory. Source: Piorr, Ravetz, & Tosics (2011, p.25).

The targeting of territorial cohesion and regional policy programmes involves taking more into account the urban-rural relationship and the specific role of peri-urban areas within regional analysis followed by the implications for the peri-urban agenda. "If each of these challenges is addressed in isolation from the others, the situation could worsen. So to integrate and generate added value, we need to explore 'integrated development pathways' for 'peri-urban territorial cohesion" (Piorr, Ravetz, & Tosics, 2011, p.106).

Piorr, Ravetz, & Tosics (2011, p.114) propose an integrated approach to managing the peri-urban areas, seeking to avoid sprawl and manage sustainable growth territorial cohesion. “The challenge of managing peri-urban areas calls for multilevel, multi-sectoral, multifunctional ‘integrated governance for peri-urban territorial cohesion’. But this is easier said than done” Piorr, Ravetz, & Tosics, 2011, p.114).

Nevertheless, the real city of today is a result of the planning models implemented over years and also of the “no-planning” model, what are better understood as unruly city. The literature deliver descriptions of models in use and the resulting urban form shaped over time in practice. Some of these urban form types are defined below.

a) Unruly City (UC)

Cities are places where housing and different activities are developed, for instance commerce, industry and education among others. Cities are supposed to be ruled, organised and controlled by a government. The term “unruly city” refers to cities or spaces within a city where there is no control, organisation or planning by a government level or institutional. These kinds of city have spontaneous growth and difficult issues of governance (Hall, 2007; Pile, Brook, & Mooney, 2005). The spatial occupation and the urban functions are settled by individuals and later it is based normally on non-written agreements among the local population organisation (Garcia, 2009). These spaces are also called “informal urban spaces”, “informal cities” or “subnormal areas” (IBGE, 2011), because in general, the activities and the use of the territory are not regulated or controlled by a government. The people living in these areas develop their own rules for occupying the territory. This pattern for city development is frequently seen in the developing countries. Many cities in Brazil and Colombia have their expansion areas under these conditions of dwelling and transport infrastructure, due to the fast and uncontrolled urbanisation taking place since the seventies (Gonçalves, Rothfuß, & Morato, 2012).

b) Sprawling city (SC)

Sprawling is an “American word, introduced in the 1950s to describe the urban growth spilling out from the edges of towns” (Ingersoll, 2006, p.3). The European commission (2010, p.25), discussing this pattern of spatial development has defined it “as the low density expansion or leapfrog development of large urban areas into the surrounding rural land.” Many cities with rapid population growth in developing countries have gone into sprawl development, reaching the city outskirts, going into rural areas, with widespread informal housing, lack of sanity, extensive poverty, within an informal hypergrowth (Hall, 2007).

Ewing (1997) proposed three main indicators of sprawl development:

- Leapfrog or scattered development;
- Commercial strip development;
- Large expanses of low-density or single-use development (as in sprawling bedroom communities).

Sprawling cities have spatially dispersed urban functions. For McElfish (2007, p.1), "Sprawl development is characterized by low density development that rigorously separates residential uses from other land uses, and that relies entirely or almost entirely on automobile transportation to connect the separate uses". The connection of the suburban areas to the city centre is made by trains or highways. In general the long distances covered, coupled with the congestions on the main intersections and bottlenecks into the access roads to the centres, result in long commuting times. "Furthermore, sprawl can be characterized by its change of land use composition. […] urban sprawl describes a large scale conversion process of natural or semi-natural surfaces to urban uses" (Fina & Siedentop, 2008, p.490).

The European Union project's SCATTER summarised urban sprawl in three key concepts (SCATTER, 2005, Summary, p.16):

- Low density;
- Uncoordinated urban growth;
- Spatially segregated land uses (e.g. homogenous single-family residential development; shopping centres, retail and services; freestanding industrial areas).

Urban sprawl is the antithesis of the ideal compact city. The sprawling city can be shaped in a variety of forms, combining areas of more compact density with areas of completely dispersed development and contiguous suburban growth. It can also start in a central compact core and trigger the growth of a number of smaller satellite towns. This process is characterised by empty spaces between the city and its satellites, by linear patterns of strip development, and by leapfrog and scattered development (SCATTER, 2005).

c) Compact City (CC)

The urban development concept known as the "Compact City" has evolved with more significance in conjunction with the emergence of the concept of sustainability for urban growth. The purpose of the idea of Compact City is to face the pattern of urban growth sprawl that is considered to be unsustainable and have negative environmental, social and economic impacts. Compact City has both the theoretical and political appeal of being able to concentrate the majority of future urban development within existing urban areas that in general consist of high density cities. Its principles derive measures "on urban intensification, creating limits to urban growth, encouraging mixed-use development and placing a greater focus on the role of public transportation and quality urban design" (Arbury, 2006, p.16).

The compact city has a high density, centralised development and a mixture of spatial functions. The European project (SCATTER, 2005) describes the case of Copenhagen's development plan and its effects on the shaping of the city over time:

> "The challenge for the city of tomorrow is how to combine a compact city with the need for green space near where people live. Several good examples already exist, mainly based on Scandinavian planning and building traditions. The basic requirements for the green compact city are as follows: Better coordination between transport, land use and open space

> planning. Copenhagen's master-plan of 1947, the so called Finger Plan, is an example of combined urban transport, land use and open space planning. Development was focused along transport corridors, the "fingers", driven by the near-to-station principle, according to which new workplaces should, as far as possible, be situated close to public transport links. Open spaces are preserved between the fingers as green wedges in the infrastructure. Although, over the years, there has been some development between the fingers, the vision behind the Finger Plan still forms the basis for the future development of Greater Copenhagen. Preservation of green infrastructure for walking and cycling. Another way to integrate transport and open space planning is by developing green and blue corridors so that people can use them for walking and cycling. In a new plan, Copenhagen is improving its network of cycle paths in an effort to encourage even greater numbers of its inhabitants to cycle to work."

This concept of urban development is favourable to the idea of non-motorised and public transport as the basis of the urban transport network (Bertolini, 2005). This pattern for spatial development combined with mixed land use would shorten distances needed between the urban functions, thus reducing the use of individual motorised transport.

d) Transit Oriented development (TOD)

Grant (2006, p.64), discussing New Urbanism, writes that smart growth can be a strategy to manage the good growth of cities, because when "growth is properly managed and the correct principles applied, the theory suggests, then growth can help to create better communities". The principles of the so-called Transit Oriented Development (TOD) cities match with these ideas. For the author:

> "Smart growth operates from the premises that growth is inevitable, and that if managed correctly it will prove healthy for the economy and the community. The problem with post-war growth, advocates say, is that it was handled badly. Growth management policies that tried to control growth with strict codes and tough zoning bylaws led to urban sprawl, exclusionary policies, long commutes to work, and high housing prices. […] Smart growth allows municipalities to plan for growth within the regional urban framework and thus make good use of existing infrastructure while reducing negative externalities" (Grant, 2006, p. 64).

The main characteristics of a transit-oriented design cited by the Transit Oriented Development Institute (2010, n.a.) are:

> "Walkable design with pedestrians as the highest priority; train station as prominent feature of town centre; a regional node containing a mixture of uses in close proximity including office, residential, retail, and civic uses; high density, high-quality development within 10-minute walk circle surrounding train station; collector support transit systems including trolleys, streetcars, light rail, and buses, etc.; designed to include the easy use of bicycles, scooters, and rollerblades as daily support transportation systems; reduced and managed parking inside 10-minute walk circle around town centre/train station".

Transit Oriented Development has strict co-ordination of land use and urban transport. The network must be composed using the different transport modes: walking, public transport and private transport.

e) Decentralised / Polycentric Development (DPD):

This type of urban development normally has a central urban nucleus where the main urban activities, surrounded by multiple small urban centres, are located. The urban form comprises a mass of housing, industry, retailers, and also agricultural and green areas with no proper boundaries for the urban areas. This settlement structure is absolutely dependent on its transport network, roads and high density public transport, to connect the urban centres. “Commuting within the dispersed settlement is multi-directional, following the transport network pattern” (Cerne, 2004, p.88).

f) Regional urban development (RUD)

Regional movement of people can create environmental pressures and social fragmentation. Regional Urban Development, as a general definition, comprises a transboundary development of the city territory considering one or more of the following aspects: spatial, economic, political, administrative, environmental and social (Piorr, Ravetz, & Tosics, 2011, p.50). The level of organisation of a specific regional urban development can vary from spontaneous growth, forming urban agglomerations as it is found in many developing countries, to the organisation of metropolitan regions, consortiums of cities, agreements, cooperation and joint administration.

Okabe (2005, p.55; 59) describes the urbanisation process by differentiating monocentric development, with its single cores, from the polycentric development, “consisting of closely located administratively independent cities”, which produces the city-region. The author argues that monocentric development leads to sprawl when traditional planning practices try to control land-use and urban density based on the enforcement of laws, and based on a dual perspective of urban versus rural, where the expansion of the urban area is seen as invading agricultural areas. The city-region must be seen as a framework keeping a coherent regional unit, under flexible and dynamic management, where the rural and urban characteristics are identified as green and built-up areas.

Furthermore, cities within a region can organise regional networks and clusters with economic and social purposes, as is found in European countries, where common visions and goals are set aiming to create an innovative environment to jointly develop the areas (as seen in Figure 39). They are “often formed from a heterogeneous group of different actors including representatives of firms, universities, technology centres, and development organizations [and government. Additionally, the members] are typically involved in global competition and they belong to sectoral interregional networks” (Harmaakorpi & Pekkarinen, 2003, p.3).

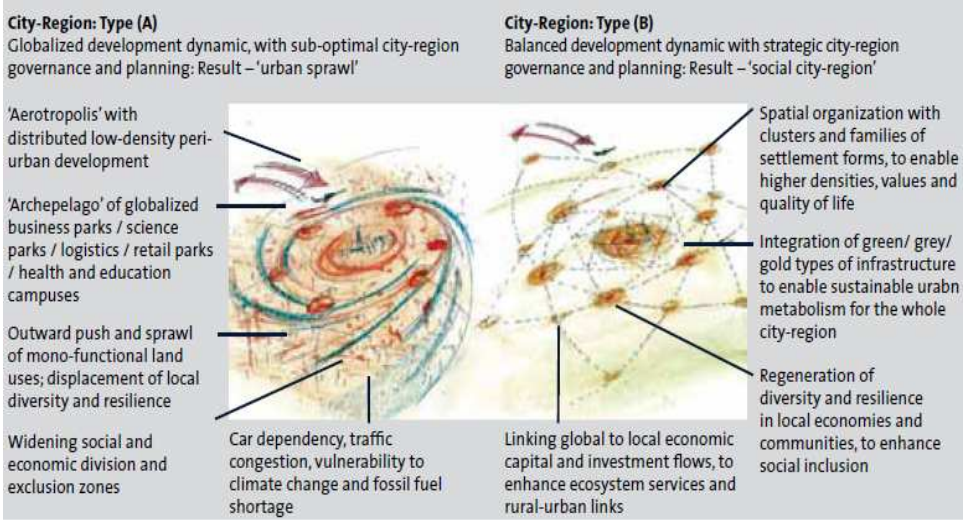


Figure 39: Visions and goals for the City Region: European analysis. Source: Piorr, Ravetz, & Tosics (2011, p.118).

2.2.6 Urban and transport systems renewal and regeneration

Today with our great concern for the environment, we can see that the depletion of natural resources, the deterioration of city centres, the bad housing on sprawling peripheries, the decline of many traditionally industrial areas and urban infrastructures, including those serving transport, all of which are results of industrialisation and past development patterns, need a solution in terms of making urban spaces liveable and sustainable. The question is what to do with these already-built areas that served the old patterns of urbanism and socioeconomic development. Should we leave these long-ago-constructed areas behind, allowing for the transformation of these spaces and old infrastructures into a massive abandoned Brownfield, and go ahead with opening new development areas and settlements, expanding the cities into natural landscapes?

In order to answer this question many planners are raising their voices in favour of urban regeneration and renewal, which generally refers to the rehabilitation of urban spaces and services as a solution for the restructuring of the lives of cities. The report of the 'Urban Task Force' (1999, p.25) states that urban regeneration or "urban renaissance should be founded on principles of design excellence, economic strength, environmental responsibility, good governance and social well-being".

Schiler, Bruun & Kenworthy (2010) argue that the twentieth century bears a cumulative debt related to development patterns resulting from urban and transport planning models implemented over the years. Therefore, the authors claim that the construction of more sustainable transport and urban environments is only possible by way of urban regeneration and reparation and the renewal of what was damaged in the past in the physical environment. Their policies include firstly "regeneration, repair and renewal of the physical environment"; secondly, "regeneration, repair, and renewal of the social and cultural environment"; and thirdly, "regeneration, repair and renewal of governance and decision-making institutions and the economic assumptions underpinning them" (Schiler, Bruun & Kenworthy, 2010, p.237).

These policies and measures must include:

> "All the movement and vehicle storage space that provides the mobility and accessibility needs of people and the greening of the environment in the broadest sense of the word. It also includes the restoration of public spaces, regeneration of transit systems and all transportation, the types of vehicles, the fuels they use, and the emissions that they produce and so on" (Schiler, Bruun & Kenworthy, 2010, p.237).

Meeting the demands of a sustainable city is not possible without facing the problems of the already developed areas, whether they are related to the built, unbuilt or natural environment. It is not possible to create sustainability without finding a way to bind the territory – considering the multifarious view of a territory (e.g. natural, social, cultural) and its coherence or lack of it – smoothing the flows in order to make territorial and social cohesion possible. Following these ideas, urban and transport regeneration is imperative within urban and transport planning and is a field worth exploring in the cities of developed as well as developing countries. It is worthwhile to consider regeneration, rather than to only draw attention to the construction of new infrastructures.

2.3 THE PLANNING PROCESS OF URBAN TRANSPORT

> "The whole point of futures is not to predict but to understand alternatives as a context for choices"
> (Slaughter, 2002)

According to Banister (1994, p.21), "The structure of the transport planning process followed the systems approach to analyses and mark the move towards an analytical approach rather than decisions being based on intuition and experience." For Friedrich (2007, p.4), planning process in urban transport aims towards "the preparation, implementation, enforcement and impact control of decisions on measures influencing the transport system."

Planning process for urban transport has been institutionalised and supported by legislation in many countries like the UK and the USA since the Second World War. Most of the time, the legislation delivered a framework where planners must follow the procedures proposed for the process. Dimitriou (1992, p.9) writes that "this process is a formalised planning methodology to provide guidelines and priorities." Friedrich (2007, p.5) argues that the planning process "handles the preparation of decisions about when and where which measures should be implemented within a defined time period in such a way as to optimally achieve the planning objectives taking into account all relevant restrictions." For Kelly and Becker (2000, p.17) some basic steps and tasks "are common to almost all forms of planning: data gathering, data analysis, policy making, implementation, and monitoring."

According to Patton, Sawicki, & Clark (2013, p.5), the classic comprehensive planning process includes these elements:

> "1- An extensive inventory phase, usually for gathering data on the natural geography and environment, on the physical infrastructure, and about the demographic and economic characteristics of the resident population
>
> 2- A search for alternative solutions, which may be described as exhaustive, but in fact is severely constrained, with significant alternatives eliminated before presentation to the client (the public)
>
> 3- The preparation of a plan
>
> 4- An unspecified client: "the public interest"
>
> 5- A subject-oriented, as opposed to a problem-oriented, scope (e.g. the transportation system versus congestion of the downtown loop)
>
> 6- A rather long-term perspective (at least ten years)
>
> 7- An apolitical approach to the process of implementation"

Britton (2007, p.16) presented seven points that ought to be considered for the scope and organisation of the urban transport planning process:

- Systemic: Does it select measure and address the full array of multiple objectives concerned?
- Flexibility: Does it permit a wide range of alternative planning, financing and implementation adaptations?
- Incremental: Can it be brought into line in phased steps permitting significant readjustments, fine tuning at acceptable levels of public discomfort and cost?
- Big House/Open Doors: Does the project by its nature invite and provide for active democracy, deep public participation and genuine city-shaping collaboration?
- Reconciliation: Does the process behind it demonstrate a mature capacity to reconcile valid opposites?
- Reversible: Can it be readily and cheaply reversed, radically restructured or later moved to a better location, if it proves unsatisfactory in performance at the selected site?
- Information availability: Is the necessary information available to diligent professionals for planning and implementation in other places?

Discussing the planning process, Hall (2002) presents the steps for the organisation of the process as following: first, defining goals, objectives and targets; second, forecasting, modelling and plan design; and third, plan evaluation.

> "This first stage in the planning process involves great difficulties of a conceptual and technical nature. In the first place, it is not entirely clear who should take the lead in the process. Broad goals for society, it might be argued, are a matter for the politicians, though the professional planner can play a valuable role by trying to order the choices. But politicians are largely involved with acute short-term issues; their timescale is very different

> from that of the planner, whose decisions may have an impact for generations. The public themselves form a very heterogeneous mass of different groups whose value systems are almost certainly very different if they are not in open contradiction" (Hall, 2002, p.215).

Different authors agree that the organisation of the planning process can affect the results of the plan and also that it is, in practice, a challenge for planners, especially concerning the process organisation, the availability and the quality of information, the actors involved and the process of decision. However, different approaches have been presented to analysing, organising and supporting the implementation of the planning process. In order to start the process of planning, it is necessary first of all the vision that it is necessary to intervene on a matter, then a decision maker need to call for a formalised process to start and to develop a plan. In this context, the first question that arises is that one about: who are (or might be) the planners?

Considering planning as a part of public policy, it would start on the institutionalised environment, taking into account the legislation and guidelines that dictate or orient the way the process should or must start and being organised. But on the other hand, in many public structures, like in less developed countries, there is not even a basis or any guidelines or legislation. Additionally, it may happen places where the civil society is traditionally involved on the process of participation in planning and it is active on the process of decision on public issues. Moreover, may exist places where there are legislation, institutions, the process can have organised steps, objectives and targets and co-involve public participation but, in practice, things happen quite different of those formalised ideal, for instance, due the ability of gathering people together, sharing of information, working with conflicts, catalysing the results and drawing the outcomes. Therefore, who are the planners is not so clear for any society and institutions in charge of public and planning affairs. It depends on the development conditions, prevalent ideology, political and social organization, public and institutional organization, tradition on public participation and planning culture.

2.3.1 Who are the planners involved in the planning process?

> "If different points of view produces different results, this is not a problem to solve, but an opportunity to use"
> (Mandelbrot, 1975)

In several countries, the federal/national constitution or ordinary laws lay down the planning tasks and decree who must perform the activities of planning urban spaces and transport. The regulations define, in a general way, how the government levels must organise and develop the planning policies and processes.

The dynamics of planning process organisation lay, first of all, in the types of governance in use in the city or region. The issue of whether government levels are centralised or decentralised affects the share of responsibility among them and affects the extent to which society is involved in the planning process. In the complex contemporary society, the territory governance and the way the public is involved and the effective participation on planning process depend on the regulations; government administration ideology; social, political and institutional structures; and the expectations on the outcomes.

Hillier (2007, p.47), discussing spatial planning, governance and complexity theories, laid a comprehensive schema for the "landscape of complexity", in order to explain how processes and outcomes are understood in ordered or un-ordered (ontology) systems, if they follow rules or heuristics (epistemology):

- In an ordered system (C), relationships between cause and effect can be discovered. A desired outcome or end-state is identified, the current situation is analysed and a series of steps is prescribed to achieve the given outcome.
- In an ordered system where emphasis is placed on heuristics (D), processes are incremental, rational and involve mixed scanning.
- In an un-ordered system, desired end-states are not given. In seeking favourable outcomes (A), facilitators manage negotiations by applying certain 'rules of play' (Innes & Booher, 1999).
- In an unordered system, with emphasis on heuristics (B), issues of participation and communication are important. Space and time are performative. Outcomes are unpredictable and emergent.

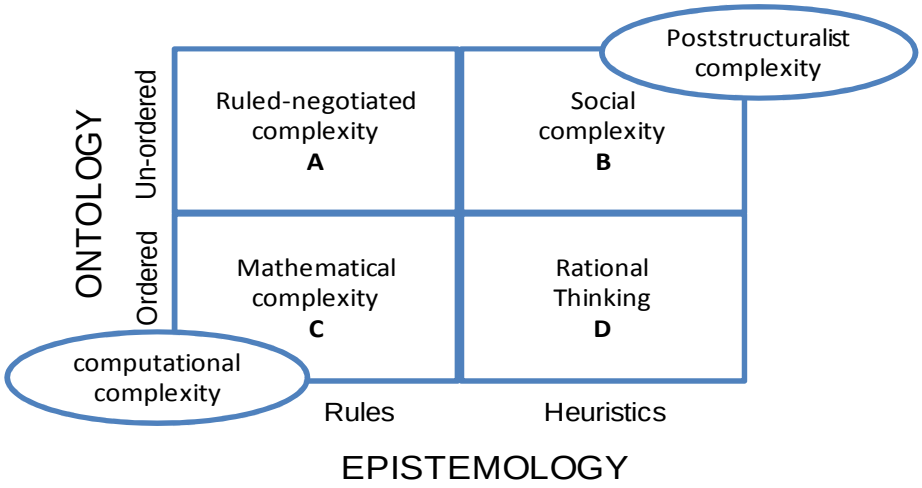


Figure 40: Landscape of complexity. Source: adapted and designed on the basis of Hillier (2007, p.46).

Therefore, Hillier (2007, p.49) argued that:

> "Where goals and ends are 'known' or predictable, governance involves a bureaucratic approach and administration of regulations and programmes. Where outcomes are prespecified, but the means of achieving those outcomes are somewhat flexible, there is some scope for innovation as in traditional forms of strategic spatial planning or master planning. Where processes are prespecified but outcomes are open, as in many judicial processes, fair or procedurally just processes of public participation, such as referenda, consensus-building strategies and so on, permit some form of collective rational choice to be made."

Who are the actors at play in the urban transport planning process? Where is the "power nucleus", and who are the groups that influence the organisation of the planning process and the decision-making? Is there a material centre of influence and decision, like an individual

person, institution or legal system, or is the decision more diffused into society and indefinite groups, for instance? In some cultures like in India, families are very important power and safety networks that influence and support the economic growth and decisions of society. The understanding of the planning process, its organisation and consequently its outcomes, rests also on the understanding of the actors at play in this process and the way they are involved in networking: individuals; families; NGO's[20]; organised society; diffused interests; general society; institutions; real state, political parties; churches; ideological, ethnic, gender, aging and cultural groups; etc.

2.3.1.1 Participation in the process of planning

Smith (2003, p.5) claimed that public participation is made up of "processes in which individuals, groups, and organizations have the opportunity to participate in making decisions that affect them, or in which they have an interest."

A participant or stakeholder, seen by Smith (2003, p.5) as "one who will be affected, may be affected, or has an interest in an issue, or may have the ability to affect a decision or outcome", can be an individual, a group or an organisation.

Who would participate in any public process? Sanoff (2000, p.17-18) suggests that:

> "People choose to participate if they see themselves affected by have an issue because of a possible threat of benefit of a proposed facility, if they have an economic interest in the outcome of a particular decision, if they need to protect or increase access to use of a facility or service, if they perceive an environmental or health risk associated with a proposed action, or if an issue affects strongly held religious or political beliefs."

Paulo Freire (1990, in Sanoff, 2000, p.14) argues that a level playing-field is necessary for people to exchange knowledge and ideas. In this environment "all citizens are assumed to hold equally valid knowledge that they can contribute to an active discourse." Moreover, it is only under these conditions that social understanding and learning will take place and the iterative discourse will lead to a consensus.

The incorporation of public participation into the process of planning has already happened, in the seventies, when planners realised that the involvement of citizens would be essential for the development of any major urban transport planning. Gakenheimer (1976) wrote about one of the first experiences of citizens' participation in the planning process, happening in Boston in the 1970s. He claims that most of the budget was spent on consulting the communities and on building up political consensus about the measures to be implemented.

However, public participation in planning is still strongly debated today, especially in the new democracies of the developing countries like Brazil or Colombia. Participation means

[20] NGO stands for Non Governmental Organization

accountability and the right to influence or decide public policies (Vasconcellos, 2001). It means the empowerment of citizens in the governance of their territories.

Strategic planning requires public participation in order to enhance the outcomes. Furthermore, as written by Sanoff (2000, p.33):

> "Good strategic planning is a participative process in terms of reflecting an organization's vision about how it should operate and the actions needed to prosper in that envisioned environment. Fundamental to this view is the understanding that there are many "stakeholders" in the planning process and that participants have different views about what is, what ought to be, why things are the way they are, and how they can be changed. The core of this approach is that individuals or groups have a stake in what the organisation does by being able to affect or being affected by an organisation's operations."

Mason and Mitroff (1981, in: Sanoff, 2000, p.33), says that a participative view of the strategic planning process might involve the following principles:

- Participative: the active participation of various individuals is positive because they posses varied information and practices;
- Adversarial: oppositions rising into the planning process must be accepted as a part of the process to allow doubt to surface and be publicly debated.
- Integrative: it is necessary to have a coherent plan of action, corresponding to shared vision of the future, used to guide the strategic planning process.
- Supportative: the active involvement of the managers in the process allows them to understand the rationale for various decisions.

2.3.2 Communicative and Collaborative planning

> "Plato thought that the *gulf* between ideas and life could be bridged by *dialogue* – not by a written dialogue, which he considered but a superficial account of past events, but by a real, spoken exchange between people of different backgrounds. I agree that a dialogue reveals more than an assay. It can show the effect of arguments on outsiders. It makes explicit the loose ends which an assay tries to conceal by showing the inconclusiveness of "conclusions"
> (Inre Lakatos, 1999)

During the 'Information Age', as it is called by Castells (2004), society does not resign itself to accepting the centralised decision-making process, like it did in the past. The rise of public availability of information in the Western democracies has strongly encouraged the general public to intervene in public affairs and to be integrated into the process of planning (Gonçalves, 2011). These are places where representative democracy has reached more mature levels. However, representation alone is no longer sufficient for governments to communicate with people at large and give them the answers they need or deliver solutions to public demands (Rothfuß, Perrone, Mororó, 2012). Even in developing countries strong calls for participation have been made, and people want to be more active within public issues and want to intervene in matters that affect their way of living or their environment. It seems that a mixture of the present socio-political configuration and the needs of a generation to stake opinions on its

future, has inspired recent uprisings by young people. These uprisings began in Tunisia before crossing national boundaries and even the Atlantic Ocean, so that Brazilians, on the eve of their country's hosting the FIFA world cup and the Olympic Games, are now questioning their government in its various levels, questioning the parliaments and the international position regarding the way public investments are made in infrastructure. These complaints are mainly concerned with the low share directed towards public transport and other public services, and the massive investments concentrated on the construction of sports stadiums.[21] In many countries people have started to raise their voices publicly, asking for more participation, and for the dignity and freedom to voice their opinions and to intervene in public dominions (Castells, 2012). Therefore, the call for participation is not only a top-down strategy for improving the quality of plans and projects. There is another meaning of participation, coming from the public at large, starting bottom-up and spreading in an uncontrolled and multidimensional manner. This is a result of the new configuration of society, where increased education levels across the world and the suitability of fast, direct, technology-based communication, are changing thinking patterns among people and among public relations (Gonçalves, 2011).[22]

Healey (2007) argued that since the 1990s there has been a tension in socio-spatial relations, which Castells (2005) referred to as a tension between 'places' and 'flows' in a network:

> "This new network language not only emphasises the complex socio-spatial relations between physical and economic networks it also stresses the complex ways in which networks, or webs, overlay each other and reach out to others elsewhere in space and time. In the midtwentieth century, it was thought that these networks were somehow integrated together in a coherent entity called a 'city'. But these days, [...] our experience tells us that our social worlds, even of daily interaction, may stretch well beyond the area of a particular city, and that the webs which matter to us may be quite different to those of our neighbour. As a result, the 'places' of cities and urban areas cannot be understood as integrated unities with a singular driving dynamic, contained within clearly defined spatial boundaries. They are instead complex constructions created by give meaning to qualities of places" (Healey, 2007, p.2).

In today's complex system of societal development it is not possible to approach and carry out planning the way it was done before. Accountability is extremely important today. As Habermas

[21] The representative democracy was attacked directly at its heart in the case of the Brazilian youth uprising: the first demonstration happened in Brasilia, the capital of Brazil, where a mass of young people climbed the Niemeyer's most famous building, the Brazilian Parliament's House, which has been a symbol of Modern Architecture and planning for an age, proclaiming in one voice, "the parliament belongs to us!" This action was also a symbol of society's transformation, calling for a different kind of democracy.

[22] Although uprisings were stronger in the developing world, causing the fall of presidents and dictators, it was not only there that they happened. Many demonstrations also took place in the developed world against government sociopolitics or against specific projects. One example is the "Stuttgart 21" demonstrations that gathered together thousands of people during more than a year of activities directed against the modifications of the main train station in the city of Stuttgart, Germany.

(1981) theorised, planning must be a communicative process. Today, people are asking for more communicative action (using the concept of Jürgen Habermas) within the public dominion, which would empower the citizens and communities involved in the decision-making process, instead of simply reflecting centralised and manipulative political actions and decision-making, as was the case in the past. Allmendinger (2009) argues that the problem is that society has changed very fast, while planning methods and practices have not evolved in accordance with this by adapting or innovating their procedures. And "central to this idea is the debate over rationality. Despite attempts to improve public involvement and widen participation, planning processes remain dominated by rationality, born of the enlightment and modernity and typified by the systems or synoptic approach to planning" (Allmendinger, 2009, p.197).

In this age citizens want to participate and want to see their opinions being transformed into policies and practices within the public dominion. According to Freire (1990, 2011) public institutions need to create an environment where different sectors of society are involved in the planning process, and need to create conditions needed for the sharing of real knowledge among people, in order to promote a fairer balance of power and social justice. One way to involve the public in the planning process, as proposed by various authors, is within a collaborative process (Healey, 2006; Innes & Gruber, 2001; Innes & Booher, 1999; Harris, 2002, among others). Healey (2006, p.34) writes that:

> "The challenge of addressing collective concerns with the quality of urban region environments demands an approach which both provides an account of the forces leading to change in the qualities of places in urban regions and offers ideas about the forms and processes of governance through which stakeholders and local political communities can come together to work out what to do and how to act."

Healey (2006), in her book "Collaborative Planning", discusses the idea of a new institutionalism based on the introduction of a communicative approach deriving from the social sciences (Giddens, 1990) and the philosophy of Habermas (1981), where there is communicative action proposing an approach for planning as a collaborative process, with society and individuals participating in the development of public solutions. In the case of planning, stakeholders and government need an environment (Freire, 1990; 2011) where they can come together to develop communication and a culture of working collaboratively on public issues. It is necessary to build the institutional capacity for legitimate collaborative process. "Building governance capacities thus not a one-way process from experimental initiative to a broad governance culture, but a dynamic of continual interaction" (Healey, 2006, p.336).

Sustainable collaborative governance processes demand continuous efforts in collaborative practices. "If collaborative processes become a 'normal' way of doing governance work, then citizens and stakeholders generally will demand and expect to be involved in any governance initiative which significantly affects them, especially where it changes the environments of day-to-day living" (Healey, 2006, p.334-335). In this way collaborative practices must be able to develop communicative environments and understanding with regards to the most contradictory actions within public issues, and to work on conflicts of interest whether they are social, territorial, cultural or economic in nature, incongruities produced within the core of this society,

and the ideological and political struggles, which together form a real challenge for our complex contemporary society.

2.3.3 Actor-Network Theory (ANT)

Networks are described by Hall & Pfeiffer (2000, in: Rothfuß, 2006, p.100) as the following:

> "Networks are constructed of nodes (actors) and linkages (information flows) between these nodes. The activity of connecting the nodes (e.g. the exchange of information) is what we call "networking", essentially comprised of virtual and of real interaction and collaborative decision-making."

For Castells (2004, p.3) a network can be defined as:

> "[…] a set of interconnected nodes. A node is the point where the curve intersects itself. A nework has no center, just nodes. Nodes may be of varying relevance for the network. Nodes increase their importance for the network by absorbing more relevant information, and processing it more efficiently. The relative importance of a node does not stem from its specific features but from its ability to contribute to the network's goals. However, all nodes of a network are necessary for the network's performance. When nodes become redundant or unless, networks tend to reconfigure themselves, deleting some nodes, and adding new ones. Nodes only exist and function as components of networks. The network is the unit, not the node."

Healey (2006, p.34), discussing Roberts (2004)[23], wrote that "networks possess three basic elements: social actors (persons, groups, organizations, states and so on), social ties connecting the actors and channels of communication between the actors. Communication between the actors is regarded as being vital for networks to function."

For Esnault, Zeiliger, & Vermeulin (2006, p.300), an actor is mainly characterised by his capability to act and interact; that is to say, by his influence.

An actors' network implies the idea of people and material elements performing actions in a specific process and environment. This implies the idea of participatory process. Esnault, Zeiliger, & Vermeulin (2006, p.299) wrote that "participatory design approach may be considered a process of negotiation of usefulness to be achieved through reconciling the contrasting perspectives of various stakeholders."

Actor-network theory (ANT) was developed at the end of the seventies and beginning of the eighties. Bruno Latour (1986) was one of its first proponents. Later other authors tested and supported it, for instance Law (1992, 2003) and Warzynski (2006). Law (1992, p.2) claims that "society, organizations, agents and machines are all effects generated in patterned networks of diverse (not simple human) materials" [and] "all of these are ordered networks of heterogeneous materials whose resistance has been overcome."

[23] Roberts, N. (2004) "Generic strategies for governance in a network world." In: Healey (2006, p.34).

According to Esnault, Zeiliger & Vermeulin (2006, p.300) one of the most important originalities of the theory is that it "provides a conceptual framework helping formulating and building a design methodology that sustains efficient participation of heterogeneous".

It is not true that human and non-human entities have the same function in society or the same weight in the systems described by ANT. The theory treats the participation of the actors as a relational influence with different weights. For Law (1992, p.4) "people are who they are because they are a patterned network of heterogeneous materials." Still according to the author "an actor is a patterned network of heterogeneous relations, or an effect produced by such a network" [and] "an actor is also, always a network".

For Warzynski (2006, p.2) ANT is a construction:

> "In which there is a symmetry between human and non-human entities, it does not reduce the explanation of change to a few structural, cultural, technological, physical or human variables but rather focuses on the interaction of all these variables within a broad heterogeneous network of human and non-human entities, and assesses the effects of this network on technological and organizational change. As a methodology ANT incorporates a wide range of actors and variables into a systematic process for creating change that bridges several levels of analysis and offers a more inclusive description and explanation of network dynamics and technological change than typical single dimensional approaches."

For the above-mentioned authors the interaction between the human and non-human entities, "networks of objects-and-people" (Law, 1992), generates knowledge and the process that creates organisations and institutions "including hierarchy and power" (Law, 1992, p.2), and reproduces them in society.

Bardini (1997) defines ANT as "a progressive constitution of a network in which both human and non-human actors assume identities according to prevailing strategies of interaction." For Warzinski (2006) the interactions in the process between the actants (human and non-human representatives) generate the identities and the qualities of the actors. Translation, defined as "the ability of actants to keep other actants involved in the project by translating and representing their interests, needs, values, and efforts into their own language" (Warzinski, 2006, p.3), is the most important interaction that "generates ordering effects such as devices, agents, institutions, or organizations" (Law, 1992, p.5).

Still according to Law (1992, p.8), organisation is "an achievement, a process, a consequence, a set of resistances to overcome, and a precarious effect. Its components – the hierarchies, organizational arrangements, power relations, and flows of information – are the uncertain consequences of the ordering heterogeneous materials."

Law (1992) assures that the systems reproduce themselves through the interactions between the heterogeneous materials or, in other words, through heterogeneous networks. As claimed by Latour (1987), a network is stabilised and can reproduce itself when "many elements are made to act as one". These elements can be "issues, objects, people, structures, processes, and technologies, etc" (Warzinski, 2006, p.3).

According to ANT the process of changing current states is supported by the network rather than by individual decision making. Warzinski (2006, p.5) claims that "leadership, power, competence and successful change are effects of the expanding network of translators and supporters rather than the results of a charismatic leader. It is the network that has the power to shape social reality and bring about change. The leader is only one aspect of the network."

Based on the above discussion it is possible to deduce that the results of a plan are influenced by the way the planning process is organised. Synthesising the various human and non-human actors into the planning process will define the results in a plan and in its implementation. Therefore, taking this assumption, the interactions of the actors entering, remaining and leaving play the most important role in the process of planning. Furthermore, power can be considered as a relational rather than a personal variable, more complex than that of the formal organisation's representative. Also, the power to make a decision rests on this complexity.

2.3.4 The hierarchic network as "chain of command" vs. the heterogeneous network of "dependent power relationships"

Figure 41 below shows a diagram illustrating a model for the actor-network participating in the process of planning. This diagram is a proposed theoretical schema to help understand actor's participation in the process of urban transport planning. It shows four forms of planning networks: hierarchic network; horizontal heterogeneous network; top-dawn diagonal network; bottom-up diagonal network.

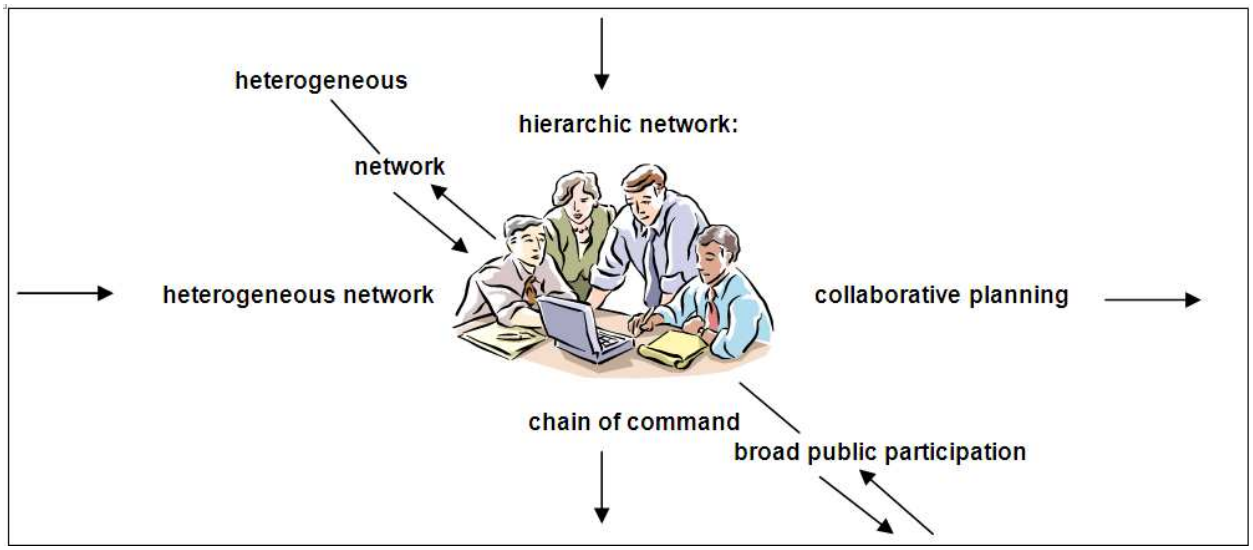


Figure 41: Urban transport planning process: Actor-network diagram – proposed theoretical schema. Source: From the author (picture from Microsoft Corp.).

Comparing the above schema with the one proposed by Hillier (2007) (section 2.3.1, Figure 40) within an approximation, the hierarchic network would behave like in an ordered-ruled system, where planning outcomes are predicted. The organisation of the process follows the well defined administrative structure, like what was discussed by Verma (2010). Therefore, the hierarchic network is assumed as the formal organisational framework of the institutions involved in urban transport planning, supported by legislation. It is organised according to a

"chain of command" and it is characterised by flows of information and power in a formalised and vertically structured chain and bureaucratic organisation.

The heterogeneous network is defined in this study as a diverse participation of stakeholders in the process of planning, defining a stakeholder as "any person or group that has an interest or concern in something"[24] (Ward, 2001). Or in other words, a stakeholder is any person, institution or group that participates or has influence on the urban transport planning process. This participation can enter the process through individuals, society at large, or representatives from organised society, institutions and public boards. The inclusion of the diverse participation of group representatives or individuals can limit the power of individual participants, giving the opportunity of voice and contribution to all participants. As the diversity of participants grows, the dependence on relationships between participants rises as well.

The heterogeneous network could be associated with the schema proposed by Hillier (2007) (section 2.3.1, Figure 40), considering that as the systems move far from the ordered-ruled (hierarchic network) point and towards the unordered-heuristics systems, the heterogeneity would grow and the network would change its form gradually in terms of more complex actors' participation and more dependence power relationships: from vertical to horizontal, then to diagonal (bottom-up or top-down).

The participation of stakeholders in a heterogeneous network can enter the process of planning in one of two ways: either in a horizontal participation organisation, through representation in committees and structured meetings, performing an organised collaborative process (Innes & Gruber, 2001; Healey P., 2006; Harris, 2002) through representatives of the society and the public boards; or through diagonal entry into the process via an opened and broad public participation (see Figure 41).

The diagonal entry of public participation into the process of planning can take place bottom-up or top-down. Top-down participation happens when the planners, decision-makers or politicians invite the general public to an audience where already-developed plans are presented in order to achieve a validation of the proposed ideas and projects. This method is used in many countries, and in many cases it is a legal obligation to accomplish the planning process in the phase of decision. What is expected is not an open discussion where new proposals can be suggested, but the communication of changes and the adherence to regulations. There are also powerful individuals who participate without needing an organised group such as those involved in collaborative planning or the social movements, who possess the power or the interest to influence outcomes. Politicians use this procedure many times when they can not lead to a consensus-building into a more participative planning process. Then they try to convince or co-opt (Innes & Gruber, 2001) the group and lead the decisions into a more technical beaurocratic decision making, using the hierarchic network.

Participation can also enter the process in a bottom-up direction, through social movements (Innes & Gruber, 2001; Castells, 2012) and various networks or individuals, for instance

[24] Definition from the Oxford English Dictionary in Ward (2001).

affected local people, people studying the matter, the media, etc. The diagonal participation bottom-up can in some cases break through the process or bring about possibilities for innovative outcomes, considering a social complexity (Mason and Mitroff, 1981; Hillier, 2007) where the planning process is developed most of the time, and the relative independence of the participants to give their opinions. In these cases it is also important to consider the level of democracy of the society and the conditions of the environment for public participation, if it is allowed free expression of opinions and if the planning arena is able to translate ideas into valid outcomes for social learning (Freire, 1990; 2011).

The dependent power relationships influence the possibilities for consensus-building on a measure or to gain power in order to influence or making a decision. In this way power can be understood as a relational rather than a personal variable. In practice where a consensus is necessary in order to deliver a solution, the organisation of the planning process must be prepared and able to use methodologies to create an environment where consensus can be reached (Freire, 1990). But indeed, most of the time, when it is not possible to come to a consensus within a large group because of ideological or political constraints, the decisions are taken by the hierarchic network, using the heterogeneous network simply as a way of creating political adherence, or on a community consultancy-based discussion of the plans, but this should not be taken as genuine or effective participation in the development of the plans.

Ward (2001) investigated the inclusion of diverse stakeholders' participation in urban transport planning, with the application of three case study areas in Europe. He tested three hypotheses seeking to evaluate the effects of increasing the diversity of stakeholders in transport planning. In his results Ward (2001, p.119) emphasises that "stakeholder participation in transport planning is potentially beneficial but difficult to achieve." According to the author, increasing participation in transport planning is obstructed mainly because of the existence of a "concentration of power" (Ward, 2001, p.129) in the hands of a small nucleus of public and private organisations, or of another society's representatives.

The analysis made by Ward (2001) of the diversity of participants in the urban transport planning process included in the study not only institutions formally in charge of urban transport planning, but also NGOs, different associations, broad public participation, and any person or group with interest or concern. The assumption can be understood as an analysis of the "heterogeneous network" involved in planning processes in general.

The analysis of Ward (2006) shows that the results found for the participation of a diversity of stakeholders in urban transport planning depends on the variety, disparity and balance of the participants. The influence of the participants is dependent on the relationships between them and the balance of the power that each one brings into the planning process. In one case study the author concluded that "the influence of the forum was obstructed not by indecision but by power play." In an interview one participant said that "despite initial differences, understanding and deliberation on a personal level between representatives including business became quite constructive" (Ward 2001, p.126), even though the forum orientations were not taken over by the planners. The assumptions show that power dependence among the participants exists and also influences the final decision in the process in a positive or in a negative way.

The diversity of participants implies interdependence among them. The power of each one affects and also influences the group. The balance in the power of the participants directly influences the results of the plan. However, the inclusion of participation alone does not necessarily mean that contributions will enter the process or have an effect on the design of the plan (Rothfuß, Perrone & Mororó, 2012; Rothfuß & Mororó, 2011; Innes & Gruber, 2001; Ward, 2001). In many cases, like in Brazil, the government is legally obliged to develop a participative planning process, or in other countries which grow into mature democracies, the citizens are genuinely allowed to talk freely, protest against their government and also to sit at a planning table. But effective participation on a strategic level, with power to make decisions, is not the rule. It is an exception in both theory and practice.

2.3.5 Information in the planning process

At the end of the twentieth century the growth of the availability of information and knowledge had a significant effect on Western society. Worldwide formal education has grown together with the spread of information and knowledge. Drucker (1993) refers to this society as the "knowledge society", where knowledge is not simply a resource, but in fact the most important resource in the production of any kind of service or product that society wants. Healey (2007, p.245), discussing other authors (Giddens, 1984; Forester, 1999), affirms that:

> "In part, our knowledge of the world exists as a 'store', accumulated in our cultures and communities of practice. But it is also in constant production as we relate observation, experience, intuition to what we 'know' from this store. We learn through the flow of life, through practical engagement as well as through formal processes fo 'studying' and structured reflexion. Getting to know, 'knowing', is thus a process, a continuing activity, developing through our practical engagements, our living 'in the world'. In this way, the process of knowledge development and its substance are co-produced, 'validated' by practical relevance, by emotional resonance and by socio-cultural acceptance."

Nonaka & Tackeuchi (1995, p.10), discussing knowledge creation and dissemination, remark that "in fact the most powerful learning comes from direct experience." The authors also emphasise the importance of learning "through trial and error". These are important lessons for the case of planning, especially in the current society where there is on one hand a vast network of communication and power, disseminating its values and directly influencing knowledge in the public spaces outside the formalised institutional domain, and on the other hand there are the institutions that have their own planning cultures and values.

Castells (2009) highlights the significance of public space in situations where the public at large and social movements exchange messages and forms of knowledge. "Public space is the space of societal, meaningful interaction where ideas and values are formed, conveyed, supported, and resisted, space that ultimately becomes a training ground for action and reaction" (Castells, 2009, p.301). Furthermore, today "multiculturalism is the norm rather than the exception in our world. And so there is extraordinary diversity of cultural production and distribution of content" Castells (2009, p.124). Therefore, in this society planners need to be aware of the need for new methods and spaces to communicate, and to understand the messages the citizens deliver,

considering the complex and diverse environment. It is creating an environment that transforms tacit knowledge into explicit knowledge (Nonaka & Tackeuchi, 1995), in order to use it for planning.

Planning institutions play an important role in the communication with society and in transforming tacit knowledge, coming from the general public, into explicit knowledge that can be used for planning. Castells (2009, p.299-300) writes that "institutions are crystallizations of social practices of prior moments in history, and these social practices are rooted in power relationships. […]. These institutions result from the conflicts and compromises between social actors, who enact the constitution of society according to their values and interests." Therefore what is needed is to find the way and the place to innovate in public and institutional relations, and to reach a new level of communication and learning, in order to build up social knowledge and a new level of development. Castells (2009, p.300) claims that "the interaction between cultural change and political change produces social change. Cultural change is a change of values and beliefs processed in the human mind on a scale large enough to affect society as a whole. Political change is an institutional adoption of the new values diffusing throughout the culture of a society."

Healey (2007) presented a schema intending to explain the forms of knowledge, as seen in Figure 42:

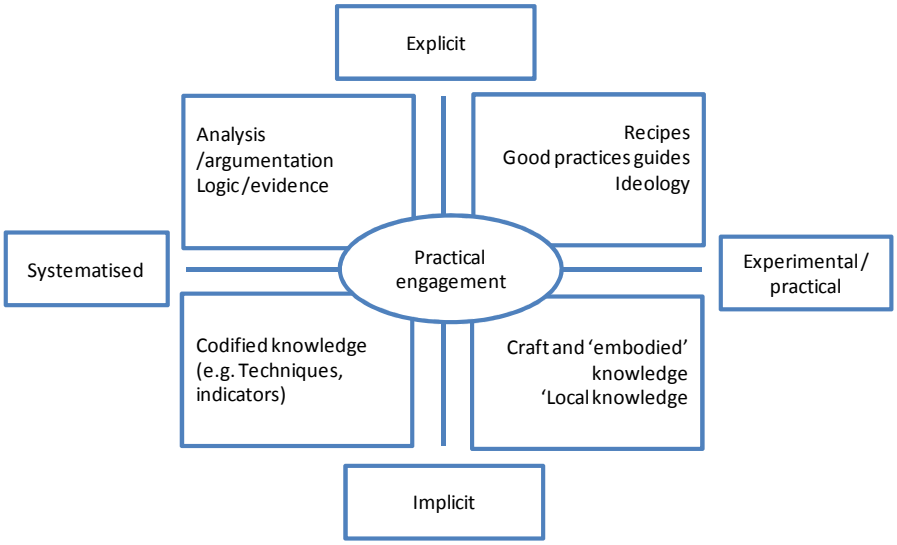


Figure 42: Forms of knowledge. Source: Healey (2007, p.245).

For Healey (2007), the conception and understanding of knowledge can vary and expand enormously within the planning process, considering the methods of gathering, generating and mobilising the events and the co-relation among them. The many forms in which knowledge appears, the possibility of experiencing or systematising, the transformation of implicit knowledge into explicit knowledge and the flows for sharing it, all require the instruments and the environment needed for social learning (Freire, 1990; 2011). The knowledge produced within this environment needs to flow as information for the planning process. The type of information and the way they flow into the process will certainly influence the outcomes of planning.

Sanoff (2000, p. 33) argues that “clarifying information and its underlying assumptions becomes a major objective of the strategic planning process”. Besides organisation and technical and material capacity, the information used for planning is central to the results of a plan. The way the data is generated, gathered and organised, the extension of the analysis of the information used for planning, and the actors involved (if in the participatory process or not) will all have an effect on the type of plan that is produced and implemented, and on its quality and final results.

Figure 43 below shows a diagram illustrating the flow of information through different potential actor-networks participating in the process of planning. Monge and Contractor (2003, p.39) wrote that “communication networks are the patterns of contact that are created by flows of messages among communicators through time and space.” Therefore, the way those patterns are produced and flow through time and space, and the kinds of messages created will also influence the informational framework of planning.

A plan performed by a collaborative planning process, using information generated on this basis, will deliver different results from one performed on the basis of a bureaucratic organisation, within a hierarchic network, or with the influence of the public.

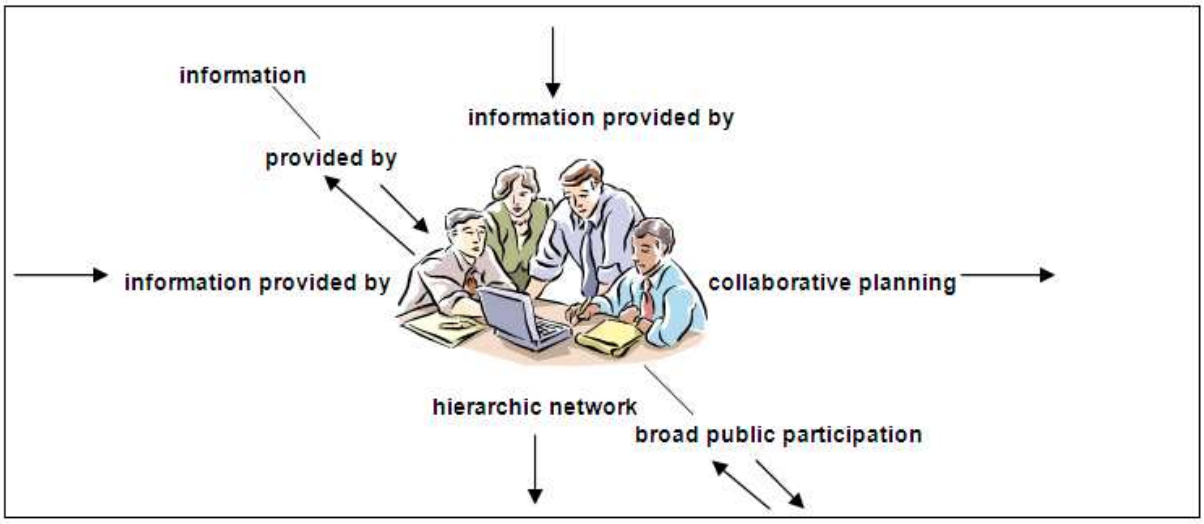


Figure 43: Urban transport planning process: Information flow diagram – proposed theoretical schema. Source: from the author (picture from Microsoft Corp.).

Therefore, the questions highlighted below must be considered with regards to the information used in the planning process:

- The generation of information used for planning: who produces the information and what is the technological basis of this production?
- How high is the quality of the data available, in terms of accuracy or legitimacy?
- Are the organisation and structuring of the information used, the methodological aspects, clearly based on valid methods?
- Is the availability of information for urban transport planning sufficient, and broad enough?
- In which way is information used in the planning process?

- How is the flow of information designed? Is the information arriving on time and reaching the places of interest?
- Is the information adequate for multiple technological uses?

Vasconcellos (2001), reasoning on planning process, argues that the process of planning in developing countries behaves differently to the process in developed ones, partly because these countries do not have good information available for planning. Therefore, the results of traditional technical approaches to urban transport planning can fail when the information available in developing countries is not enough to supply the requirements of softwares used for planning in developed countries. Therefore, the basis to produce, gather, organising and make available in the channels and sharing information and knowledge is to be constructed.

2.3.6 Urban transport planning process organisation

> "It is strategic thinking and acting that are important, not strategic planning. Indeed, if any particular approach to strategic planning gets in the way of strategic thought and action, that planning approach should be scrapped"
> (Bryson, 1995)

2.3.6.1 Planning levels for urban transport: strategic and tactical/operational

For Checkoway (1986, in: Sanoff, 2000, p.38), strategy "is the act of mobilising resources toward goals. It includes setting goals and priorities, identifying issues and constituencies, developing an organisation, taking actions, and evaluating results."

Albrechts (2004, p.751-752) points out that:

> "Strategic planning is selective and oriented to issues that really matter. As it is impossible to do everything that needs to be done, `strategic´ implies that some decisions and actions are considered more important than others and that much of the process lies in making the tough decisions about what is most important for the purpose of producing fair, structural responses to problems, challenges, aspirations, and diversity."

For Sanoff (2000, p.38-39), strategic planning "requires information gathering, an exploration of alternatives, and an emphasis on the future of present decisions. It can facilitate communication and participation, accommodate divergent interests and values, and foster orderly decision making and successful implementation."

Bryson (1988, in: Sanoff, 2000, p. 39) explains that:

> "A strategic plan is a method of developing strategies and action plans necessary to identify and resolve issues. The challenge in creating a plan is to be specific enough to be able to monitor progress over time. To be usable, a strategic plan should have built-in flexibility to allow for revisions as new opportunities become apparent."

Moreover, Sanoff (2000, p.39) highlights the importance of the vision statement for the guidance of the planning process:

> "The development of a strategic plan requires the creation of a vision statement to provide suitable guidance and motivation for the ensuring process. The vision should emphasize purposes arrived at through group sessions in order to establish a common reference point for the broad objectives of the community. It outlines the key areas of concern within the community and will help people make decisions that support that vision."

The Brazilian National Public Transport Association (ANTP, 1992) presents in its manuals of urban transport an orientation for transport planning organisation that takes into consideration the establishment of strategic and tactical/operational levels of planning and the scope of influence of the plans in both sectoral and systemic aspects. It is basically a spatial and temporal disposal of the investments and of the institutional organisation for a planning area. Based on this, once the regulations are set, the responsibilities are shared among the institutions involved in the planning process, including the distribution of the budget.

The first step for planning is concerned with the evaluation of its scope and its level, seeking to organise the process, share responsibilities and set the time-frame for its implementation. Table 10 below shows the scope and the levels of planning, according to ANTP (1992).

Table 10: Hierarchy in the urban transport planning process.

Planning		Scope	
		Sectoral	**Systemic**
Level	**Strategic**	Example: - Cycle plan - Operational improvements on bus corridors; - Construction of a new road within an area.	Example: -Urban Transport Master Plan -Designing of an integrated transport network
	Tactical / operational	Example: - Modification of a bus line itinerary; - Modification of bus stop; - Improvements in a pedestrian area.	Example: - Definition of transport operation area for concessionaries. - Definition of a type of fare or ticket.

Source: adapted from ANTP (1992, p.8).

In general, planning is considered strategic when it requires substantial investment that is considered as a long-term plan. Moreover, strategic planning is considered systemic when it has an impact on an entire area, such as a city, and sectoral when it effects a specific and smaller area. The tactical/operational level is considered as a medium to short term plan, and generally requires less investment than strategic planning. Furthermore, there can be a very localised impact in a specific area when planning is sectoral, or a generalised impact over the planning area when it is systemic.

Taking the general idea of planning for the complexity of the society in the information age (Perrone, 2010; Castells, 2005; Castells, 2009) the concepts of strategic and tactic/operational for urban transport planning have a very fine edge. The complexity of the movements and

needs for mobility in the current society require always to taking decision on a strategic analysis focus (Ribbeck, 2005; Gonçalves, Morato, Rothfuß, 2012). This means that the planners must take decision always on a systemic basis impact analysis, being selective and oriented to issues that really matter, within a long term vision (Checkoway, 1986; Bryson, 1988; Sanoff, 2000; Albrechts, 2004).

The United Nations Human Settlements Programme (UN-Habitat, 2009, p.11) defines a strategic plan as a "broader-level, selective (or prioritizing) spatial plan, usually showing, in a more conceptual way, the desired future direction of urban development. Particular decision-making processes accompany the production of a strategic plan."

2.3.6.2 Phases in the planning process for urban transport

Traditionally the urban transport planning process is organised in steps considering: problem analysis, development of measures and designing of scenarios, decision-making and the implementation of the chosen measures. The German Road and Transport Association (FGSV)´s guidelines for transport planning proposes a basic framework for the organisation of the planning process which should follows steps or phases for its development (see Figure 44 below) (FGSV, 2001).

The five phases serve as an orientation for the organisation of the process in order to designate responsibilities and tasks, and also as a schedule for time-planning. For instance, this schema is useful for organising the participation of stakeholders, for indicating the technologies required, and for the structuring and planning of the financial schema and budget.

The phases can be described as the following (Friedrich, 2007, p.6-8):

- Pre-orientation: "assesses whether any kind of transport planning is required." Basic discussions are carried out by the planners, political bodies or any stakeholder in ways that identify deficiencies in the system or analyse the existing suggestions or proposals.
- Problem analysis: "aims to identify deficiencies in the current existing or the future transport supply."
- Examination of measures: deals with the development of measures to improve the existing state of urban transport, and with the estimation of the impacts of these measures. "The feedback between the different steps of this phase ensures that the steps are repeated until an appropriate solution is found."
- Decision: "deals with the final evaluation by comparing the advantages and disadvantages of possible solutions" by the actor authorised to make the decision.
- Implementation: "deals with the enforcement of the selected scenario. This involves legal steps and the development of financial schemes and organisational structures."

According to the model, it is essential to receive feedback between the phases, as an iterative process.

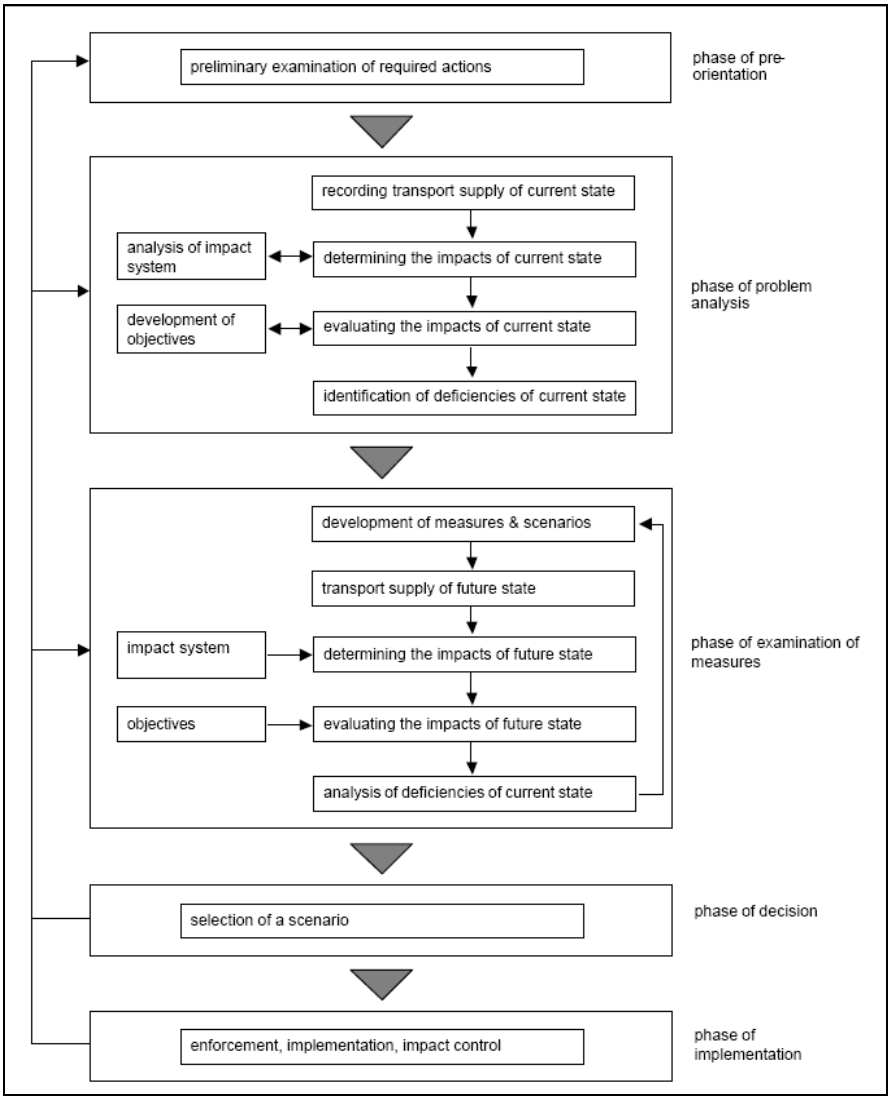


Figure 44: Process of urban transport planning. Source: designed on the basis of FGSV (2001, in: Friedrich, 2007).

2.3.6.3 Summary: levels and phases for the organisation of the planning process

Figure 45 shows a rough summary of the traditional technical organisation of the planning process in urban transport considering strategic and tactical/operational levels, based on the approaches in use in Brazil and Germany.

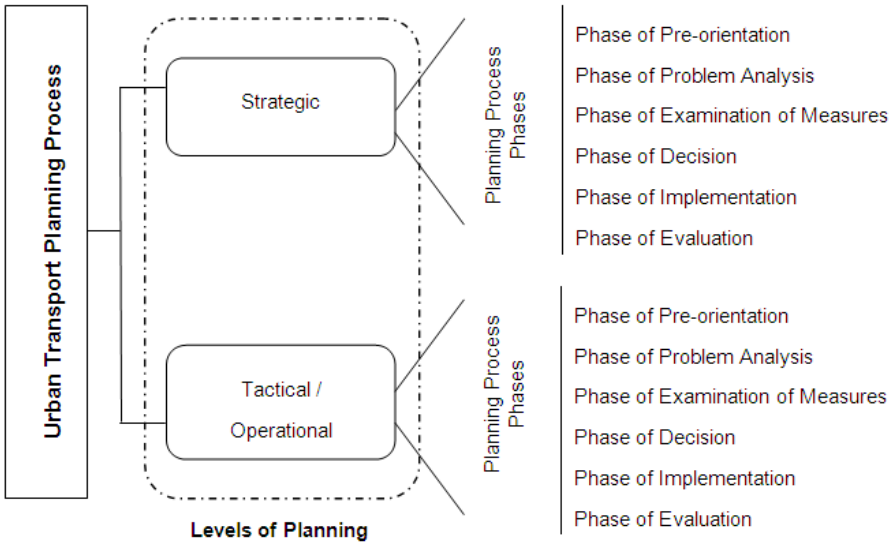


Figure 45: Urban transport planning: levels and phases of the traditional technical organisation planning process. Source: from the author, designed on the basis of Associação Nacional de Transporte Público – ANTP, 1990 (see Table 10, this Chapter), and FGSV (2001) (see Figure 44, this Chapter).

Each level of planning can have different actors involved in the process and also different methods of coordination and decision-making. That is why this framework can be helpful for describing and organising the planning process in different areas or specific projects, observing the investments involved and the impacts on society.

2.4 URBAN TRANSPORT PLANNING APPROACHES

The movement of people, goods and information is a constant in the everyday life of any country and of urban areas nowadays. For the facilitation of these movements, different transport and information transferring facilities are demanded in order to guarantee mobility and accessibility. Over the twentieth century, the growth of the population and the increasing complexity of socio-economic systems based on technological development required more accurate use of resources and the capability to make complex interactions in space and time. Under those conditions, urban transport planning emerged as a multidisciplinary field of study dealing with the physical organization of cities and of the movement of people and goods.

As Klosterman (2008) argued, urban development is reflected in socio-economic and demographic data, in land use, in urban density and in environment, and is the basis for urban and transport planning design. Moreover, urban development is the visible result of the implementation of those plans or the lack of them. Besides that, urban and transport planning involve the population's behaviour and decisions, political and institutional organisation, public policy and legislation. Urban transport planning shall be co-ordinated with urban and regional planning (Hall, 2002).

Since the 1990s urban and transport planning have been influenced by the new global agenda on development and environment. The main discussions of that decade included the subjects of

sustainability[25], social exclusion, the impacts of the current development pattern on the environment and the perspectives towards the twenty-first century (Hall, 2002). The world conference "Rio Earth Summit"[26] brought about those issues and concerns and delivered the "Agenda 21"[27]. Based on this Agenda, national and city governments were encouraged to develop plans and policies towards social and environmental sustainability, advocating democracy and public participation on planning. The agenda proposed the idea of 'think global and act local', matching what "town planners have long ago argued that 'everything affects everything else' [...]. How we plan and live in the settlements in the rich Northern hemisphere matters globally" (Allmendinger et. al., 2000, p.3).

Urban transport planning is particularly affected by this agenda, considering concerns about the issues of urban pollution, climate change, energy production/consumption, universal accessibility, traffic safety and social inclusion. Urban transport in the developed world is considered the major contributor to global greenhouse gas emissions (Banister, 1992). According to the United Nations (1996, p.xxxi) "the need for planning becomes ever more necessary in the light of the increased social economic and environmental impacts of urbanization, growing consumption levels and renewed concerns for sustainable development since the adoption of Agenda 21". As claimed by Allmendinger et. al. (2000, p.3) "the urban challenge is global [... and] planners have to be aware of this global dimension". The current globalised world has substantially increased the movement of people, capital, labour forces and information, and the cities are the core of the system's development. Therefore, in the urban spaces an exponentially increasing need for mobility has taken place.

The challenges for today are related to providing mobility for the population in a complex environment marked by transformations in different areas like the economy, population and environment, with impacts on the urban spaces. The planning theories have to be able to deal with the old organisational structures and the existing transport infrastructures. Additionally, the approaches have to incorporate the understanding of the driving forces of current development, in order to set out sustainable solutions for the future. Therefore, the city and the need for accessibility for the population are at the core of the present study. How to meet those needs is the question that might be answered by the urban transport planning approaches.

[25] What is sustainability? For Satterthwaite (2001, p.4), "there is no agreement as to a definition but most agree with the world Commission on Environment and Development's 1987 definition that it is 'meeting the needs of the present without compromising the ability of the future generations to meet their own needs." Zillmann (1996) defines "sustainable development as having economic, social, cultural and environmental dimensions and carrying ideas of equality among humans and generations." According to Satterthwaite (2001, p.43), "for urban planners, sustainability means developing and promoting plans that contribute to more efficient urban form and to strong social fabric."

[26] United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, Brazil, from 1992 (United Nations, 2009a).

[27] "This is the most substantive document formally endorsed by all the government attending the United Nation Conference on environment and Development (UNCED)" (Satterthwaite, 2001, p.4).

In this study, planning approaches are understood based on the general principles and orientations that set the course of actions in a planning area. These principles and orientations can combine concrete definitions about planning and about the scope of laws with public policies and the points of view and decisions of people and organisations involved in the process of planning. A planning concept (e.g. mobility concept) presents a structured description of the concepts used to design a plan for a specific area. It presents a "Leitbild" (Becker & Jessen et. al., 1999). In other words, it presents an overall concept of the plan with the description of the principles and actions, showing the development pattern of the area before its implementation. This kind of vision or mission statement will be the general principle for driving the adjustments of the plan as time passes.

An Urban Transport Plan (UTP) can be defined as a structured set of principles and orientations to design an urban transport network. In its scope it might also present clear concepts for the development of measures to be implemented in the planning area. It is often described by different authors as a sectoral plan. This means that a UTP is a component of the urban planning. Therefore it should be integrated into the other planning areas in a city (e.g. land use, education, social and economic development.)

This study does not intend to present an exhaustive discussion about all existing approaches to urban transport planning. Indeed, it proposes to discuss those more commonly found in the literature and practice of Europe and Latin America. Those are: the traditional, or so-called technical, and the sociological approaches. The 'technical' approach is well-known among transport planners and broadly used across the world, including for developing countries. The sociological approach proposes to discuss transport planning based on the problems of the developing countries (Vasconcellos, 2001). The main differences between these approaches are presented in Table 11.

Table 11: Major differences between the technical, geographical, social and sociological approaches to urban transport.

Approach	Data used (nature)	Preferred elements for analysis	Preferred focus of explanation	Preferred elements of evaluation
Technical	Quantitative	Vehicles	Individuals	Economic efficiency (cost-benefit analysis)
Social	Quantitative and qualitative	People in general	Individuals	Economic efficiency, with social analysis
Sociological	Quantitative and qualitative	Political beings and their roles in traffic	Individuals, family, social groups and classes	Economic and social efficiency; equity analysis
Geographical	Quantitative and qualitative	Space, people in general and their movement in space	Space usage, social and political groups.	Space/time co-relation and efficiency; Space use impacts

Source: designed on the basis of Vasconcellos (2001, pg. 40) and Rodrigue, Comtois, & Slack (2009).

2.4.1 The traditional or the so-called technical approach

Urban transport planning has been organised in a structured way since the immediately post-war period. The technological development in the following decades (in particular the development of computer technology) together with economic growth brought about transformation in the cities and in the transport systems. Transport planning benefited directly

from these technique-widening advances, and used other research fields for its analysis and applications. In the USA a milestone for the establishment of transport planning was the US Highway Act of 1962 together with the expansion of road construction programmes in the country.

> "Planning abandoned its traditional concern with the design of the physical city in the 1950s and 1960s for a new focus on the quantitative techniques and theories of the social sciences. Under this new ideal of planning as applied science, the intuitive designs of the planner-architects were assumed to be replaced by the "scientific" and "objective" methods and findings of the emerging fields of regional science, urban economics, and operations research. Computers were assumed to play a central role in the new scientific planning by improving planners understanding of the urban development process, expanding their ability to determine the direct and indirect effects of public and private actions, and allowing them to forecast accurately future states of the metropolis" (Klosterman, 2008, p.87).

The automotive industry expanded fast. According to Dimitriou (1992, p.26) "professional thinking simultaneously moved away from simplistic travel surveys, towards the use of more analytical techniques for travel demand analysis and a greater interest in the impact of land use on transport and vice versa". In the sixties aggregate studies proposed methods to efficiently carry out the movement of people and goods (Banister, 1994). Dimitriou (1992, p.9) emphasises that UTP (Urban Transport Planning) was a 'scientific effort' seeking to deliver approaches to solve the emerging problems of motorised road traffic, with travel demand as a central issue. The studies were developed based on:

- Observing current travel behaviour;
- Advancing certain hypotheses concerning the relationship between urban land use and movement;
- Testing these hypotheses as a basis for estimating future travel demand;
- Ultimately recommending additional transport capacity.

One of the first aggregate studies was developed in the American city of Chicago during the sixties (Figure 46).

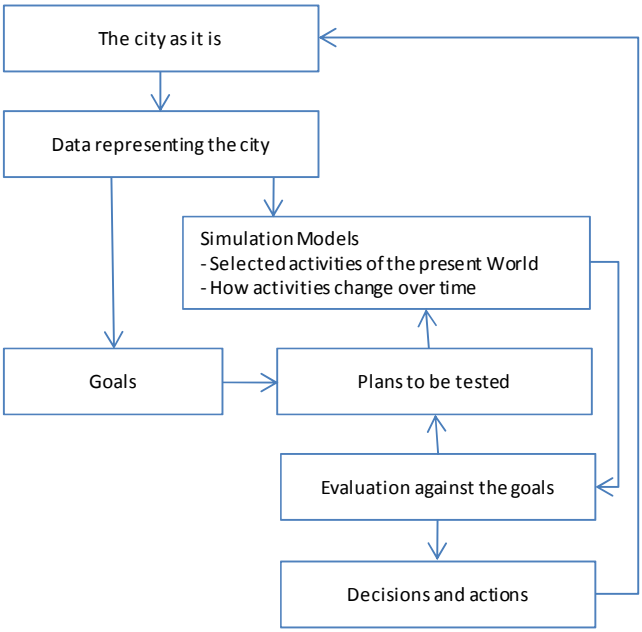


Figure 46: Classical aggregated studies: Structure of the Chicago Transport Study. Source: Banister (1994, p.22).

The Chicago Area Transportation Study was the basis for the subsequent structural organisation of planning processes as presented by Thomson (1974, in: Banister, 1994). In a summarised form, he presented the basic process for designing a structured plan in eight steps:

I. Problem Definition
II. Diagnosis
III. Projection
IV. Constraints
V. Options
VI. Formulation of plans
VII. Testing of alternatives
VIII. Evaluation

The structure proposed above is broadly used to this day.

However, the use of aggregated data and the long range of demand forecasting suffered criticism and consequently evolutions were proposed. The classical transport planning model indicates that personal decisions can be modelled using sequential, linked sub-models or stages of decisions (Ortúzar & Williamson, 1994). The first sequence proposed was: generation, distribution and assignment. With its introduction in the 1960s, the 'mode choice' (Figure 47) is "considered the trade-offs between private and public transport means. Correspondingly, the basic unit of analysis changed from vehicles trips to person trips" (Vasconcellos, 2001, p.97).

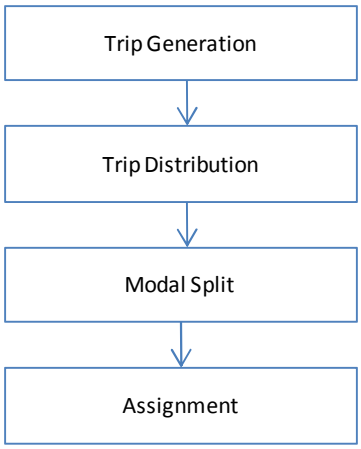


Figure 47: The classic four-stage transport model. Source: designed on the basis of Ortúzar & Williamson (1994).

The journey time analysis changed from a single evaluation to the "broader concept of 'generalised cost of travel', which included all time and money resources allocated to travel" (Vasconcellos, 2001, p.97). Simulation and quantification were developed and presented, based on models of travel demand. It "simulates the adjustment of transport demand and supply by modelling various factors believed to affect travel" (Dimitriou, 1992, p.15). For Banister (1994, p.23), "the transport planning model (TPM) forms the central part of the transport planning process", considering it leads with the transport analysis system and forecasting. However, it is not "the overall UTP itself" (Dimitriou, 1992, p.20). It proposes "to correspond to the decision-making stages of the decision-making of the trip-maker" (Dimitriou, 1992, p. 20). It is a tool to support the development of measures in the process of planning.

According to Dimitriou (1992, p.14-15) the major features of planning process in the seventies and eighties were based on:

- Extensive dependence upon simulation and quantification;
- Semblance of comprehensiveness;
- Formality of approach, based on principles of systems thinking;
- A set of procedures akin to a scientific approach to problem solving.

For Kelly & Becker (2000, p.43) a comprehensive plan is "a tangible representation of what a community wants to be in the future". The idea of a "comprehensive plan", according to Dimitriou (1992, p.15), "is derived from its attempt at providing a city-wide coverage of all types of urban transport modes. The semblance of comprehensiveness also arises from its incorporation of land-use/transport interactions [...]" within a systemic way of thinking. 'Systemic' is understood as "a set of objects together with relationships between the objects" (Black, 1981, p.22). In a comprehensive plan the formality of the process comes up "as a prerequisite to formulating recommendations [, emerging] from the methodology's need to handle complex interrelationships and analyse large amounts of data" (Dimitriou, 1992, p.15). In this way, the researchers began to draw their attention to the operational research and to the development of software to be able to work with more complex and larger amounts of data in order to deliver solutions based on quantitative analysis.

2.4.2 Sociological Approach

Transport planning faces social and environmental change. The change of the environment has socio-political consequences considering distributional issues and social system interactions. This assumption is the basis for the development of the social approach to transport. As emphasised by Healey (1977, p.199), sociology offers mechanisms of analysis that support the understanding and adaptation of the new state to the current social environment. The author also assures that the active interests of the society alter "the structural context of the planning activity, with a resulting introduction of strains and inconsistencies into the application of the planning paradigm", although the social analysis is "an attempt to adjust the existing paradigm to the changed conditions" (Healey, 1977, p.201).

As described in Table 11 the social approach focuses its explanation on individuals based on an analysis of people in general. The analysis and the evaluation use qualitative and quantitative data seeking economic efficiency in the light of social analyses. For instance, for an analysis of transport quality and traffic conditions, the social approach would add to the 'technical analysis' – which considers the traffic conditions measured by traffic volume, speed and density, proposing solutions based on the capacity analysis and traffic management, and providing a given demand – the quantity and the characteristics of people involved (age, gender) and the "understanding of the division of space between people and hence of the social impact of any particular decision" (Vasconcellos, 2001, p.39).

The sociological approach proposes an advance on the 'descriptive social research' which limits its explanation of social impacts and of the demand analysis which considers the individual daily trips as a 'given'. The sociological proposal "is characterised by the analysis of travel patters given social, political, economic and institutional constraints" (Vasconcellos, 2001, p.33). In this context, qualitative evaluation about "***how"*** and "***why****"* the trips are made are included for the demand analysis. Furthermore, "it analyses traffic-related social data in respect to the relative economic and political assets of social groups and classes, as well as their conflicting (or merging) interests" (Vasconcellos, 2001, p.33).

The sociological approach for transport planning was formalised and presented by Vasconcellos (2001) in the book "Urban Transport, Environment and Equity: the case for developing countries". This book discusses the political and social proposals for transport planning and has as a background the applicability for developing countries. The basis for the development of this approach was the issues presented in Table 12 below where the author argued that the conditions of urban transport in developing countries are a result of the implemented urban policies and transport planning over the years, following traditional techniques without adequate investigation of the local development, or just the absence of a comprehensive plan for the urban areas. Based on those statements the author claims that the developing countries face a profound crisis on urban mobility that requires a "radical change in the transport planning process" (Vasconcellos, 2001, p.231) to develop structural solutions, new policies and transport measures that enable the overcoming of challenges.

Table 12: Issues in developing countries' urban transport crises.

Issue	Content
Political	Highly centralised states; fragile democracies; uneven distribution of power; coalition between technocracy and middle classes; uneven right to use road space
Institutional	Lack of co-operation between agencies; lack of proper human and technical resources
Social	Unequal accessibility; comfort inequity; activity inequity
Technical	Use of techniques borrowed from developed countries; irresponsible forecasting exercises; conservative planning in support of private transport
Technological	Technological commitment to automotive transport; neglect of non-motorised means of transport
Economic	Fiscal crisis of the state, hindering social policies; persistent poverty; negligent operation of public transportation; over-investment in roads for private transport
Operational	Irregular provision of public transportation; poor traffic conditions; priority to private automobiles in traffic management
Environmental	High traffic accident rates; increasing pollution; disruption of residential areas

Source: designed on the basis of Vasconcellos, "The urban transportation crisis in developing countries: alternative policies for an equitable space" (1997, p.7).

How do we address these problems and find solutions? To face these concerns it is necessary new arrangements of space, time and energy and the relationship between people and places should also be re-thinked (Whitelegg, 1997) and new proposals must be developed. The drawbacks of the current planning patterns must be discussed and a proposal for the developing countries must be presented in a way to guarantee accessibility in the cities. Indeed, "deep social and economic differences in developing countries translate into different access to transport modes and to space. Most people are transport deprived – hence socially deprived – in some way" (Vasconcellos, 2001, p.233). Therefore, the question of how to access the urban space is a central issue in the discussion of the fundamentals of the sociological approach for the analysis of urban transport. For Vasconcellos (2001) the urban space is analysed having as a central concept:

> "The city as a built environment made consciously and composed of a myriad of physical structures designed to sustain the development process. This built environment is not static, but subjected to ongoing constructive and destructive processes in conjunction with the external and internal migration of people and economic activities. [...] There is therefore a highly complex network of interests involved in socio-spatial organization. [...] And this mix will lead to a specific distribution of accessibility in space and will generate a pattern of average distance to be traversed, with profound consequences for the transport system" (Vasconcellos, 2001, p.51-44).

It is a fact that many cities or their districts in the developing countries have grown spontaneously without adequate control or comprehensive planning to guide urban space uses. Therefore, the urban development pattern created segregated areas for the upper class as well as for the lowest classes. The so-called "gated communities" are visible in many cities in Latin America. On one side, the richest people, the middle to upper classes, live in enclosed areas (the so-called "*condominios fechados*" in Brazil), in villas or skyscrapers that have plenty of leisure facilities as well as security borders, and are surrounded by walls. On the other side are the segregated areas of the lower classes and of those living under the poverty line (Gonçalves; Rothfuß; Morato, 2012).

For the lower classes just above the poverty line, the most common solution is so-called "popular"[28] neighbourhoods constructed in the city's outskirts, usually with physical separation from the urban tissue. They form an isolated community, connected to the city centre by the public transport corridors in a certain period of the day. These communities are very often deprived of schooling, leisure and other services as most of them cannot afford a car, and due the lack of public transport connections, coupled with the impossibility of accessing the centres of services by foot or cycling, considering the long distances and that the infrastructure is inadequate or not available[29] (Gonçalves, 1995; 1997).

Those living beneath the poverty line are the so-called "people of the periphery", who live in slums. Being part of the 'periphery' group does not necessarily mean that they are living on the geographical periphery of the city, but reflects the set of socio-cultural ways of living, unwritten rules and poverty conditions: they are on the periphery of society. These people can also live in "gated communities" or gated slums, as noticed by Kunath (2009), isolated from the middle and upper classes, with their own socio-cultural reproduction; deprived of the adequate urban infrastructure and services. As well as the lack of infrastructure and adequate transport connections, poverty may restrict people from accessing convenient destinations when they do not have money to pay for transport tickets (Gonçalves, 1998). "For example, poor children do not have money to use buses to get to schools, and they remain poor because of a lack of education (among other factors). [...] Therefore, one should associate mobility impairment with poverty and accessibility impairment with deprivation" (Vasconcellos, 2001, p.233, 235). This assumption is one of the main bases of sociological approaches to transport planning in developing countries, so "although the solution to structural poverty lies beyond transport policy, adequate transport planning and provision may minimize or eliminate some of the crucial barriers faced by the poor or deprived" (Vasconcellos, 2001, p.233).

Hence, for the sociological approach "the key word is accessibility in its wider sense, ensuring that people have the opportunity to access space and services under safe, convenient and comfortable conditions" (Vasconcellos, 2001, p.234). That means not only the "ability to move, a function of physical and economic resources, [or] the ability to overcome space" (Vasconcellos, 2001, p.53-54) but it actually means "'mobility of opportunities', that is, mobility which allows the person to get to the desired destination". In this sense, accessibility can be defined as "the ease of getting to a destination. [Though] what matters is access and how transport can contribute to it, not mobility in itself. [Therefore,] a consequent relevant question for policy purposes is actual versus potential accessibility" (Vasconcellos, 2001, p.54). Hence, the urban transport policies

[28] Low-standard dwellings constructed in an open ground in the outskirts of cities, in large numbers for the low and middle-low classes.

[29] A research conducted by the author in the city of Florianopolis, Brazil, analysed in detail the operation of public transport and the travel demand for the connection of a low-income community located 10 kilometres away from the City Centre. Surveys using stated preference (SP) techniques uncovered the preference of the users based on the different scenarios for public transport presented to them. Among the results was the finding that they would pay 10% more for the tickets in order to have more comfort, better connections to the city centre, and access to services (Gonçalves & Novaes, 1996).

must give priority to investments which ensure equity of urban space use for the whole population, supporting them in overcoming spatial segregation in the cities, as accessibility is seen "as an important spatial output of transport systems" (Vasconcellos, 2001, p.54).

For the same author, mobility and accessibility analysis requires the discussion of these concerns:

- Social, economic and political differences deeply influence mobility and accessibility conditions.
- Relative importance of mobility and accessibility must be understood within the structural constraints of the development process.
- The analysis of mobility and accessibility conditions entails the discussion of equity issues.

Considering the topics above, Vasconcellos (2001) proposed principles for the development of transport policies in developing countries. Table 13 presents the principles needed for designing the framework to support urban transport policies and planning.

Table 13: Proposed principles and related questions for the development of transport policies in developing countries.

Principle	Content	Traditional Question	Proposed Question
Accountability	Ensuring the right to participate in policy decisions and to evaluate results	What are the best technical tools to support transport and traffic policies?	What are the most democratic ways of using technical tools to support transport and traffic policies?
Social progressiveness	Identifying and filling existing accessibility gaps	How may transport demand tendencies be provided for in the future?	How were urban and travelling environments built; who may use them and under which conditions; and how can equity gaps be filled now?
Equity	Targeting of policies to ensure equitable accessibility, safety and environmental conditions	What is the most efficient way of ensuring the highest mobility?	What is the most efficient way of ensuring the most equitable appropriation of space?
Sustainability	Reorganizing space and transport technology	What are the technological alternatives to ensure maximum mobility?	What are the most efficient, environmentally friendly and sustainable means of ensuring the equitable appropriation of space?

Source: designed on the basis of Vasconcellos (2001, p.250; and 1997, p.9).

However, considering the above statements, the sociological approach proposes quantitative and qualitative analysis for travelling patterns based on the idea that "while circulating, the user develops desired or needed activities interrelated by time and space network. This network is composed of origins and destinations spread over the space, and the traveller must consume time in order to reach any one of these spatial points" (Vasconcellos, 2001, p.54). Therefore, the analysis is based on the basic elements:

- Time budget, by mode and purpose; and
- Space budget, by mode and purpose, according to selected social groups and classes.

In this way, traffic movements and demand must "be analysed in the face of social, economic and political determinants" (Vasconcellos, 2001, p.38) to meet the needs of the stated and the

suppressed demand.[30] For Vasconcellos the real travel demand can only be understood based on qualitative and quantitative analysis. The author points out that various studies

> "Showed that manifest demand, captured through origin-destination surveys, revealed only the 'possible' trips: that is, those possible given prevailing conditions. If other conditions were present, other trips would have taken place. [In addition, researches conducted] into the daily activities of people in a household made it clear that all individuals were constrained by both personal and family limits, along with limits imposed by the environment and transport supply. [...] Therefore, the sociological approach never sees manifest demand as a given, but rather as a product of prevailing conditions, influenced by individual and family characteristics, the existent transport systems, spatial and time constraints, and public policy decisions. It includes the political dimension as an essential component to complement the technical one" (Vasconcellos, 2001, p.35).

Furthermore, for the case of developing countries transport modelling and demand forecasting has various drawbacks that influence the results of urban transport projects. Many cities do not have planning structures or institutions in charge of the process of planning, coupled with weakly institutionalised democratic procedures. Therefore, the conditions under which information is gathered, organised and stored provoke serious concerns. Very often it is not clear which kind of methodology is used and also it is possible to find many incongruities or inconsistencies in the data available. The weaknesses of the institutions in the face of the political powers-that-be, imply discontinuities regarding the provision of information. It is very common in developing countries that political changes in the administration of cities result in changes of direction for public policies. When this happens, projects are stopped and documents are simply rejected and lost.

Adding to the concerns above, the complex relationship between land-use, travel patterns and transport supply hinder rigid forecasting and modelling procedures. The lack of comprehensive

[30] The first demand forecasts for the implementation of the integrated public transport network, together with a bus rapid transit (BRT) corridor, in the city of Criciuma, Brazil, in 1996, was made based on historic data using only the quantitative analysis for the calibration of the demand matrix. Hard discussion about the results led to a complementation of the studies with qualitative evaluation including a wider analysis of the social-economic and land use impacts with the improvement of accessibility for the population. The results of the first forecasting based on the stated demand of the O-D matrix failed substantially. A short time after the implementation, the suppressed demand of about 12% was found in the number of passengers transported by the system. One year later, surveys were conducted to evaluate the results of the project. The interviews confirmed the numbers: a significant number of young people aged 15 years and over were able to reach schools and universities after the new transport system started to run. These people, who lived in districts on the outskirts, could not study before, due to the lack of transport connections coupled with the education policy stating that local governments are only obliged to provide schooling for students up to the age of fourteen within each district. Beyond this age, education becomes a state responsibility. The flow of students to the secondary and technical schools, and to universities, completely changed the land use of the main neighbourhoods where those schools are located (Gonçalves & Silva, 2007).

planning, public control and continuity of transport supply; the intrinsic social, political and economic instability; and the fast process of change, all imply a high possibility of mistakes in the gathering of data and the calibration of the parameters to be used in the models.[31] Therefore, the planning process must be organised in such a way that the many variations and uncertainties of social-political-institutional-economic conditions, the complex configuration of the process of decision, the local planning peculiarities, the land-use instability, and the vagueness or inexistence of information, can all be overcome in a way to make the design of transport projects possible.

Following the assumptions made by the sociological approach for urban transport planning and policies as stated above, and in order to meet the developing countries' conditions, planning may take into consideration these steps (Vasconcellos, 2001, p.259-260):

- Planning agencies have to analyse the city as a built environment and must use expertise from various origins, blending social and technical sciences.
- The planning process has to clearly define the way society and organised groups will be included in the decision-making process.
- Technical and social data has to be gathered in a way that illustrates the social and economic life of the city, combining land-use and travel information; data to reveal actual transport and traffic conditions of accessibility, safety, fluidity, comfort, environment and cost.
- People involved with planning tasks, including social representatives, should evaluate current conditions and identify positive or negative conditions, such as which externalities are being generated, who is responsible and who is suffering their consequences.
- Two questions must be asked: what kind of city (or transport system) do we have? And: what kind of city (or transport system) do we want to have in the short to medium term? Plausible scenarios must be drawn with the most relevant and discernible variables.
- Transport and traffic alternatives that support the idealised future situation are then evaluated; the analysis has to combine social, technical and economic characteristics and impacts, according to the aforementioned variables. Impacts have to be analysed considering the relevant roles (resident, pedestrian, cyclist, public transport user, car or motorcycle driver, truck driver) and their relative weight.
- The selection of alternatives should be based on clearly-defined social and economic objectives, and on the economic and financial feasibility and capability of implementing and monitoring them.

[31] In the sprawling cities of developing countries, it is very often possible that literally overnight a new settlement with thousands of people will suddenly appear in an open space between two already consolidated districts - this can happen illegally or with allowance, based on political interests, without any consideration of the urban or transport plans, bringing about an unexpected demand for transport services. This new demand needs to be accommodated by the forecasts set by previous projects.

- An implementation plan must be defined for the selected alternative, concerning legal support, institutional responsibility, investment flow, means of social control, intermediate evaluation procedures and impact assessment.
- The first level of measures involves interfering with the urban development process through land-use and fiscal regulation, targeting a medium-term transformation of the space.
- The second level of measures relates to spatially confined projects concerning urban renewal. Urban renewal occurs when public agencies and the private sector promote changes in deteriorated areas or in those areas where the travelling environment has collapsed (due to extreme congestion and inefficiency).

2.5 THE THESIS APPROACH FOR URBAN TRANSPORT PLANNING: INTEGRATED URBAN TRANSPORT PLANNING APPROACH TOWARDS ACCESSIBLE CITIES FOR INDIVIDUAL AND COLLECTIVE DEVELOPMENT

Considering the urban transport planning background discussed in the above sections, the main questions to be answered are: ***How*** do we explain the urban transport planning approaches practiced in European and Latin-American cities? ***What*** is the main influencing framework that affects urban transport planning approaches in use in these two geographical areas? ***What*** are the main results of the planning approaches and influencing framework on the mobility concepts of the case study areas? ***What*** could we learn from the theory and practice and ***how*** could we share social learning in planning urban transport to support sustainable individual and collective development?

The main issue of this thesis is to analyse urban transport planning (UTP) in use in European and Latin-American cities, focusing on the comparisons of the planning approaches of selected cities used as case study areas (CSAs). In order to meet this objective, specific topics were developed and discussed, supporting conclusions and recommendations for the social learning of urban transport, and planning to propose an integrated approach towards accessible cities which seeks to enhance individual and collective development. Firstly, the current challenges for and influences on UTP were discussed, and secondly, various ideas, cultures and theories about planning and prevalent urban transport planning approaches in Europe and Latin America were revised.

To meet the further specific objectives of this study, a model was designed for the higher abstraction and understanding of theories and practice. Echenique (1968, p.164) defined a model as “a representation of a reality, in which the representation is made by the expression of certain relevant characteristics of the observed reality and where reality consists of objects or systems that exist, have existed or may exist.” In this case the reality “may be known by a process of observation and abstraction [therefore, a model is made by a] plurality of partial and extrinsic realities which depend on each observer and its intentions” (Echenique, 1968, p.165). A descriptive model is an essential foundation for aiding the understanding of a phenomenon, as it is a theoretical statement helping to demonstrate the relationships between relevant factors and variables within a more complex system before an intervention would be considered (Vyzoviti, 2005).

The empirical research conducted in multiple-case study areas focuses on the analysis of urban transport planning approaches in European and Latin American cities, the effects of these approaches on the mobility concepts designed for those cities, and on the accessibility available to those cities' populations. Furthermore, this study analyses the framework that influences the design of the planning approaches of each city. The use of a model helps to interpret and contextualise reality (by exploring and describing), on one hand elucidating the principles and assumptions on which the urban transport planning of each city is designed, and on the other hand discussing them on the theoretical basis of the urban transport planning approaches developed or prevailing in Latin America and Europe, ultimately aiming to deliver contributions to planning theory and practice.

Figure 48 and Figure 49 show the proposed model for the discussion of the theories and practices and the results of this thesis.

2.5.1 Urban transport planning scope and influencing framework

The scope of urban transport planning (Figure 48) comprises the institutions, organisations and other stakeholders responsible for and directly and formally participating in the development and regulation of urban transport planning, and the organisation, implementation and monitoring of the planning process. Indeed, the planning scope represents the space and environment for the formalisation of the planning process and its results and application.

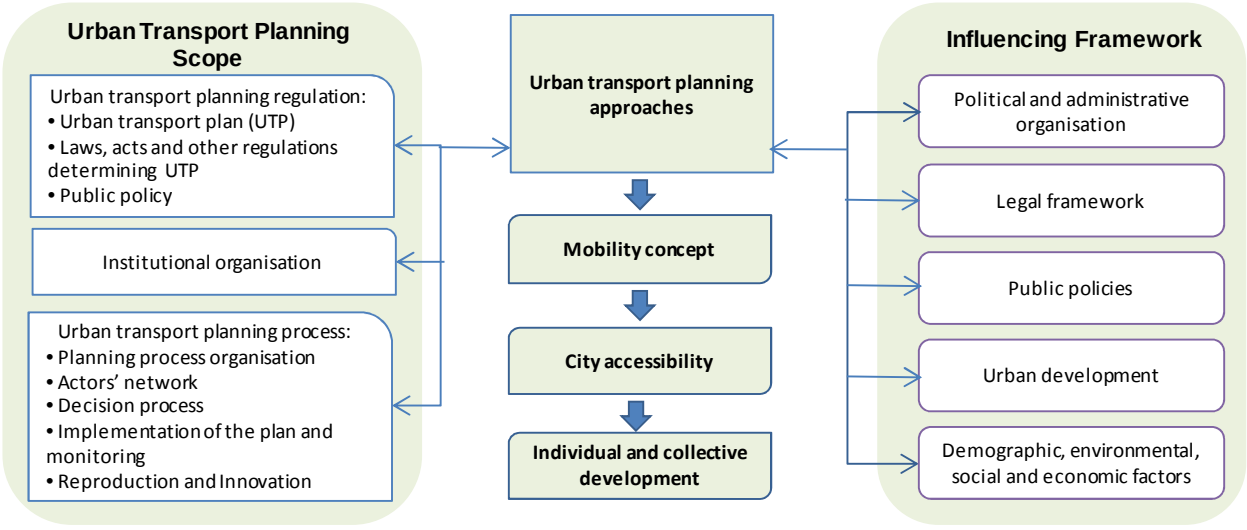


Figure 48: Integrated urban transport planning approach towards accessible cities for individual and collective development: scope and influencing framework. Source: from the author.

For the analysis of the influencing framework (Figure 49) on urban transport planning in each city, the national, state and regional political and administrative organisations in each country were considered, in order to evaluate the position of the city in dealing with the planning tasks, how responsible it is for making decisions, the regulations in the different government levels influencing UTP, the public policies, the predominant urban development concept and the relationships and incongruities among these factors. Furthermore demographic, socioeconomic and environmental factors must be considered. The structure of demography related to gender, age, education, culture, beliefs, ideology, habits, distribution in the territory, the dwelling

structure and form, and the settlements themselves, can all determine the use of and demand for transport in a city. Also socioeconomic and political factors must be considered: such as income and its distribution; the conditions of the settlements and the city infrastructures; the conditions of accessibility for services, workplaces, education, leisure, shopping, and all places in the urban spaces; and the conditions of democracy and the guarantee of individual and collective rights for development.

There are also the influences of the built and unbuilt environments and the way society deals with those factors. These aspects can affect and sometimes determine the movement of people throughout the urban spaces and influence the modes to be used, for instance the existence of natural and geographical phenomena like rivers and mountains in the unbuilt environment, or on the other hand considering the available social infrastructure of a settlement. Additionally it is worthwhile to mention the impacts that mobility concepts cause for the built and unbuilt environments and consequently for the lives of humans, such as pollution, indiscriminate land consumption, traffic accidents and physical and socio-political barriers.

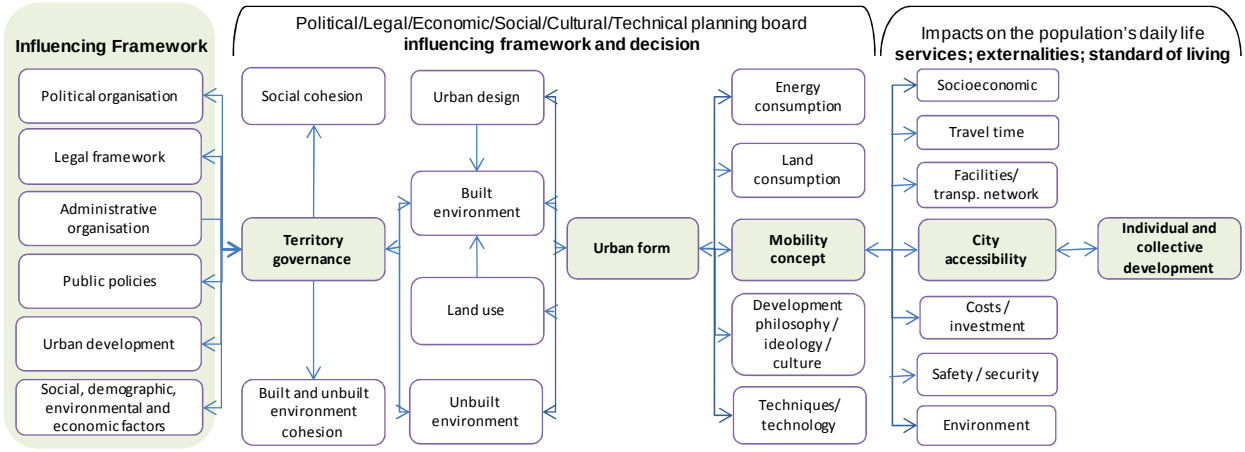


Figure 49: Integrated urban transport planning approach towards accessible cities for individual and collective development: influencing framework. Source: from the author.

As discussed in the above sections of this chapter, urban transport planning intrinsically possesses a highly complex nature in itself, since it intervenes directly in private and public affairs and can indeed determine or at least influence the future of a society. Therefore, it will always bring into the process a vast number of variables, facts, factors, data, information, cultural aspects, techniques, beliefs, ideologies and philosophies, among other things. The specificity of the issue under the various environmental conditions of each city can sometimes confuse the planning process, partially delivering outcomes that cannot support individual and collective development. That is to say, activities within planning can have opposite results for society, creating desires to reject the results. One way to diminish the negative impacts is to have a process of planning that can incorporate the various influencing factors and use them to design the results and the process of decisions regarding what makes a good plan for a specific city. In this way the model can help the understanding and designing of the scope of, and the influencing factors on, urban transport planning for a city, in order to gain a picture of the real conditions of the planning environment.

3 RESEARCH FRAMEWORK AND METHODOLOGY

The search for knowledge seems to have its foundation in the most ancient ages of human history. For as long as Mankind's path has been charted by evidence, there have also been signs of human interest in transforming the natural world or in leaving behind a mark of existence to be discovered. Thinking this way, one can infer that learning-transforming-follow-up knowledge is a part of the human being. In the case of the structured concept of the object of study as methodology, various research areas such as philosophy, sociology and psychology have been proposing methods and theories to support the search for knowledge and the development of sciences, since the time of René Descartes ("Discourse on Methodology", 1637).

All areas of endeavour have developed or just adapted the most appropriate research approaches and methods to design inquiries, findings and theories that emerge from the dedicated work of researchers looking for the truth, in order to better understand or explain the reality of the world, or just to explore and uncover phenomena.

Cervo and Bervian (2002) explain research as an activity that finds solutions to theoretical or practical problems, based on applying scientific processes. According to Lakatos and Marconi (1992), a scientific work aims to find the truth, to the extent to which the real world can be explained through methods and theories. The method is a set of rational and systematic activities that enable the reaching of goals and objectives (valid knowledge) with more accuracy and less economic resources, leading the way that is to be followed, identifying the mistakes and helping the scientists to make better decisions, in contrast to those made by common sense or basic observations of reality.

3.1 THE RESEARCH DESIGN

"It is the theory that determines what can be observed"
(Albert Einstein, 1926)

Creswell (2009, p.3) explains research design "[…] as the plan or proposal to conduct research". Furthermore, it includes the placement of the philosophical worldview, indicates whether the research involves qualitative, quantitative or mixed methods, and indicates the selection of the strategies of inquiry, the research methods for data collection, data analysis, interpretation, description and validation (Creswell, 2009).

3.1.1 Research approaches and methods

a) Research Approaches

The 'logic of investigation' or 'research approaches' used for this study were based on deductive and inductive approaches. On one hand the study was deductive when forming concepts and gaining understanding from the theory and from the discussions about planning traditions in Europe and Latin-America, and from socioeconomic development. On the other hand the research was based on the investigation of multiple-case studies, conducting an empirical inquiry of the urban transport planning of various cities in Europe and Latin-America, using an inductive approach to interpreting reality. Both approaches helped the development of a more abstract understanding, leading to the design of a representation or simplified picture of the reality of urban transport planning, in a model format aiming to deliver contributions to planning theory and practice.

b) Research Theories

For this research, the study of the theories does not have the objective of drawing "a ready-made series of hypotheses to be tested from the literature" (Creswell, 2009, p.62), as the study was not based on one single theory supporting the entire research discussion. That was not possible because of the complexity and intricate variety of perspectives involved in the explanation of the problems resulting from urban transport planning in European and Latin-American cities. The main perspectives involved in the discussion include the technical approach based on the engineering perspective, the sociological perspective, the geographical perspective, the perspective of urbanism and of regional planning and development and socio-economic development, and other perpectives – all of them generating questions and answers or proposing orientation for the issue.

Furthermore, this investigation relies on multiple-case study design for the strategy of inquiry. In this way the theory embodies what was studied and serves as guidance for the research design. In agreement of what Yin (2009, p.36) argued, "theory development prior to the collection of any case study data is an essential step in doing case studies." Therefore, the theories used had the goal of offering sufficient blueprints for the investigation, requiring theoretical propositions, such as a "hypothetical story about why acts, events, structure, and thoughts occur." [In this way, the theorectical background provided] "guidance in determining what data to collect and the strategies for analyzing the data" (Yin, 2009, p.36).

Yin (2009, p.40) emphasises the importance of theory in case study, remarking that "the use of theory, in doing case studies, is an immense aid in defining the appropriate research design and data collection. The same theoretical orientation also becomes the main vehicle for generalizing the results of the case study." Also according to Yin (2009, p.38), the transformation of scientific findings into generalised theory can follow in two ways: the best-known way, the so-called "estatistic generalisation", is where "an inference is made about a sample from that universe." The author argues that "the appropriately developed theory also is the level at which the generalization of the case study results will occur." That is what he called "analytic

generalisation". Yin (2009, p.39) also affirms that "the logic of replication and the distinction between statistical and analytic generalization will be covered in greater detail in the discussion of multiple-case study designs."

Allmendinger (2009, p.10-11) presented a synthesised description of six broad categories of types of theory. This can be seen in Table 14. The descriptions are helpful abstractions for the understanding of the purposes and the expected outcomes of this study.

Table 14: Categories of theory.

Type of theory	Characteristics
Normative	Concerns how the world ought to be and provides ideas about how to achieve this state. Traditionally, these could be regarded as theories of planning and could, for example, include Marxist, liberal, communicative or collaborative planning approaches.
Prescriptive	Concerned with the best means of achieving a desired condition;the means of how to go about things. Traditionally, this has been termed 'theories in planning' and includes, for example, cost-benefit analysis, mixed scanning, etc.
Empirical	Explains and interprets reality and focuses on causal relationship and dependent and independent variables. Hypothesis forms part of empirical theory and allows it to be tested and adjusted. Examples could include theories concerning the impact of town retail upon town centres.
Models	Representations or stylised and simplified pictures of reality that do not always include hypotheses but are still testable.
Conceptual frameworks or perpectives	Ways of looking at or conceiving an object of study. They essentially form a linguistic analysis of situations and ideas leading to perpectives and critiques that might otherwise be lost. Some Marxist perpectives can be seen to fall into this category (though there are others too) and can lead to a perspective on, for example, class freedom that questions assumptions, practices and theories.
Theorizing	Thinking about some aspect of a phenomenon. It generally is a catch-all category that covers thinking and debating ideas and other theories as to their suitability and applicability.

Source: designed on the basis of Allmendinger (2009, p.10-11).

This research uses empirical study to analyse the problems of planning in Europe and Latin-America, supported by existing approaches and theories about planning and urban development, leading inductively to a more generalised and abstract understanding of reality. From both the empirical investigation and theoretical basis, a model was designed deductively, aiming to give a simplified picture representing an approach for planning urban transport. The model was used for discussing planning practice in European and Latin-American cities, relating specifically to the more detailed examination of five case study areas. Conceptual perspective was used to look at the planning approaches in use in cities in both developed and developing countries, posing a critical analysis view and ideas for improving planning and public policies in developing countries, with the aim of constructing "cities without barriers" in order to promote individual and collective development.

As Creswell (2009, p.62) discusses, theory was used in qualitative research in order to give perspective to the study, and also as a theoretical lens providing an overall orientation to shape questions needed for interviewing, showing how data should be collected and analysed, and providing a call for action or change. In the case of mixed methods it was used inductively to support the abstractions and the construction of the analysis (Creswell, 2009).

Table 15 shows a summary of the main theories and approaches used to support the development of this research and its analysis and recommendations.

Table 15: Theories and approaches used to support the investigation.

Issues	Theory discussion on	Main authors
Statistics and data on: GDP and income, Global investment capacity, Demography, urbanisation	• Empirical, official statistical information • World finance and development • Investment in urban transport	• UNACTD • World Bank • Canuto and Giugale (2010) • European Union • IBGE
Urban development	• Impacts of past and current development pattern on mobility • Urban form • Governace of the territory • Urban regeneration	• Ribbeck (2005); Rothfuß (2006); Perrone (20101); Siedentop and Fina (2008); IBGE (2011); Newman and Kenworthy (1999); Gonçalves, Rothfuß, Morato, (2012); European Commission.
Urbanisation and economic development	• The role of innovation in the process of change and economic development • The triumph of the city	• European Union; World Bank; Glaeser (2011); Jacobs, (2011); Schumpeter (1939); Ribbeck (2005);
Urban sociology	• Implications of planning on social development	• Haessermann and Siebel (2004); Freire (1990, 2011); Vasconcelos (2001).
Planning theories	• Complexity and diversity in planning • Politics and planning • Planning cultures • Planning styles • Urban planning • Governance and planning	• Rothfuß (2006); Perrone, (2010); Allmendinger (2009); Healey (2006, 2007); Verma (2010); Grant (2005); Jacobs (2011); Innes and Gruber (2001)
Planning approaches for urban transport	• (so-called) Technical approach • Sociological approach • A perspective for integration of multimodal urban transport network	• Ortuzar and Williamson (1994) • Vasconcellos (2001) • Bertolini (2005)
Planning process	• Communicative and Collaborative planning	• Healey (2006, 2007); Habermas (1981) ; Freire (1990); Rothfuß, Perrone, Mororó, (2012); Ward (2001.); Innes and Gruber (2001); Vasconcellos (2001)
Actors and society networks	• Actor Network Theory (ANT) • Networking Society	• Latour (1981); Law (1992) • Casttels (2004; 2009)
Evaluation method	• Analytical Hierarchy Process (AHP)	• Saaty (2007)

Source: from the author.

c) Research Methods

Creswell (2009, p.15) explains that “research methods involve the forms of data collection, analysis, and interpretation that researchers propose for their studies.”

- Qualitative methods:

Creswell (2009, p.129) argues that qualitative research intends to “explore the set of factors surrounding the central phenomenon and present the varied perpectives or meanings that participants hold.”

Qualitative methods are oriented to exploring the nature of objects, therefore it uses argumentation to understand or explain the phenomena surrounding the objects (Aristotle method for sciences). Denzin and Lincoln (2000, p.3) describe qualitative research as:

> "[...] a situated activity that locates the observer in the world. It consists of a set of interpretative, material practices that makes the world visible. These practices [...] turn the world into a series of representations including fieldnotes, interviews, conversations, photographs, recordings and memos to the self. At this level, qualitative research involves an interpretative, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret, phenomena in terms of the meanings people bring to them."

For the purpose of this investigation, qualitative research offers possibilities for making interpretations and drawing conclusions, considering that in order to understand planning it is necessary to combine various elements of social reality and also of politics, government institutions and public services. Those conditions lead to a high complexity of data collection and analysis. Therefore, statistical procedures or other means of quantification alone would not be enough to produce the findings that can be reached by qualitative procedures (Strauss & Corbin, 1998). Furthermore, as claimed by Bryman (1988, p.8) "the way in which people being studied understand and interpret their social reality is one of the central motifs of qualitative research." Planning and public policies can only be understood within their own social reality.

The main purpose of the study is to reach an analytical understanding of planning approach in different cultures and patterns for socioeconomic development, as expressed in five different languages in cities located on two continents. This entails a high level of complexity in the application of procedures for data collection and interpretation, in order to arrive at more in-depth analysis and findings. Under these conditions and objectives, qualitative research was the most adequate method for most of the steps of the investigation. As told by Lewis and Ritchie (2010, p.277), "one of the key roles of qualitative research is to identify and display range and diversity. […] The inference that can be drawn from qualitative data concerns the nature of the phenomenon being studied but not its prevalence or statistical distribution." Therefore, it was also adequate to support the comparative methods of analysis, enabling an understanding of the differences, incongruities and similarities among the various approaches to urban transport planning in the case study areas in Europe and Latin-America.

- Mixed Methods – Triangulation:

Brannen (1992, p. 33), discussing mixed methods, argues that "with multiple methods the researcher has to confront the tensions between different theoretical perpectives while at the same time considering the relationship between the data sets produced by the different methods."

Ritchie (2010, p.43) writes that "triangulation involves the use of different methods and sources to check the integrity of, or extend, inferences drawn from the data. It has been widely adopted and developed as a concept by qualitative researchers as a means of investigating the 'convergence' of both the data and the conclusions derived from them." Triangulation was used in this study as a strategy to broaden vision through the use of different sources discussing the same issue or just presenting different points of view, while sometimes checking details or the accuracy of specific points of the study. As argued by Ritchie (2010, p.46), triangulation "lies in

extending understanding through the use of multiple perpectives or different types of 'readings' often termed as **multiple method** research."

Creswell (2009, p.191) writes that it is useful to empower the discussion and "triangulate different data sources of information by examining evidence from the sources and using it to build a coherent justification for themes. If themes are established based on converging several sources of data or perspectives from participants, then process can be claimed as adding to the validity of the study."

Lewis and Ritchie (2010, p.275) affirm that, because of triangulation's use of information, its application is used in order "to confirm and to improve the clarity, or precison, of a research finding." In their book they also summarised various forms of triangulation written by other authors (Lewis and Ritchie, 2010, p.276):

- Triangulation of methods: comparing data generated by different methods (e.g. qualitative and quantitative);
- Triangulation of sources: comparing data from different qualitative methods (e.g. observations, interviews, document accounts);
- Triangulation through multiple analysis: using different observers, interviewers and analysis to compare and check data collection and interpretation;
- Theory triangulation: looking at data from different theoretical perspectives.

The research uses triangulation of sources, triangulation through multiple analysis and theory triangulation to look at different perspectives of the problem, considering that planning relies on high complexity activity and considering its conflicting and multifaced nature, especially when the investigation works with multiple-case study, located in multicultural environments. Futhermore, triangulation was used in order to enhance the analysis and findings.

Table 16 gives a summary of the research methods discussed by Creswell (2009) and used for the investigation:

Table 16: Research methods for the investigation.

	Qualitative Methods	Mixed Methods
Characteristics	• Emerging methods • Open-ended questions • Interview data, document data, and audio-visual data • Text and image analysis • The researcher focuses on learning the participants' ideas about the problem or issue • Themes, patterns, interpretation inquiry • Holistic account – attempts to develop a complex picture of the problem or issue under study	• Both pre-determined and emerging methods • Both open- and closed-ended questions • Multiple forms of data drawing on all possibilities • Statistical and text analysis • Cross-database interpretation
Philosophical Assumptions	• Critical/participatory knowledge claims	• Pragmatic/criitcal knowledge claims
Strategies of Inquiry	• Grounded theory, critical theory and case study	• Triangulation
Data Collection Methods	• Natural setting – data collection in the field where participants experience the issue or problem under study • Multiple sources of data • Open-ended questions, emerging approaches, text or image data	• Triangulation for collecting multiple sources data and for analysis
Practices of Research as the Researcher	• Researcher positions him- or herself as a key instrument • Collects participant meanings • Brings personal value into the study • Studies the context of setting of participants • Makes interpretation of the data	• Collects multiple sources data • Develops a rationale for mixing • Integrates the data at different stages of inquiry • Presents visual pictures in the study

Source: designed on the basis of Creswell (2009, p.15, 17, 175, 176).

d) Research Types

Ritchie (2010, p.27) proposes, for a better understanding, a comprehensive classification of types of research. Firstly there is contextual research, which "is concerned with ***identifying what*** exists in the social world and the way it manifests itself" and "describing the form or nature of what exists", and is also subdivided by other authors into 'descriptive' or 'exploratory' research. Secondly there is explanatory research, "examining the reasons for, or associations between, what exists". Thirdly there is evaluative research, "appraising the effectiveness of what exists" and fourthly generative research "aiding the development of theories, strategies or actions."

This study uses contextual research (both descriptive and exploratory), with the two objectives of presenting the main characteristics of the studied phenomena in a way that captures their inherent nature, and of highlighting important variables in the studied context. To reach these objectives, general literature review about planning and document analysis, for example field observations and interviews, were explored in the case study areas in Europe and Latin-America. In this way, the nature of the urban transport planning approaches practised in Europe and Latin-America can be better understood.

> "A major feature of qualitative methods is their facility to describe and display phenomena as experienced by the study population, in fine-tuned detail and in the study participants' own terms. It therefore offers the opportunity to 'unpack' issues, to see what they are about or what lies inside, and to explore how they are understood by those connected with them" (Ritchie, 2010, p.27).

For this research the contextual research type was used in order to (Ritchie, 2010, p.27):

- Map the range of elements, dimensions, classes and positions within the phenomenon;
- Display the nature and features of the phenomenon;
- Identify and define typologies and different planning approaches.

The research also uses evaluative perspective to examine the results of the urban transport planning implemented in the case study area cities over the years, and to assess the power influences of main actors in the planning process and the respective correlations between the variables influencing planning and decision making. According to Ritchie (2010, p.27) "evaluative research is concerned with issues surrounding ***how well does it work***, a question that is central to much policy related investigation."

In qualitative research the evaluative research is used in order to ***examine*** the dynamics of ***how*** the phenomena operate, giving information about the process. On the other hand an evaluative type of research can use qualitative data to work on the understanding of the outcomes "by identifying the different types of effects or consequences that can arise from a policy and the different ways in which they are achieved or occur" (Ritchie, 2010, p.29). For this study it was used in order to:

- Explore a range of organisational and technical aspects surrounding the delivery of planning or public policies and services.
- Design a model for urban transport planning.
- Explore the context in which interventions are received.
- Examine the nature of requirements of different groups within the target population.
- Identify factors that contribute to successful or unsuccessful delivery of planning processes, services and interventions.

Furthermore, the research is generative. As written by Ritchie (2010, p.30):

> "Generative research is concerned with producing new ideas either as a contribution to the development to the theory or to the refinement or stimulus of policy solutions. Because qualitative research seeks to capture emergent concepts and is not overly predetermined in coverage, the potential for original or creative thoughts or suggestions is high. It also allows ideas to be generated through, and then placed in, the 'real' contexts from which they arise."

For the purpose of this thesis the generative research was used in such a way as to:

- Develop new conceptions or understanding of planning approaches in use in Europe and Latin-America;
- Identify strategies for improving the development of urban transport policies and planning for urban transport;
- Demonstrate some of the actions and best practices drawn from the case study areas that are needed to make mobility programmes, policies and services more effective.

e) Strategies of inquiry

Creswell (2009) instructs the researcher to, after selecting the research method (qualitative, quantitative or mixed methods), also choose a type of study within the three possibilities of choice. The type of study can be seen as strategies of inquiry which "are types of qualitative, quantitative, and mixed methods designs or models that provide specific direction for procedures in a research design" (Creswell, 2009, p.11).

Various authors have written about the differing strategies of inquiry used for qualitative research. For this study, strategies based on grounded theory, critical theory and case studies were used. According to the definitions of Creswell (2009, p.13):

- **"Grounded theory** is a strategy of inquiry in which the researcher derives a general, abstract theory of a process, action, or interaction grounded in the views of participants. This process involves using multiple stages of data collection and the refinement and interrelationship of categories of information. […]. Two primary characteristics of this design are the constant comparison of data with emerging categories and theoretical sampling of different groups to maximize the similarities and the differences of information."

For Snape and Spencer (2010), symbolic interactionism is a tradition of qualitative research which aims towards "exploring behaviour and social roles to understand how people interpret and react to their environment" and which, in social studies, leads to Grounded Theory, which seeks to develop "'emergent' theories of social action through the identification of analytical categories and the relationships between them" (Snape & Spencer, 2010, p.12). This perspective can support the understanding of the planning process for urban transport.

- **"Critical Theory**, originating in the disciplinary approaches of Sociology, aims to identify ways in which material conditions (economic, political, gender, ethnic) influence beliefs, behaviour and experiences" (Snape & Spencer, 2010, p.12).
- **"Case studies** are strategies of inquiry in which the researcher explores in depth a program, event, activity, process, or one or more individuals. Cases are bound by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time" (Creswell, 2009, p.13).

Yin (2009, p.2) highlights that "the methods all overlap in many ways, not marked by sharp boundaries", but that situations also arise where it is preferable to use case studies as strategies of inquiry. For him researchers would choose this method for studies when:

- "How" and "why" questions are being asked;
- The investigator has little control over events; and
- The focus is on a contemporary phenomenon within a real-life context.

These statements relate to current research purposes. The study aims to understand how urban transport planning is developed in multiple cases and why it follows those patterns for development. The cases show a high complexity in relation to the context of where they are conducted and how they are developed, such as within multicultural environments and traditions

of planning. Furthermore, the researcher has little ability to control the events that affect planning, especially in multicultural contexts. Finally, the core problem for the study concerns the differences, similarities and incongruities among the five case study cities, highlighting the points where European and Latin-American cases overlap or depart from each other.

3.2 RESEARCH QUESTIONS AND HYPOTHESIS

The main issue of this thesis is to analyse urban transport planning (UTP) in use in European and Latin-American cities, focusing on comparisons between the planning approaches of selected cities used as case study areas (CSAs), in order to support the conclusions and recommendations of an integrated urban transport planning approach towards accessible cities meeting individual and collective development.

The thesis discusses the urban transport planning approaches of five cities located on two continents and in four different countries. The analysis considers the socioeconomic and development stages, cultural and political particularities and complexity, and the urban development contexts.

How do we explain the urban transport planning approaches practiced in European and Latin-American cities? ***What*** is the main influencing framework that affects urban transport planning approaches in use in these two geographical areas? ***What*** are the main results of the planning approaches and influencing framework on the mobility concepts of the case study areas? ***What*** could we learn from the theory and practice and ***how*** could we share social learning in planning urban transport to support sustainable individual and collective development?

- Hypothesis 1:

The type of urban development (governance, socioeconomic, political, cultural, spatial, technological aspects) influences the design of the urban mobility concept and impacts on the accessibility for the population.

- Hypothesis 2:

If urban transport planning is integrated, then urban transport networks present better services for their populations.

3.3 EMPIRICAL RESEARCH – THE CASE STUDY AREAS

The core of the urban transport planning study presented in this thesis consists of a comparative analysis of five case study areas: “case studies involve studying a phenomenon within its real-life setting […]. This allows a particular issue to be studied in-depth and from a variety of perspectives” (Kitchin & Tate, 2000, p.225).

Flick (2011, p.134) argues that “the aim of case studies is the precise description or reconstruction of a case”. Moreover, the author claims that “case studies can capture the

process under study in a very detailed and exact way. They are not restricted due to an intended comparability and are able to fully use the potential of certain methods."

For the fieldwork, five case study areas (CSAs) were selected. They are the European cities of Stuttgart in Germany and Barcelona in Spain, and the Latin American cities of Curitiba and Porto Alegre in Brazil and Bogotá in Colombia. The cities were chosen considering the differences in their economic, technical, cultural and political contexts. Moreover, the specificities of each city in relation to their traditions of urban transport planning, as recognised by the available literature, were taken into account.

The five case study areas are known in the regions where they are located and also worldwide, according to various publications, for their results in urban transport planning. For instance, Barcelona is recognised as an influential city in urban planning for its Modernity movement, for its regional institutional organisation and for its multimodal integrated urban transport network; Stuttgart is likewise recognised for its public transport network and the advanced technology that it uses for traffic management and control; Curitiba for the Bus Rapid Transit (BRT) concept and for its co-ordination of urban and transport planning; BOGOTÁ for the Transmilenio; and Porto Alegre for its social movements and public participation in the process of planning (Participative Budget – O. P.).

Also, practical reasons were considered decisive in the selection of the cities:

- Personal experience of working in urban transport planning in the CSAs. The five cities participated in the European Union Program URB-AL. The author was the representative planner from a Brazilian city in different projects in partnership with these cities. In the case of Curitiba, the city was also one of the case study areas of the master thesis;
- Accessibility to literature and information resulting from the projects of URB-AL;
- Possibility of visiting the cities.

3.3.1 Structure and contents of the empirical research

A multiple-case design strategy of inquiry was chosen for the empirical investigation. Five cities were selected: two in Europe (Barcelona and Stuttgart) and three in Latin America (BOGOTÁ, Curitiba and Porto Alegre). Yin (2009, p.53) argues that multiple-case design has both advantages and disadvantages, when compared to single-case design. One major disadvantage is that "the conduct of multiple-case study can require extensive resources and time beyond the means of a single student or independent research investigator." This point can be considered one of the main difficulties facing the present research. The analysis of contrasting cultural, socioeconomic and political conditions, and planning traditions of European and Latin-American cities required the study of more than just two cases (one in Europe and one in Latin America). But it was a challenge for the researcher to find the support and material conditions needed for the field work, including contacts, key interviewers, trips to where the local field work was carried out, and the interpretation of a vast mass of documents, data and sources, in four different languages, including their sorting and classification and the

interpretation and translation of all terms into single terms in English. An extensive amount of time and money was required, sometimes including external support or breaks in order to look for the financial support needed to go ahead and guarantee the conclusions of the study.

In accordance with Yin (2009, p.60-61), the present study offered important advantages for using multiple-case study design. Among them the following can be pointed out:

- "The first word of advice is that, although all designs can lead to successful case studies, when you have the choice (and resources), multiple-case designs may be preferred over single-case designs. Even if you can do a "two-case" case study, your chances of doing a good case study will be better than using a single-case design."
- Multiple-case study brings substantial benefits for the quality of the analytical process;
- The use of the minimum of two case studies gives the possibility of the replication of the results;
- Analytic conclusions will be more powerfull when they are based on at least two cases or experiments, instead of taking the results from one single experiment or case;
- The analysis of two or more contrasting case studies can offer conditions for strengthening findings towards theoretical replications, when the results and findings support the hypothesised contrast; different from those resulting only from single cases;
- Single-case study can be criticised due to the "uniqueness or artifactual conditions" of the case, for instance due to special access to a key informant. Furthermore, it can increase scepticism towards the ability of the researcher to do empirical work, due to the possibility of a weak analysis from basing results on a single case. This would require very strong arguments in order to assert the validity of the research.

The empirical research uses qualitative methods, considering that "case studies are qualitative in nature, using observation and interviewing as methods of data generation" (Kitchin & Tate, 2003, p.225), and mixed methods for the collection of data in the fieldwork.

3.3.1.1 Summary of the empirical research

Table 17: Summary of the empirical research

Objectives	Period	Extension	Activity	Investigated person/element
• Discussing the current challenges for and influences on UTP; • Revising prevalent urban transport planning approaches in Europe and Latin America; • Contextualising (exploring and describing) UTP in the cities' case study areas (CSAs); • Examining various results of implemented planning on the current passenger urban transport network using selected criteria and indicators	2002 - 2006	Europe and Latin-America – in especial the cities of Barcelona, BOGOTÁ, Curitiba, Porto Alegre and Stuttgart	• Participant observation of the context of the European URBAL Program Network No. 8 Projects: VICOROSA; MOVILIZATION; MOVMAN; Bus Drivers Training; CULTURA; OROS; Accessibility for People with Reduced Mobility	Planners, technicians, political authorities, communities, NGOs, transport companies, universities, researchers, consultants, media, data and information
• Discussing the current challenges for and influences on UTP; • Revising prevalent urban transport planning approaches in Europe and Latin America; • Contextualising (exploring and describing) UTP in the cities' case study areas (CSAs); • Examining various results of implemented planning on the current passenger urban transport network using selected criteria and indicators.	2007 - 2010	World Network on the discussion of Urban Mobility – in especial the cities of Barcelona, BOGOTÁ, Curitiba, Porto Alegre, Stuttgart	• Participant observation of the context of the Cities-for-Mobility World Network	Planners, technicians, political authorities, communities, NGOs, transport companies, universities, media, data and information
• Identifying similarities, differences and incongruities among UTP in the CSAs.	2007 2008 2010	Barcelona, Spain	• Direct observation • Individual interviews • Paired/tried interviews • Documentary analysis	Urban and transport planners, technicians, political authorities, statistic data basis, documents, reports, projects, surveys, laws
• Identifying similarities, differences and incongruities among UTP in the CSAs.	2007 2008 2010 2013	BOGOTÁ, Colombia	• Direct observation • Individual interviews • Paired/tried interviews • Documentary analysis	Urban and transport planners, technicians, political authorities, statistic data basis, documents, reports, projects, surveys, laws
• Identifying similarities, differences and incongruities among UTP in the CSAs	2007 2008 2012	Curitiba, Brazil	• Direct observation • Individual interviews • Paired/tried interviews • Documentary analysis	Urban and transport planners, technicians, political authorities, statistic data basis, internal documents, reports, projects, surveys, laws
• Identifying similarities, differences and incongruities among UTP in the CSAs.	2007 2008 2011 2013	Porto Alegre, Brazil	• Direct observation • Individual interviews • Paired/tried interviews • Documentary analysis	Urban and transport planners, technicians, political authorities, statistic data basis, documents, reports, meeting agendas, projects, surveys, laws
• Identifying similarities, differences and incongruities among UTP in the CSAs.	2007 - 2013	Stuttgart, Germany	• Direct observation • Individual interviews • Paired/tried interviews • Documentary analysis	Urban and transport planners, technicians, political authorities, statistic data basis, documents, reports, projects, surveys, laws

Source: from the author

3.4 DATA COLLECTION

The study applies qualitative and mixed research methods for collecting and analysing data in order to deliberate on urban transport planning approaches in European and Latin American case studies.

The research methods applied for collecting the data and information were the following:

- Literature review regarding urban development contextualisation, planning theory and urban transport planning;
- Case study: in-depth investigation of five case study areas in Europe and Latin America, focusing on the activities of urban transport planning at the local government level, based on documental investigation, participant and direct observation, and interviews;
- Triangulation of data was used for data collecting, including multiple sources, based on different methods like interviews, document analysis, analysis of official reports, statistics and data basis, personal and participant observation.

Yin (2009, p.110) affirms that "case studies need not be limited to a single source of evidence. In fact, most of the better case studies rely on a variety of sources." Furthermore, the sources must be "reviewed and analyzed together, so that the case studies' findings [will be] based on the convergence of information from different sources."

Winchester (2000) highlights three streams of qualitative work: "oral methods (from biographical to survey interviews)", "textual analysis" and "participative approaches". For Crang (2003, p.496) interviewing is focused on "semi structured approaches" and can be organised by individual and paired "in-depth open ended interviews"; "participant observation"; "interpretation and analysis of varieties of texts, be they archival, maps, literature or landscape and visual materials including pictures, films, advertisements".

The sources of data and information used were primary (interviewing, taking pictures, drawings, descriptions of observed oral and material manifestations or landscapes) and secondary data (documents, laws, plans, reports, surveys, projects, diaries) including the following investigation techniques for data collecting:

a) Qualitative observation:

For Creswell (2009, p.181), "qualitative observation are those in which the researcher takes field notes on the behaviour and activities of individuals at the research site. In these field notes, the researcher records, in an unstructured way (using prior questions that the inquirer wants to know), activities at the research site. Qualitative observers may also engage in roles varying from a non-participant to a complete participant."

- Direct observation: "Assuming that the phenomena of interest have not been purely historical, some relevant behaviours or environmental conditions will be available for observation. [...] the observations can range from formal to casual data collection activities."

(Yin, 2009, p.109). The opportunity for direct observation is given in the framework of a case study because it is conducted by collecting data in the natural setting of the "case".

For this research, direct observation was conducted in the five case study area cities, at different times and during visits to the public spaces, urban transport network, institutions and companies involved in planning (Table 17). This visual information was registered in pictures, drawing, drafts and text, and afterwards triangulated and analysed with documents, interviews and texts.

- Participant observation: In this case the researcher is not a passive observer. He or she will "assume a variety of roles within a case study situation and may actually participate in the events being studied" (Yin, 2009, p.111). The difficulty in applying this technique can lie in gaining access to the groups or events that are to be engaged with. Flick (2011, p.226) claims that "the main feature of the method is that you as a researcher dive headlong into the field. You will observe from a member's perpective but also influence what you observe due to your participation."

Jorgensen (1989, p.13-14) highlights features that can elucidate the use of participant observation. All of these features are applied for the case investigated here, as cited bellow:

- A special interest in public opinion and interaction as viewed from the perspective of people who are insiders involved in particular situations and settings;
- A logic and process of inquiry that are open-ended, flexible and responsive to opportunity, requiring constant redefinition of what is problematic, based on facts gathered in concrete settings of human existence.
- An in-depth and qualitative case study approach and design;
- The performance of a participant role or roles that involve establishing and maintaining relationships with local residents in the field.

b) Document analysis:

Wolff (2004, 284) writes that "documents are standardised artifacts, in so far as they typically occur in particular formats: as notes, case reports, contracts, drafts, death certificates, remarks, diaries, statistics, annual reports, certificates, judgements, letters or expert opinions."

For all case study areas a variety of documents and data sources were explored, including reports, protocols from the commissions and committees, pictures, historical movies, maps, papers, statistics, laws, internal procedures, plans, reports, surveys and projects. These materials together with the interviews were used for the description and for the comparative analysis of the case study areas.

c) Semi-structured in-depth interview:

Hammersley and Atkinson (1995, p.126) highlight that: "the expressive power of language provides the most important resource for accounts. A crucial feature of language is its capacity to present descriptions, explanations, and evaluations of almost infinite variety about any aspect of the world, including itself" Creswell (2009, p. 181) explains that "in qualitative interviews, the

researcher conducts face-to-face interviews with participants, interviews participants by telephone, or engages in focus groups. […]. These interviews involve unstructured and generally open-ended questions that are few in number and intended to elicit views and opinions from the participants." Individual and paired interviews were conducted using the aforementioned instruments and techniques.

Furthermore, interviews can "provide access to the meanings people attribute to their experiences and social worlds. While the interview is itself a symbolic interaction, this does not discount the possibility that knowledge of the social world beyond the interaction can be obtained" (Miller & Glassner, 1997, p.100). This point of view was especially observed in the individual and paired interviews conducted in the case study cities with urban and transport planners and technicians. Through this perception, their experiences of developing and implementing the plans came out in the discussions. Also their political views of the realities and difficulties faced when working in the planning process were particularly evident from the opinions and expressions used and the approaches mentioned. It was very important to link theory to practice during the fieldwork.

The interviews made in the case study areas followed the method of in-depth open-ended interviews for individuals and pairs: technicians, directors and heads of public companies, the committees/commissions managers and project managers. This method was used because "it is hoped that open-end questions better reflect a person's own thinking", considering that "the interviewee's responses are not constrained to categories provided by the interviewer; actors can give whatever answer they wish" (Kitchin & Tate, 2003, p.213). The paired discussion methods were used for the interviews with the members of the committees and commissions. The objective for using the dynamics of group discussion was to "bring out feelings and experiences that might not have been articulated in a one-to-one interview" (Kitchin & Tate, 2003, p.215). Participant observation was done in the fieldwork in Barcelona, BOGOTÁ, Curitiba, Porto Alegre and Stuttgart.

The complexity of the institutional organisations and the arrangements of the stakeholders participating in the planning process were also better elucidated during the individual and paired interviews.

The triangulation of interviewees from multiple sources was used during the processes of the interviews, including interviews with experts from public institutions, universities, consulting companies, and administrative as well as technical staff from public bodies, members of planning committees and politicians.

3.5 RESEARCH ANALYSIS METHODS

> "Not everything that can be counted counts and not everything that counts can be counted"
> (Albert Einstein, n.a.)

Ritchie et al. (2010, p.219) argue that "analysis is a continuous and iterative process". Furthermore, the authors claim that the course of analysis follows two key stages: "the first requires managing the data and the second involves making sense of the evidence through descriptive or explanatory accounts" (Ritchie, et al., 2010, p.219).

Creswell (2009, p.184) affirms that qualitative analysis is:

> "An ongoing process involving continual reflection about the data, asking analytic questions, and writing memos throughout the study. I say that qualitative data analysis is conducted concurrently with gathering data, making interpretations, and writing reports. While interviews are going on, for example, the researcher may be analysing an interview collected earlier, writing memos that may ultimately be included as a narrative in the final report, and organizing the structure of the final report."

Ritchie et al. (2010, p.219-220) recommend that data and information management and the rigour of the analytical process depend on the basis of the analyst's conceptual thinking.

> "Making sense of the data relies, in part, on the method or tool that is used to order and categorise data, but it is more dependent on the analyst and the rigour, clarity and creativity of her or his conceptual thinking. Therefore, any guidance about how to move through the analytic hierarchy must not only focus on the tools used, but also on the conceptual and intellectual processes engaged in by the analyst" (Ritchie et al., 2010, p.219-220).

The theoretical basis for the research is founded on the topics shown in Table 15. The discussion uses the model presented in Figure 48 and Figure 49 (Chapter 2) as an abstraction of the reality of urban transport planning, helping to enhance understanding on planning theory and practice, leading to the design contributions. The model and concepts are used to link theory and practice, as they serve as supports "in defining the research problem" (Kitchin & Tate, 2003) and in conducting its analysis. The description and analysis of urban transport planning in the case study areas focuses on the organisation of the urban transport system, and on the planning and transport regulations and planning processes.

Employing the above-mentioned research methods for collecting data, the proposed objectives are met following qualitative and mixed methods analysis (triangulation). For Patton (2002, 556), "it is in data analysis that the strategy of triangulation really pays off, not only in providing diverse ways of looking at the same phenomenon but in adding to credibility by strengthening confidence in whatever conclusions are drawn."

- Discussion, based on triangulation of qualitative criteria, of how the framework (political and administrative organisation; regulation; urban development) influences the approach and the organisation of urban transport planning for the case study areas.

- Display of data in charts and tables to enable the comparison.
- Triangulation and qualitative analytical review of the results, with comparisons of the case studies and their responses to the theory.
- Comparative analysis, based on qualitative methods and triangulation, of the impacts of the prevalent urban transport planning approach of each case study on the urban transport network, based on mobility (modal split; average daily travel time per person) and transport indicators (passenger per kilometre index (IPK); degree of motorisation; cycling and walking facilities and infrastructure).
- Evaluation of the organisation of planning process, based on the analytical hierarchic process (AHP) method and analysis in the CSA.
- SWOT analysis, framing the strengths, weaknesses, opportunities and threats of the prevalent planning approaches in the CSA, and proposing strategies for the transfer of the best practices and experiences for urban transport planning between European and Latin-American cities;
- Recommendations of results; conclusion.

3.5.1 Comparative Analysis Method

The purpose of employing comparative methods is to conduct a simultaneous examination of various specific or contrasting phenomena, or of various different populations, and to seek to elucidate the similarities, differences and incongruities, drawing possible correlations between variables and particularities of the phenomenon. The results can support an explanatory research and propose improvements to a theory, and additionally can help with the development of planning or policy making, and its application in practice.

The comparative analysis follows an analytical interpretation and description of what is within the cases but also of what is between the cases. “In most analytical approaches, data management initially involves deciding upon the themes or concepts under which the data will be labelled, sorted and compared” (Ritchie et al., 2010, 221). Flick (2011, p.135) affirms that in a comparative study the case may not be observed as a whole and in its complexity, “but rather a multiplicity of cases with regard to particular excerpts” may be observed. The difficulty often encountered is “the selection of groups to be compared. […] A further problem is what degree of standardization or constancy you need in the remaining conditions that are not the subject of the comparison.” Because of this, data and information management in multiple-case studies is a very difficult area to penetrate and analyse, which would be necessary for the construction of a logical structure that can be compared. This is especially true when the cases come from complex contexts and are still relatively unexplored by researchers. Therefore, the analysis used to give guidance for data management is the abstract model.

3.5.1.1 Description of Urban Transport Planning in the CSA cities

For Ritchie et al (2010, p.237), “an initial stage in descriptive analysis refers to unpacking the content and nature of a particular phenomenon or theme. The main task is to display data in a way that is conceptually pure, makes distinctions that are meaningful and provides content that is illuminating.” The authors indicate three useful steps for conducting the description. Firstly, detecting the substantive content and dimensions of a phenomenon, searching within the theme; secondly, defining more refined categories which set out the key dimensions within the range and assign the data to them; and finally, classifying groups of categories at a higher level of abstraction, moving from a synthesised or original text to descriptive categories, in order to sort, encapsulate and present data.

The descriptions of the CSA cities were organised observing four categories to better identify substantive contents and dimensions of urban transport planning: political and administrative organisation involved in planning urban transport; historical and current overview of planning; urban transport network; and the planning process for urban transport.

The framework shown in Figure 46 was used to help in the organisation of data collection and in interviews related to planning processes in the CSA cities. As pointed out by Kitchin & Tate (2003), a conceptual method, understood as “a diagrammatic version of a theory which demonstrates process, concepts and relationships”, helps to place the ideas in a context and “give expression to abstract and complex thoughts”. The organisational structure in charge of urban transport planning was observed, considering planning in the strategic and tactical/operational levels. The objective was to ascertain whether there were differences in the organisation of the institutions and different actors involved in the process of planning according to the level of planning, especially in terms of the decision process within each case study. In the interviews it was additionally observed how the process of planning was organised in practice and how the actors and their tasks were involved.

3.5.1.2 Comparative analysis and evaluation of urban transport planning approaches in the CSA

Using the comparative method, the research seeks to analyse the urban transport planning approaches of the European and Latin-American cities chosen for this study, aiming to interpret the similarities, differences and incongruities among the cities, and additionally to demonstrate the most prevalent characteristics of European and Latin-American planning traditions. The results of the analysis have the objective of delivering contributions to the understanding of planning cultures and of the approaches to the development of urban transport policies and planning, and of drawing up recommendations for planning strategies based on the identification of the best practices used by the CSA cities. Selected qualitative and quantitative criteria are used to analyse mobility patterns and the transport network, as well as the structure of planning process in the CSAs. Furthermore, the interface of the urban development concept and the mobility concept are analysed.

3.5.1.2.1 Qualitative and triangulation analysis of the planning approach in the CSA

Qualitative and triangulation criteria-related political and administrative organisation, regulation and urban development concepts were all used in order to analyse the UTP approaches, seeking to increase the understanding of:

- Similarities, incongruities and differences in political and administrative organisation;
- Urban development: “the real city of today”;
- Integration within urban transport planning and the urban transport network;
- Urban mobility concept analysis;
- Co-relation between urban development and city accessibility.

A check-list of qualitative criteria was composed in order to identify the existing types of integration and co-ordination in urban transport planning in the CSAs. The results are used to analyse the influence of the integrated approach on planning, on the interface of UTP and urban development, on the characteristics and design of the urban transport network and on the performance of urban transport services in the cities.

3.5.1.2.2 Analysis of mobility patterns and the urban transport network in the face of the prevalent planning approaches

The evaluation of the results of the urban transport planning and of the planning approach influencing framework (political and administrative organisation; regulation; public policies; urban development) on the urban transport network (UTN) is carried out according to mobility (modal split; average daily travel time per person) and transport indicators (index of persons per kilometre (IPK); degree of motorisation; cycling and walking facilities and infrastructure).

a) Mobility and transport indicators:

The evaluation, based on selected mobility and transport indicators, has the objective of comparing the general characteristics of mobility behaviour of the CSAs and the specificities of general transport indicators in such a way as to draw an understanding of their interfaces with urban development and the urban transport planning approaches.

Table 18: Mobility and transport indicators, description and objectives

Indicator	Description and objectives	Unit
Modal split	Mode choice in the UTN. It aims to characterise the travel behaviour of the population in the CSAs.	%
Average travel time per person per trip by urban transport	Average travel time in minutes per person per trip by urban transport. It aims to evaluate the performance of the transport service for the passengers and moreover to analyse the interface of the UTN and the urban development concept.	Min/trip
Average distance covered per person per trip by urban transport	Average distance in kilometres covered per person by urban transport. It aims to analyse the interface of the UTN and the urban development concept.	Km/trip
IPK	Rate of passengers per kilometre for the public transport network. It aims to evaluate the density of passengers boarding and alighting per kilometre and analyses the interface between UTP and urban development, referring to those aspects.	P/Km
Degree of motorisation	Number of cars per 1,000 inhabitants. It aims to analyse the characteristics of the urban transport network and its interface with the urban development concept.	Car/1000 Inh

Source: from the author

b) Cycling facilities and infrastructure:

The evaluation of cycling facilities and infrastructure aims to compare the availability of infrastructure and the material conditions for promoting non-motorised urban transport services among the CSAs by cycling.

c) Walking facilities and infrastructure:

The evaluation based on the indicators below intends to compare the suitability of infrastructure and material conditions for pedestrians, in order to promote non-motorised urban transport services among the CSAs by walking.

3.5.1.2.3 Comparative evaluation of the planning process in the CSA using the Analytical Hierarchy Process method

For Peter Hall (2002, p.219), “essentially, evaluation consists of any process which seeks to order preferences.” In this sense, “the essence of evaluation is the assessment of the comparative merits of different courses of action” (Hall, 2007, p.9).

The comparative evaluation of the planning process organization in the CSA was made using the Analytical Hierarchy Process (AHP) method.

Analytical Hierarchy Process is a method to support a multi-criteria assessment of alternatives. It “uses hierarchical structures to solve complicated, unstructured decision problems” Kristof (2005, p.31). According to Siedentop (2008, p.4) “the main principle of the AHP method is to decompose an assessment problem into a hierarchy of criteria and alternatives. [...The] main benefit of the AHP [is]: quantitative as well as qualitative criteria can be incorporated”. According to Saaty (2006, p.562) AHP is a descriptive theory. “A descriptive or positive statement is a statement about *what is* that contains no indication of approval or disapproval”.

For Saaty (1977) the main advantages of hierarchies are the following:

- They provide a meaningful integration of systems. The integrated behaviour or function of a hierarchical organisation accounts for the fact that complicated changes in a large system can result in a single component.
- They use aggregates of element in the form of levels to accomplish tasks.
- Greater detail occurs lower down the hierarchy levels; greater depth in understanding its purpose occurs higher up the hierarchy levels.
- Hierarchies are reliable and flexible. Local perturbation does not perturb the entire hierarchy. The overall purpose of the hierarchy is divided among the levels whereby each solves a partial problem and the totality meets the overall purpose.

According to Saaty (2007, p.860) AHP is a theory:

> "Of relative measurement based on paired comparisons used to derive normalized absolute scales of numbers whose elements are then used as priorities. Matrices of pairwise comparisons are formed either by providing judgements to estimate dominance using absolute numbers from the 1 to 9 fundamental scale of the AHP, or by directly constructing the pairwise dominance ratios using actual measurements."

The AHP method uses the comparison of criteria and alternatives based on judgements or actual measurements. "In making pairwise comparisons we estimate how many times one element is more important than another with respect to a common property by forming their ratios if we know their measurements and get an expert to tell us when we do not have their exact measurements. Each judgement is expressed with a number" (Saaty, 2007, p.862). Saaty et. al (2003, p.171) claim that "an experienced person can provide informed numerical judgements from which relatively good estimates are derived".

The nine-point scale of absolute number is "adopted as the unit for comparison and used to represent participants' judgements as to importance, likelihood, or preference among homogeneous options" (Saaty & Shang, 2007, p.26). "Judgements in the AHP are entered in a square matrix of the elements on the left side of that matrix are compared with the same elements listed in the same order above the matrix" (Saaty & Tran, 2007, p.964).

AHP is a multi-criteria process where the priorities of the alternatives derived are combined under different criteria. According to Saaty (2006, p.559), "The only possible meaningful way to do this that preserves the influence of the proportionality of priority of the criteria on each corresponding vector of alternative priorities is to multiply and add." The values from the matrix are normalised "by dividing each value by the sum of all the values" and then "an absolute scale of relative values is obtained" (Saaty, 2006, p.558).

Urban transport planning process incorporates in its essence qualitative and quantitative aspects and the evaluation of these combined aspects can be required in different phases of the process. The assessment of alternatives in the phase of decision requires an instrument which makes it possible to combine different criteria and alternatives derived from the process of planning. In this sense AHP might be a valuable tool for assessing a set of alternatives which support the decision-making process and the comparison of different systems.

Considering that the cities have different institutions, from different government levels, different levels of participation involved in the planning process, different regulations and different sets of information used for planning, what are the hierarchy and the weight of the different criteria and alternatives, considering information coming from hierarchic and heterogeneous networks, specific regulations and actor-networks and different concepts of planning? How is the process of decision organised?

The criteria selected for the evaluation were “actors: level of power”, “influence of regulation” and “influence of information” (Table 19). For each criterion the set of alternatives (variables involved in the planning process) were selected according to the approaches of urban transport planning in the CSA (Figure 50). The objective was to evaluate the weight of each selected criterion and the variables influencing the planning process organisation, and more specifically the impacts of the participation of each actor (person or material variable) involved in the urban transport planning process. The results show the level of influence of each one in the process of planning.

- Influence of regulation: level of representative democracy among organisations
- Influence of information: institutional organisation; level of participation in generating and sharing true information.
- Actors and power: range of individual power to collective power.

Table 19 below describes the criteria and Figure 50 shows each criterion and the alternatives used in the AHP evaluation.

Table 19: Planning process evaluation: Criteria description

Criteria	Description	Unit
Actors: level of power	Refers to the weight of individual power of different actors involved in the urban transport planning process.	Scale 1 – 9
Influence of regulation	Refers to the weight of the various planning regulations, coming from different levels of government, on the process of planning.	Scale 1 – 9
Influence of information	Refers to the organisation and availability of information used to develop urban transport planning.	Scale 1 – 9

Source: from the author

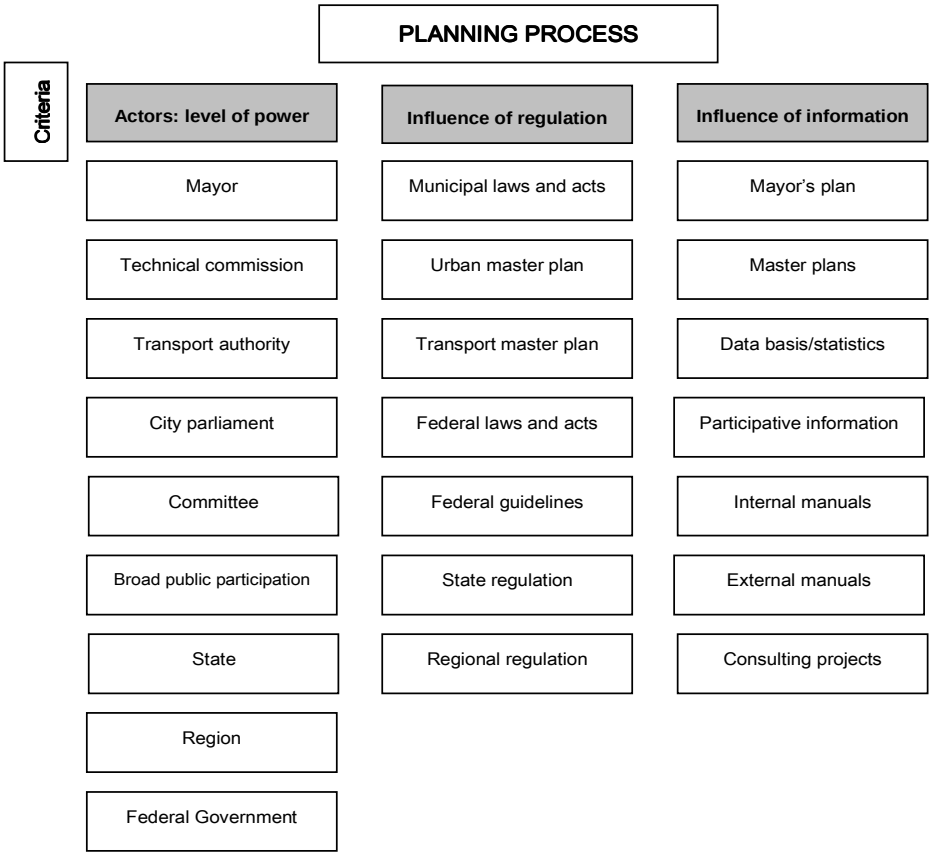


Figure 50: Planning process comparative evaluation in the CSA using AHP method: criteria and alternatives. Source: from the author

3.5.2 Application of SWOT Analysis to identify best practices in urban transport planning in the CSA and to design strategies for transferability and social learning

A practical reason to develop a comparative study in urban transport is to find similarities, incongruities and differences among the analysed cases and from these points to propose improvements for policies and planning. Another reason is to identify concepts, know-how and technologies which can be used as bases for the development of projects in cities with similar problems or development conditions.

The analysis of measures requires knowledge of its internal conditions as well as those external forces that may impinge on its development. Some questions need to be asked in order to lead the investigation of these environmental conditions, based on the cases examined in this study:

- What are the opportunities for and perspectives on urban transport planning for European cities (see Siedentop, 2008; Häussermann, 2009) and for cities in developing countries, such as those in Latin America? What are the lessons learned from the CSAs?
- Considering urban transport development strategies: What can the cities in the developing countries learn from the European cities or vice-versa?
- What can cities with a consolidated system of urban and transport planning, teach cities from developing countries that are still growing?

- Shrinkage of populations in European cities versus existing infrastructure: What are the impacts on urban transport planning in the CSAs? Are these impacts possible to evaluate today?
- How to exchange knowledge: Is it possible to exchange knowledge, bearing in mind the differing sorts of culture, legislation, political organisation and levels of development?

A SWOT analysis was done to ascertain the strengths, weaknesses, opportunities and threats involved in planning approaches in the CSAs. Moreover, the analysis proposes to identify the best practices of urban transport planning in the CSAs and also proposes strategies for the transferability of such practices between European and Latin-American cities.

According to Schueckhaus (1999, p. 148), a SWOT analysis helps us to see the true picture of a plan or of a specific measure, based on the confrontation of each current strength and weakness with future opportunities and risks. In this way it is possible to test:

- "Which strengths can be threatened by future risks;
- Which strengths can have the highest advantage through future opportunities;
- Which weaknesses can be strengthened due to the risks of the future;
- Which weaknesses can be transformed into strengths or more greatly reduced due to the opportunities of the future."

A number of measures implemented in the CSAs were assessed in order to identify the best practices and set in a table as shown below (Table 20).

Table 21: SWOT Analysis for identification of best practices in the cities CSA's

MEASURE	Strengths	Weaknesses
	Which strengths can be threatened by future risks?	Which weaknesses can be strengthened due to the risks of the future?
	Opportunities	**Threats**
	Which strengths can have the highest advantage through future opportunities?	Which weaknesses can be transformed into strengths or reduced by the opportunities of the future?

Source: from the author

Moreover, strategies for transferability were proposed through the identification of opportunities and the designing of methods and instruments.

Table 22: Designing of strategies for the social learning or/transferability of knowledge and best practices of Urban Transport Planning

STRATEGIES	Opportunities	Methods	Instruments
	Networks, measures, projects, etc…	Methodology for social learning	Spaces and channels for communication or developing projects

Source: from the author

3.6 SUMMARY OF THE METHODS AND THEORIES EMPLOYED FOR THE RESEARCH

Table 23: Summary of the research methods

Research Objectives	Type of Research	Investigation Strategies	Techniques for Data collection/manipulation	Theories and Data Analysis Methods
Discussing the current challenges for and influences on UTP	Contextual	• Literature review • Empirical research	Books; papers; official publications and data from government, national and international institutions; websites	• Qualitative analysis • Triangulation
Revising prevalent urban transport planning approaches in Europe and Latin America	Contextual	• Literature review • Empirical research	Books; papers; official publications and data from government and national and international institutions; websites	• Qualitative analysis • Triangulation
Proposing a model for the discussion of urban transport planning	Generative	• Literature review • Empirical research	• Literature review • Document analysis • Participant observation • Direct observation	• Qualitative analysis • Triangulation • Model design : Integrated Urban Transport Planning Approach towards Accessible Cities and individual and collective development
Contextualising (exploring and describing) UTP in the cities' CSA	Contextual	Case Study	• Participant observation • Direct observation • Document analysis • In-depth interviews with technicians, managers, urban and transport planners	• Qualitative analysis • Triangulation
Identifying the similarities, differences and incongruities among UTP in the CSA	Contextual	Case Study	• Participant observation • Direct observation • Document analysis • In-depth interviews with technicians, managers, urban and transport planners	• Qualitative comparative analysis • Triangulation
Examining some results of implemented planning on the current passenger urban transport network using selected criteria and indicators	Evaluative	Case Study	• Direct observation • Document analysis • In-depth interviews with technicians, managers, urban and transport planners	• Qualitative comparative analysis • Triangulation
Evaluating the planning process in the CSA	Evaluative	Case study	• Document analysis • In-depth interviews with technicians, managers, urban and transport planners • AHP Theory review • Designing an Excel program for the application of the AHP model and calculations	• Triangulation of qualitative and quantitative methods • Evaluation applying the ANT, Planning Styles and AHP Theories
Framing strengths, weaknesses, opportunities and threats involved in planning approaches in the CSA using SWOT Analysis	Generative	Case study	• Document analysis • Literature review • SWOT theory review	• Triangulation • Qualitative analysis using the SWOT tool
Proposing strategies for the transfer of best practices / social learning of urban transport planning between European and Latin-American cities	Generative	Case study	• Document analysis • Literature review • SWOT Theory review • Designing a framework for the analysis and selecting the strategies in the case study areas	• Triangulation • Qualitative analysis using the SWOT tool

Source: from the author

4 URBAN TRANSPORT PLANNING IN EUROPE AND LATIN AMERICA – THE CASE STUDY AREAS

The fieldwork was conducted personally in the five cities that constituted the case study areas CSAs. Personal and participant observation, the data collection and interviews have been completed in March 2013 in the five CSAs. Moreover, several contacts for complementing or checking information were made by internet or telephone in several opportunities along with the research. In the interviews conducted in Bogotá among all respondents were technicians from the Transport Ministry, municipal secretaries, engineers from Instituto de Desarollo Urbano (IDU) and the traffic department, former directors from Transmilenio, consultants, NGOs' representatives, university professors and researchers. In Curitiba experts and technicians from Instituto de Planejamento Urbano (IPUCC), Transport Authority (URBS) and municipal secretaries, the head and directors of URBS participated in the interviews. In Porto Alegre transport planner experts, the head and directors from the Transport Athority (EPTC), technicians from public institutions, members of commissions and committees were interviewed. In Stuttgart the interviewed people included the mayor, heads of departments and technicians from the municipality, the Transport Authority (SSB) and from the Verband Region Stuttgart, professors and researchers. Additionally, in Barcelona directors and technicians took part in the interviews. They were from the municipal secretaries, Metropolitan Transport Authority (ATM), the metropolitan region and the university. The data and all information were collected in accordance with the methodology and the approach proposed for the research (see Chapter 3).

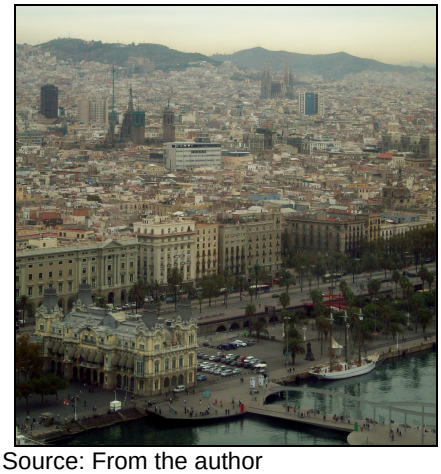
The main obstacles to conducting field work were as follows:

- It is difficult to ascertain or explain the responsibilities and tasks of the broad number of institutions, public and private organisations and other individuals involved in the process of planning, or to understand the hierarchy, level of power or influence among them.
- The five case study areas have four different official languages. The organisation of the documents and all information, as well as the meanings of the technical terms, was a challenge to describe precisely in English in order to perform the comparison, considering the cultural, political and social particularities;
- The identification of the key persons for the interviews and the organisation of the contacts, considering they are from different institutions, located in different continents and speak different languages, required a high investment of time and money;
- The overload of public bodies with work resulted in difficulty to arrange interviews with them, and then to organise and deliver the information (see Rothfuß, 2006).

The material resulting from the empiric research is the basis for the description (chapter 4) and the comparative analysis (chapter 5) of the case study areas.

4.1 BARCELONA

4.1.1 City Overview


Source: From the author

Barcelona is the capital of the state (Comunidad Autonoma) of Catalonia, located in the East of Spain. The municipality has around 1.6 million inhabitants in an area of 101km², within a region of 4.1 million inhabitants. In recent years the population growth rate has been negative. In 2007 it stood at -1.6%. Barcelona is one of the most densely populated cities in Europe: about 106 persons per square km. In addition, the city has one of the highest percentages of population aged 65 years and over, among the five cities studied in this thesis: around 17% (various sources).

Barcelona is known worldwide for its exuberant architecture. Furthermore, it is recognized as a wellspring of many influential artistic and cultural movements that began in the city, for example Modernism. Several architects, painters and other artists such as Gaudì, Picasso, Salvador Dali and other well-known names lived and worked in the city. Each one in their specific time left their legacy among the houses, parks, streets, monuments and in the urban development of Barcelona. The theories of urbanism from Idelfons Cerdà (1860) until today and the architectural styles and movements continue to influence urban planners in various countries.

The cultural attractiveness fuels one of the most important economic strengths of the city: the tourism. As well as cultural visitors the city also attracts a great number of businesspeople, with two spaces dedicated to trade fairs. Several world events took place in Barcelona. Each one influenced the city in a specific age. The most famous is the Olympic Games of 1992. This event represented “open doors” to a new Occidental world, after the end of the cold war and the reunification of Germany. Also the event attracted a significant amount of investment to implement new infrastructure for the city and reinvigorate the use of urban space.

As well as that, Barcelona is an important logistic centre in Europe and in connections to other continents. The harbour is the most important on the Mediterranean Sea, considering the movement of freights and containers, as well as cruise ships. Additionally, the city has several high-tech industrial parks (Ajuntamento de Barcelona, 2008).

The city has experienced many important political transformations over the years. These special challenges influenced the political leaders to strengthen the public institutions. Today many solutions in urban planning and public administration have been developed in Barcelona. An example is the regional organisations responsible for public transport planning that aggregates more than a hundred and sixty municipalities and the four other government levels in a single administrative, financial and planning system.

4.1.2 Urban Transport

4.1.2.1 Political and administrative organisation

Spain is a parliamentary monarchy. According to the Spanish Constitution (SC) of 1978, Spain's territory is divided into seven "Comunidads Autonomas" (Autonomous Communities). These autonomous communities are divided into provinces and each province is divided into municipalities (SC/78, Art. 2º). All four of these levels of government possess executive (with administrative and political authority) and legislative power.

According to the SC/78 the autonomous community (compared to the states of Brazil and the Länder of Germany) is an "entidad territorial que en las disposiciones constitucionales de España, está dotada con competencia ejecutiva y autonomía legislativa y el derecho a la administración por sus propios representantes"[32] (España, 1978). Article 143 of the CE/78 establishes that the communities "poderão usufruir de direito de autogoverno."[33] According to this condition they can organise their territory and establish different government hierarchies or administrative and political organisations, respecting the statements of the federal constitution and the related federal laws.

Barcelona is the capital of Catalonia, the autonomous community located in the East of Spain. Catalonia's territory and levels of government are organised into provinces (Diputació) and municipalities, as is the case throughout Spain. There is also an intermediate level: the "Comarcal" (Comarca del Barcelonès). This last level is composed of an association of municipalities. The "comarcal" and province levels have parliaments and perform certain public tasks, such as the construction and operation of roads connecting two "comarcas".

Figure 51 below shows the distribution of the responsibilities of each of the government levels concerning transport. Spain, as a member of the European Union, has as its highest level the supra-national power: the European Parliament. At this level transport acts, agreements, orientation and general guidelines are established for all members. The federal level determines the general guidelines for transport planning and has authority over the means of transport operating at national and international level. The autonomous community, respecting the federal laws and guidelines, develops the state transport master plan and takes over infrastructure and the operation of transport crossing the territory (inter-province). The municipalities have political and administrative authority over urban transport in their territory, but must respect the decisions of the federal and the state governments, and the agreements made by the various government levels.

[32] In English: territorial entity, recognized by the Constitution of Spain. It is endowed with executive and legislative autonomy and has the right to be administrated by its own representatives.

[33] In English: can use the right of self governance.

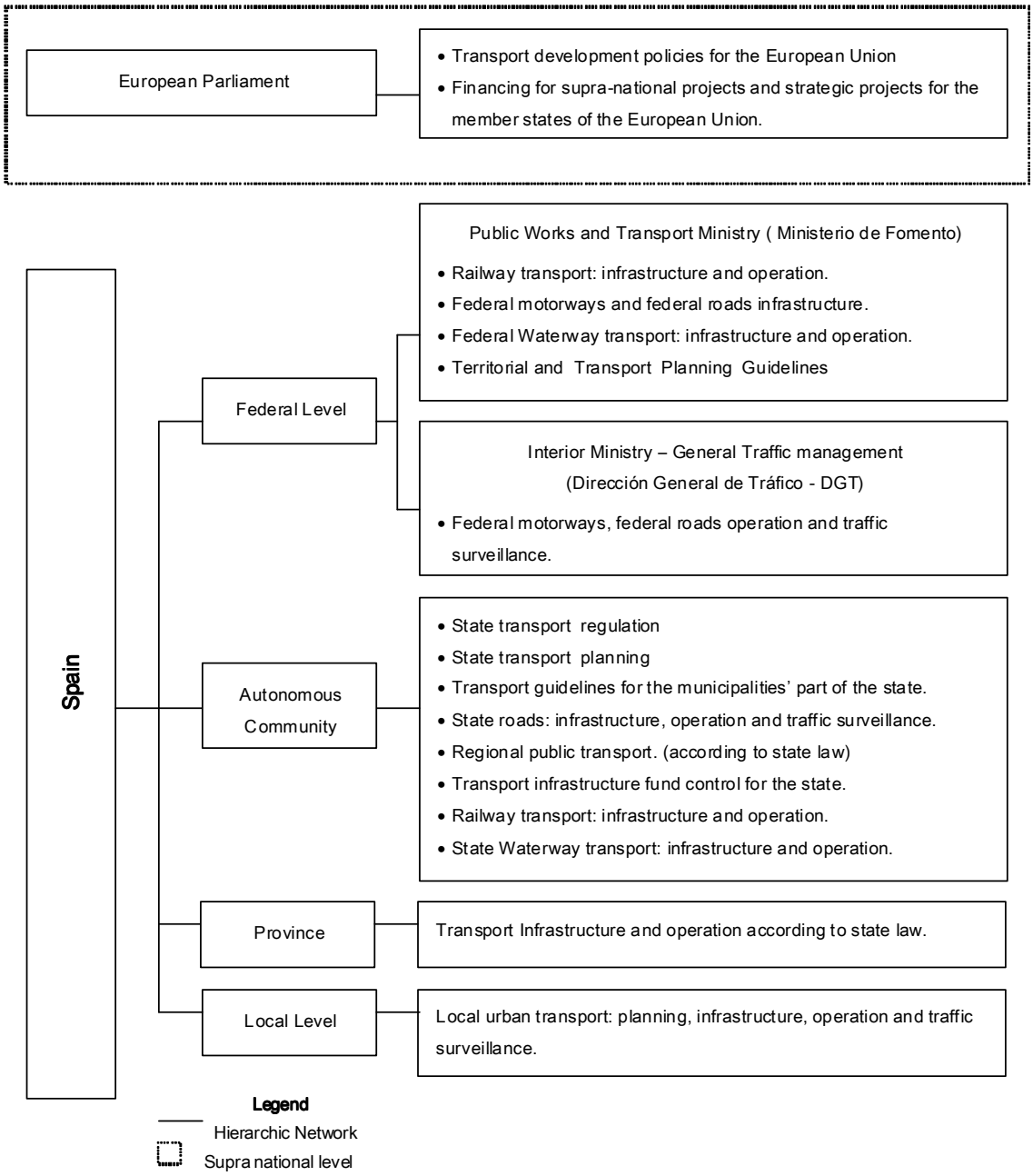


Figure 51: Transport in Spain: Distribution of responsibilities at different government levels. Source: from the author

According to Figure 52, planning, operation and infrastructure of urban transport in Barcelona are the responsibility of five government levels. On top of that Barcelona is divided into ten municipal districts. These districts each have a local administration that takes over public responsibilities. Concerning urban transport they are responsible for the maintenance of local streets and their parking space administration.

Each government level runs the planning, implementation of infrastructure, operation and surveillance of the roads under their authority. Public transport is affected by the participation of the federal, state and local levels. Furthermore, co-operation agreements among the government levels are organised in order to perform specific tasks. In 1997 the public

consortium Barcelona Metropolitan Transport Authority (ATM) was created, based on the idea of co-operative administration and planning. It was considered that the high interaction between the complex and very densely populated municipalities composing the metropolitan region of Barcelona could not possibly be co-ordinated anymore by individual government administration (Rossellò, 2008, interview).

ATM is a public transport consortium that is 51% funded by capital from the Catalonia State government and 49% by the city of Barcelona and the surrounding municipalities in the metropolitan region where public transport exists. "La ATM es un consorcio interadministrativo creado para la coordinación del transporte público en la región metropolitana de Barcelona, y formado por las Administraciones titulares de servicios de transporte en dicho ámbito"[34] (ATM, 2008). The federal level does not fund the consortium but has the right to participate in the meetings of the administrative councils as an observer (Rosselò, 2008, interview).

[34] In English: ATM is an inter-administrative consortium created to co-ordinate public transport in the metropolitan region of Barcelona, set up by the public administrations responsible for the transport services in this region.

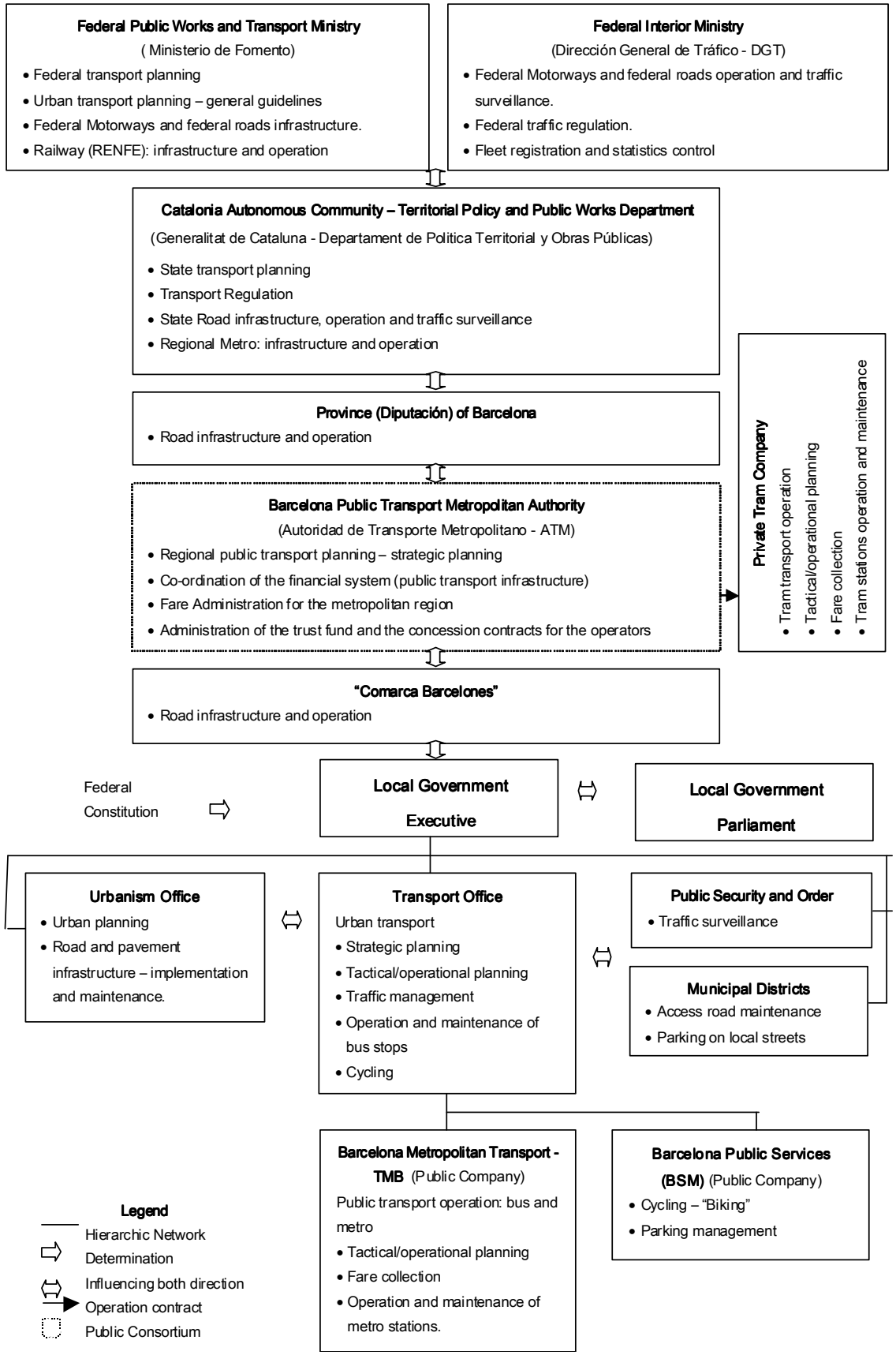


Figure 52: Urban transport organization in Barcelona. Source: from the author

4.1.2.2 Planning – 1860 to 2008

The city of Barcelona from the beginning of its foundation until the contemporary age has seen important transformations in its urban and transport structure and planning. The literature shows important moments in the history of Barcelona's urban planning, resulting from various different movements, Modernism being one of the most important. Different authors outline the city through reference to these movements' contributions to the matter.

The first settlement of Barcelona was a city built on the concept of "castrum romano" as mentioned by Guidoni (2006, p.15) "su planta era la característica del castrum romano, es decir, organizado según los dos ejes ortogonales del cardo e el decumano"[35]. The two axes, horizontal and vertical, provided the outline of the city. The vertical axis was the connection of the core of the city to the harbour. Later, a wall was constructed around the city. The growth of the population, limited by the wall, created a compact city with narrow streets.

The expansion of the territory of the city in the fifteenth century opened the main transport axis in the old city. The street called "Las Ramblas" (the connection to the sea) was constructed using the spaces left by the old wall after the expansion, accommodating a broad pedestrian area. The connection of the Ramblas in the opposite, inland-pointing, direction, to the expansion of the city was done in the nineteenth century with the construction of the "Passeig de Gràcia", with a broad street designed with a central axis for cars and pedestrian zones on both sides.

In the nineteenth century the city was still surrounded by its walls. The explosion in population growth, limited by the territorial area inside the walls, created many problems for the supply of the city with food and water, as well as problems of public health and mobility. These problems, as well as the need for a city that was prepared for the industrial age, motivated the public administration to decide to forbid the construction of factories and plants in the old city and to knock down the wall. Additionally, it was called an open competition for a new urban plan.

In spite of the open competition, the proposal approved by the king was presented by the transport engineer Idelfons Cerdà in 1860. For Cerdà (1859, n.a.) "an urban fabric ought to satisfy two main functions: movement and rest". The new plan proposed the expansion of the city incorporating the old urban design to a new one influenced by the idea that the modern city must have as its central function "las necesidades de la circulación" and "debía mostrar capacidad a los nuevos instrumentos de movilidad mecánica"[36] Guidoni (2006).

The plan of Cerdà, called "Ensanche y Reforma de Barcelona" (Extension and reform of Barcelona) "prefiguraba la progresiva formación de una metrópolis, mediante un riguroso sistema de crecimiento que permitía la ocupación del suelo agrario, con su eficaz

[35] In English: Its design had the characteristic of the "castrum romano", meaning it was organised in relation to the two orthogonal axes of the "cardo" (North-South road) and of the "decumano" (East-West road).

[36] In English: the need for circulation and should support the new instruments of the mechanic mobility.

redistribución, y la integración de las aglomeraciones ya consolidadas"[37] Guidoni (2006). The plan organised the territory in the surrounding area of the old city based on a design of an orthogonal grid road network. "The orientation of the network coincides with the bisectrix between the earth's meridians and parallels" (Lampugnagi, 1999). The set of two diagonal axes plus one central straight axis cut the territory with the function of articulating the connections with the old city and the villages in the surrounding area.

Cerdà's Plan was implemented in the area between the old city, after the destruction of the walls, and the small cities in the surrounding area, and also the greater metropolitan area of Barcelona into which the small cities were later incorporated. Today these three very distinct areas with their cultures and periods of urban planning are all visible. Moreover it is visible how the planners over the years could harmonise the three areas and develop a single urban tissue, a "compact city". In the old city the narrow streets and the Ramblas are low speed areas, cycling and pedestrian zones. The old city has strongly mixed primary uses and is heavily populated both at night and during the day, being strongly touristic, but also combining residential, public services, leisure, entertainment and retail. The new areas also have mixed land uses. These areas are connected through pedestrian and cycle routes, public transport, the axis and the rings.

In the period immediately after the implementation of the plan, some important measures were presented to complement the extension of the city. On the occasion of the "Universal Fair of 1888" basic concepts were presented, where the Cerdà plan was to configure the urban space of Barcelona and its "personality". One concept was that public spaces are vital to the urban function and those spaces have to be comfortable and efficient. Following this direction several requalification projects of the function of old spaces were implemented, for instance pedestrian zones and squares. The first "traffic ring" (las Rondas) was designed and implemented, and the old fortification was transformed in a park and space for fairs (Guidoni, 2006). This set of urban equipments prepared the city for the industrial age and its urban development in the following years.

Figure 53 below shows Cerdà's Plan and gives us an impression of the city today. The plan shows a homogeneous structure with wide streets (20 meters) and some squares. Picture 1 shows the diagonal axis and the blocks called "manzanas". The blocks have on the corner a cut of the 90° angles with the purpose of facilitating conversion to the right. Picture 2 shows in the first plan the old city with the "Ramblas" street on the right side and on the top the "Passeig de Gràcia" street. On the top of the picture it is possible to see the results of the implementation of the plan. The straight streets configure the grid system of the road network.

[37] In English: Foresaw a progressive design of a metropolis, according to a rigorous growth system allowing the occupation of agricultural ground, with an efficient distribution and integration of the consolidated urban area.

1

2

Figure 53: Cerdà's Plan of 1860 and the city today: the harmonization of planning with the old city. Source: Barcelona (2008)

The Passeig de Gràcia and the Ramblas are today important commercial and leisure areas. In addition, they form structural transport axes for public transport, cars, pedestrians and cyclists. Moreover, they serve as references for the orientation and distribution of trips in different directions leaving from the core of the city.

The decade from 1975 marks the transition of the political system in Spain. The beginning of democracy brought about the movement for urban reform. The discussions pointed to the concepts of "city-territory" and "city-region", carrying out a proposal to organise the metropolitan region as a planning and administrative base. At that time the movement was easily justified based on the high population density of the city, and the economic and social crisis. According to Guardià (2002):

> "En aquest clima de crisi, la pressió dels moviments urbans contribueix a l'aprovació definitiva del Pla General d'Ordenació Metropolitana el 1976 – el qual posa fre a una dinàmica de construció de la ciutat dominada per la voracitat de la promoció privada i permet iniciar, encara en període predemocràtic, una política municipal molt activa, que corregeix les greus mancances urbanístiques heretades i estableix un marc urbanístic avui encara vigent. S'inicia, aixi, un canvi structural…"[38]

[38] In English: In this environment of crisis, the pressure of the urban movements contributed to the definitive approval of the "General Metropolitan Master Plan" of 1976, which interrupted the development of a city dominated by the voracity of private initiatives, and which enabled the introduction of very active municipal policies, thanks to the arrival of a new democratic period, correcting the legacy of serious urban deficiencies and establishing a new urban concept still in force today. There began, thus, a structural change…

To develop the plan a regional organisation was set up aggregating 26 municipalities and three million inhabitants. The “Pla General d’Ordenació Metropolitana – PGM” (General Metropolitan Master Plan) proposed a land use scheme and a restructuring of the road network. The measures presented for the road infrastructure were considered difficult to implement due to the overly straight paths of the routes that would force many constructed areas to be demolished (Guardià, 2002).

At the end of the seventies and beginning of the eighties Barcelona experienced a strong institutional renovation, preparing the way for a new development period. Once again the city used an international event to promote itself and attract investments to reconstruct its urban infrastructure. In 1981 the city proposed to host the Olympic Games. The decision sparked a high expectation in the city for a much-needed renovation of the urban areas. Moreover a strong movement in favour of urban reconstruction began after the approval to host the Olympic games of 1992.

In 1987 the “Plan de Vies” (Road Plan) was presented. The plan suggested an adaptation of the proposals of the PGM and offered solutions to the needs of the neighbourhoods with “una solució viària possibilista i molt ajustada a les necessitates del barri”[39] (Guardià, 2002). According to Ajuntament Barcelona (1996) the “Plan de Vies” presented a set of measures for infrastructure combining new constructions, revitalisation of the uses of some roads and reconstruction of existing ones.

Along with the “Plan de Vies”, a new plan was presented for investment in transport infrastructure, with the focus on the high capacity roads: the rings (“las Rondas”) and the access roads. In addition public spaces, pedestrian zones and squares for example, received improvements and new constructions.

The main objective of this set of implemented measures was at this time to prepare the city for the Olympic Games. But there is no doubt that the investments in transport infrastructure and in many facilities to receive the visitors for this event prepared Barcelona for the economic and social transformations leading up to the nineties, earlier than other Spanish cities.

Today a set of plans coming from the different gvernement levels give guidelines for the conception of the measures and determine the rules for its implementation in the city of Barcelona. Below those related to the urban transport are described.

4.1.2.2.1 Federal Transport Plan: Strategic Infrastructures and Transport Plan of 2005 (PEIT)

The PEIT was developed and executed by Spain’s Ministry of Public Works and Transport. It was a strategic plan with a medium to long term perspective. It covers the period between 2005 and 2020. “The PEIT thus deals with the planning of all action in the field of infrastructure and transport which are the competence of the Ministry of Public Works and Transport. The plan’s

[39] In English: A possible solution for the road network to solve the problems of neighbourhoods.

design takes account of the necessary cooperation and agreement with other Territorial Administrations" (M. Fomento, 2005).

The PEIT has a chapter stating the general guidelines for urban transport planning. According to the plan it "aims to recover a framework for integrated State Administration intervention in cities" (M. Fomento, 2005) and faces the challenges to improve the urban environment. Additionally, it complies with the rules of the European Union, such as the Commission's Communication "Toward a Thematic Strategy on the Urban Environment" (COM/2004/60 of 11 February 2004).

In the guidelines for the cities and for the metropolitan areas, the plan orients the development of the "Sustainable Mobility Plan" towards the basic points (M. Fomento 2005):

- Integration of the transport infrastructure;
- Integration of the urban and metropolitan urban transport systems;
- Plan for the promotion of non-motorised transport;
- Program of research, development and innovation in transport.

4.1.2.2.2 Barcelona Metropolitan Region Mobility Master Plan of 2008 (PDM)

The Metropolitan Region Mobility Master Plan (PDM) was developed by the Metropolitan Transport Authority (ATM). It is valid for the 164 municipalities forming the Barcelona Metropolitan Region (BMR). The plan aims "planificar la movilidad de la región teniendo presente todos los modos de transporte, los pasajeros y las mercancías y fomentando los desplazamientos de los modos no motorizados[40] (ATM, 2008). The development of the plan followed the determination of the "Mobility Guidelines of the Autonomous Community of Catalonia" (2006) and was written respecting the basis of the federal law regarding mobility (PEIT, 2005).

The plan is structured along nine development guidelines covering ninety one measures. The nine guidelines are the following:

- Co-ordination of urbanism and mobility;
- Development of an integrated and safe transport infrastructure network;
- Mobility management and intermodal transport network;
- Improvement of the quality of the railways;
- Public transport: promoting accessibility, effectiveness and efficiency;
- Modernisation of logistic activities and implementation of freight railway infrastructure;
- Guaranteed accessibility to workplaces;

[40] In English: To plan mobility for the region, taking into account all modes of transport, passengers and freights, and promoting non-motorised means of transport.

- Promotion of the energetic efficiency and the use of clean fuels;
- Participative management of the mobility master plan.

4.1.2.2.3 Barcelona Metropolitan Region: Public Transport Infrastructure Master Plan – 2001 to 2010 (PDI)

The "Infrastructure Master Plan" (PDI) was developed by ATM. The objective of the PDI is to present measures for the development of the infrastructure of the public transport network in a time-span of ten years (extension of the network, construction of stations and modernisation of the existing infrastructure). In the document a large number of projects are presented covering all existing means of public transport in the metropolitan region's network - metro, railway, tram and bus (ATM, 2000).

The PDI is being reviewed with the objective of incorporating the new guidelines that were presented by the different levels of government in recent years, into the plan.

4.1.2.2.4 Barcelona Urban Transport Master Plan of 2008 (BUTMP)

The Barcelona Urban Transport Master Plan (BUTMP) was developed by the municipality of Barcelona (Ajuntament de Barcelona) through the Transport Office (Regedor de Mobilitat).

The plan incorporates the concepts developed by the "Pacte per a la Mobilitat de la ciutat de Barcelona" (mobility pact of Barcelona) of 1998. The pact was an agreement between the government of Barcelona and various professional, civil and non-government organisations, with the objective to define "el model de mobilitat amb criteris de sostenibilitat[41]" (Barcelona, 2008). Additionally, strategies for urban mobility were established according to the determination of the Law 9/2003 (mobility law of Catalonia).

The proposal of the mobility plan is to discuss the mobility concept in general, on the basis of the urban concept, considering "interrelació diferents politiques sectorials de mobilitat I cercant la compatibilitat entre elles. Es tracta, doncs, no només d'elaborar un context general que doti de coherència a les diferents politiquees ja empreses per l'Ajuntament, sinó també de definer estratègies futures que estiguin totes elles en consonància amb un model global de mobilitat"[42] (Barcelona, 2008). Moreover the plan defines the mobility concepts for the city and gives the guidelines for the development of transport measures.

The plan contains four groups of guidelines that determine the concepts of mobility and lay the basis for the development of transport measures (Barcelona, 2008):

[41] In English: The mobility concept and the criteria of sustainability.

[42] In English: The interrelation of the different sectoral policies towards mobility, seeking the compatibility among them. It is not only to develop a general context giving coherence to the different policies already undertaken by the City, but also to define future strategies that are all consistent with a concept of global mobility.

- Safety mobility: promoting safety mobility for the population.
- Sustainable mobility: decreasing the need for transport, focusing on the reduction of motorised trips.
- Equitative mobility: include the concept of the free individual journey and universal accessibility. Promoting social contacts through the use of public spaces.
- Efficient mobility: decreasing the general durations and costs of journeys. Mobility as a support for economic and social development.

The mobility plan also sets clear strategic objectives and goals to be reched for the year 2018 target. They are listed in nine main points in the urban transport master plan (Ajuntament de Barcelona, 2008):

- Increasing the share of public transport and non motorised transport to 69.6% of the total passengers' trips (the target for the metropolitan region is of 2/3);
- Increasing the public transport participation in the modal split to 36.5% (metropolitan region: 34.31%);
- Decresing the share of privat transport to a participation of 30.35% of the trips (metropolitan region: 35.23);
- Decreasing the energy comsumption per inhabitant unit in 7.5% (metropolitan region: -7.5%);
- Decresing 48.04% of emissions (metropolitan region PM10 : -48.08%);
- Decresing 39.54% of NOx emissions (metropolitan region: -39.54%);
- Decreasing 20.5% of carboni dioxid emissions. (metropolitan region: -20.54%) ;
- Dedreasing 25% on the number deaths victims on road accidents (metropolitan region: -25%).

The plan proposes a number of actions in order to achieve the goals listed above on the time target.

4.1.2.3 The Urban Transport Network

4.1.2.3.1 Public Transport

Barcelona has a public transport network composed of bus, metro, tram and railway. Public transport makes up 36% of the total modal split. The municipal public company "Transport Metropolitano de Barcelona" (TMB) operates the buses (104 routes) and six metro lines. The state public company "Ferrocarrillis de la Generalitat de Catalunya" (FGC) operates two metro lines. The four tram lines are operated by a private company "Tramvia Metropolitana" (TRAM). Additionally, the federal railway RENFE operates four lines for regional trains connecting Barcelona to its metropolitan region and beyond.

The public transport network is integrated into the municipal territory and into the metropolitan region. The public metropolitan consortium ATM is responsible for fare administration, contracts

with the operators, the strategic plan for the metropolitan region, and the control and surveillance of public transport.

The integrated fare is valid for all means of public transport operating in the metropolitan region. The Barcelona Metropolitan Region (BMR) is divided into six zones, with fare zone 1 covering the whole territory of Barcelona. The revenues made from fares across the whole system go towards a trust fund administrated by ATM. In a certain period ATM pays each operator according to the number of passengers transported.

The tickets are sold as a magnetic card. With this system ATM monitors the trips of each passenger and the integration of different journeys and means of transport within the network. The data is used to control the revenue and the trust fund. The operators are paid according to this data.

a) Bus

In Barcelona the public company TMB operates 104 bus routes and transports 640 thousand passengers per day. The city has approximately 100 km of exclusive corridors and bus lanes. The company is also responsible for the operational planning. The transport office (Ajuntament de Barcelona) is in charge of infrastructure implementation and maintenance - roads, signalling and bus stops (Barcelona,2008).

b) Metro

The eight metro lines transport around one million passengers per day. The network has an extension of around 100 km crossing a territory of 100 km². This leads to a high density of metro lines in the city and good availability and accessibility. TMB and FGC take over the operation and the infrastructure (railway and stations) of the metro. The companies are also responsible for the operational planning (Barcelona, 2008).

Source: from the author.

c) Tram

The four tram lines began running in Barcelona in 2004. The lines have 18 km of extension and 39 stations, connecting Barcelona to the metropolitan region. Nowadays they transport around thirteen thousand passengers per day. (Barcelona, 2008). The company TRAM is responsible for the maintenance of the stations and the operational planning (ATM, 2008).

Source: from the author.

d) Railway - RENFE

The railway network crossing Barcelona and operated by the federal company RENFE has around 95 km and 28 stations, transporting around three thousand passengers per day. The

tickets sold by ATM can be used on the regional trains of RENFE in Barcelona, and the passengers can make a transfer to the whole network, according to zoning.

4.1.2.3.2 Private Transport

Private transport falls under the responsibility of the municipality of Barcelona. The transport office is in charge of planning and traffic operation. The office for security and order is in charge of traffic surveillance and the office for urbanism implements the measures.

a) Individual Motorised Transport

Individual motorised transport makes up around 34% of the modal split in Barcelona. The fleet numbers approximately 1 million vehicles in the city. The number of private cars is around 620 thousand, representing approximately 2.6 inhabitants per unit (Barcelona, 2008).Table 24 below shows the road classification in Barcelona. The external ring roads surround the city and together with their access roads, they are responsible for the city's highest traffic volume. The average speed in the rings is around 55km/h. The access roads to the internal connections cause congestion during peak hours at various cross-sections, with an average speed between 12 and 20km/h.

Table 24: Barcelona road classification.

Road Infrastructure Classification			
Type	**Location**	**Function**	**Use**
Rings and access roads (Rondes I vies d'accés)	Municipality to the state roads and metropolitan region	Interurban connections and traffic distribution outside the high density zones.	High capacity roads for private and public transport.
Internal connection first level	Interdistricts	Connecting inter districts to the rings and access roads.	Medium capacity roads for private and public transport.
Internal connection second level	Interdistricts	Connecting inter districts to the rings.	Medium capacity roads for private and public transport.
Local streets	Intradistricts	Local distribution inside the districts and neighbourhoods.	Local circulation and access.
"Carrer"	Historic centre	Internal connections in the historic centre.	Pedestrians, cyclists and cars (low speed access for supplying and residents) – mixed traffic use.
Cycle routes	Inter and intra districts; combined traffic at the "30 km/h zones" .	Bicycle traffic	Cyclists for work, leisure, studies, shopping and personal activities.
Pedestrian zones	According to the plan and special projects.	Open spaces and pavements exclusive to pedestrian use.	Pedestrians

Source: adapted from "El Decreto d'Alcaldia de 16 de Novembre de 2005: Xarxa Bàsica de Mobilitat" (Mayoral Act from 16th. November 2005: mobility basic network) (Ajuntament de Barcelona – Direció de Serveis de Mobilitat, 2008).

b) Cycling

The data from Barcelona shows that 2% of the modal split is cycling. The infrastructure includes around 130 km of cycle routes and 7.7 thousand parking spaces in the streets of Barcelona. The public company BSM (Municipal Services of Barcelona) offers over a thousand places for

bicycles in underground parking garages. In addition, there are zones of combined traffic with pedestrians or cars (Barcelona, 2008).

Since 2007 the city has had “Bicing”, public transport by bicycle. The service is planned by the Urban Transport Office from Barcelona and operated by the public company BSM. The available infrastructure to the users includes 6,000 bicycles and 400 stations. The average daily uses are around 40,000 and approximately 60% of the trips are for the purpose of work. Moreover, the service is integrated into the urban transport network: around 30% of the trips combine bicing with other means of transport (BSM, 2008).

Source: from the author.

c) Walking

In Barcelona 28% of total trips are made by walking. In the city “la superficie transitable total de suelo municipal, equivalente a 11,007,390m²”[43] (Barcelona, 2008). The pedestrian zones and the pavements make up 5,985,350m² of the total area, distributed in various zones of the territory.
In Barcelona it is possible to go on foot from the Roman ruins and medieval town to the districts of Catalonian modernism, crossing the streets and wide boulevards. The old town is flat. Some streets have combined traffic (allowing the access of cars at 30 km/h and cyclists) and a large pedestrian zone.

Passeig di Gracia. Source: from the author.

4.1.2.4 Urban Transport Planning Process in Barcelona

a) Actors’ network

The municipality of Barcelona is responsible for urban transport planning in its territory. The mayor has personal responsibility for planning. However, he can delegate specific tasks or the complete process of planning to his subordinated staff or to other government institutions (Gomila, 2008, interview).

In Barcelona the urban transport planning process involves the five government levels of the Catalonian State, considering their departments and public companies (Generalità di Catalunia). Besides the five levels, the private transport company for trams is involved at the tactical/operational level.

According to federal law, the state (comunidads autonomas) and the municipalities have to develop a mobility master plan (local and regional) and co-ordinate its implementation. In

[43] The area of municipal ground designated for circulation is 11,007,390m².

Barcelona the co-ordination of the urban transport planning process is decentralised. It is clear that the share of responsibilities correspond to the levels of planning (strategic and tactical/operational). In addition, public and private transport have different coordinations for planning.

Based on the mobility master plan presented by the municipality and by the metropolitan region, the phases of planning are organised and distributed amongst the public institutions. At the strategic level, public transport planning is co-ordinated and implemented by ATM. Private transport planning falls under the responsibility of the municipality. On a tactical and operational level public transport involves the municipality (transport office) and each operator develops the measures according the regulations and guidelines dictated by ATM (for instance, the timetable). Private transport falls under the responsibility of the municipality, which delegates some tasks to the municipal districts.

Figure 54 below shows the actors involved in the urban transport planning process in Barcelona.

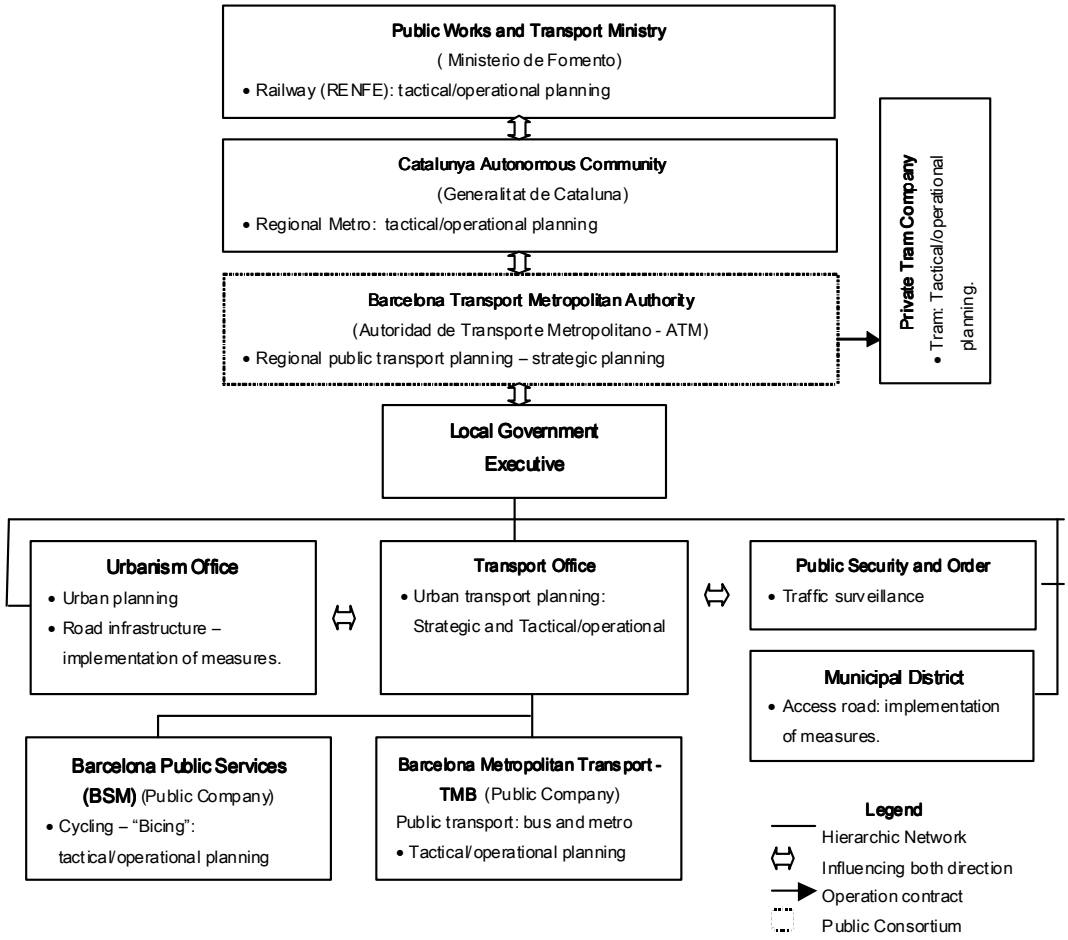


Figure 54: Urban transport planning processes in Barcelona: Actors. Source: from the author

Permanent commissions or committees do not exist in Barcelona. The working teams involved in the planning process are staff working for the institutions. Public participation is involved by the end of the phase of examination of measures (Gomila, 2008, interview).

Broad public participation is regulated by law. The plans have to be on display to the population for a month, and suggestions can be sent to the authority responsible for the plan. All suggestions have to be replied to, regardless of whether or not they are included in the plan. The picture shows an example of the presentation of some plans in Barcelona.

Source: from the author.

The neighbourhoods in Barcelona have a local association (*associación de los vecinos*)[44] with the objective of discussing and forwarding their needs and communitarian interests. Plans with direct impacts on local communities are involved in order to evaluate and make suggestions.

The process of decision involves the mayor and the head of the related offices for private transport and the ATM Administrative Council for public transport. The ATM administrative council is composed of eighteen members: nine are representatives of Catalonia and nine are representatives of the municipalities. The federal government participates with two representatives as observers and do not possess voting rights (Madrid, 2007). The presidency of the council comes from the state of Catalonia and the vice-president is the mayor of Barcelona. The local parliament has responsibility for the approval of the annual budget, which is a global financial amount estimated for areas of investment. The mayor and the head of the offices decide the amount for each measure individually.

b) Information

In Barcelona broad information about planning and other information from Catalonia and the city are available to the population.

The city of Barcelona, the metropolitan region, the province of Barcelona and the Catalonian State regularly publish manuals, books and brochures. These materials can be found in governmental book stores in the city centre. They also have websites offering information for the users and the population in general. Statistics and the set of plans valid for the city are available on the website.

In the libraries of the two universities in Barcelona, “Universidade Politecnica da Catalunya” (UPC) and “Universidade de Barcelona” there are important books, manuals and plans published by the city of Barcelona and “Diputació” of Barcelona. The objective is to engage academia in the concepts created by the planners in the city, developing an environment of discussion, continuous improvement, and the exchange of ideas.

The contents of the plans developed by the differing levels (federal, state, region and municipality) are integrated. The share of responsibilities given to each level is clear in the texts.

[44] It is an independent social movement organised by local communities.

The urban transport plan is developed mainly based in the master plans, internal data basis and statistics, and the set of information and publications produced by the government.

4.1.2.4.1 Strategic level

The organisation of the process of urban transport planning in Barcelona at the strategic level is co-ordinated by the municipality and by ATM (for public transport) (Rosselò, 2008). Figure 55 shows the actors involved in urban transport planning in Barcelona.

The plans are developed by the technicians from the public institutions or by contracted consultants. Public participation is involved at the end of the phase of examination of measures. The projects are presented to the affected community for open discussions. In order to guarantee a technical evaluation of the measures, the city hall offers the payment of a technician to support the neighbourhoods association[45]. However, the general public does not have the power to decide (Gomila, 2008, interview).

The process of decision at the strategic level concerning public transport falls under the responsibility of ATM. The administrative council make all the decisions regarding matters considered strategic (for instance fare, and infrastructure plans) using the mechanism of intense previous discussion and decision by vote. At least two thirds of the votes are needed in order to approve a matter.

For private transport (individual motorised transport and non-motorised transport) the plans are developed by the city transport office. At the phase of development of measures, work teams can be organised with representatives of other areas affected by the projects (for instance, environment and urbanism). At the decision stage, the projects are presented to the mayor by the head of the transport office. The mayor is the final decision maker.

[45] The neighbourhood chooses the technician and the city hall transfers the money for payment.

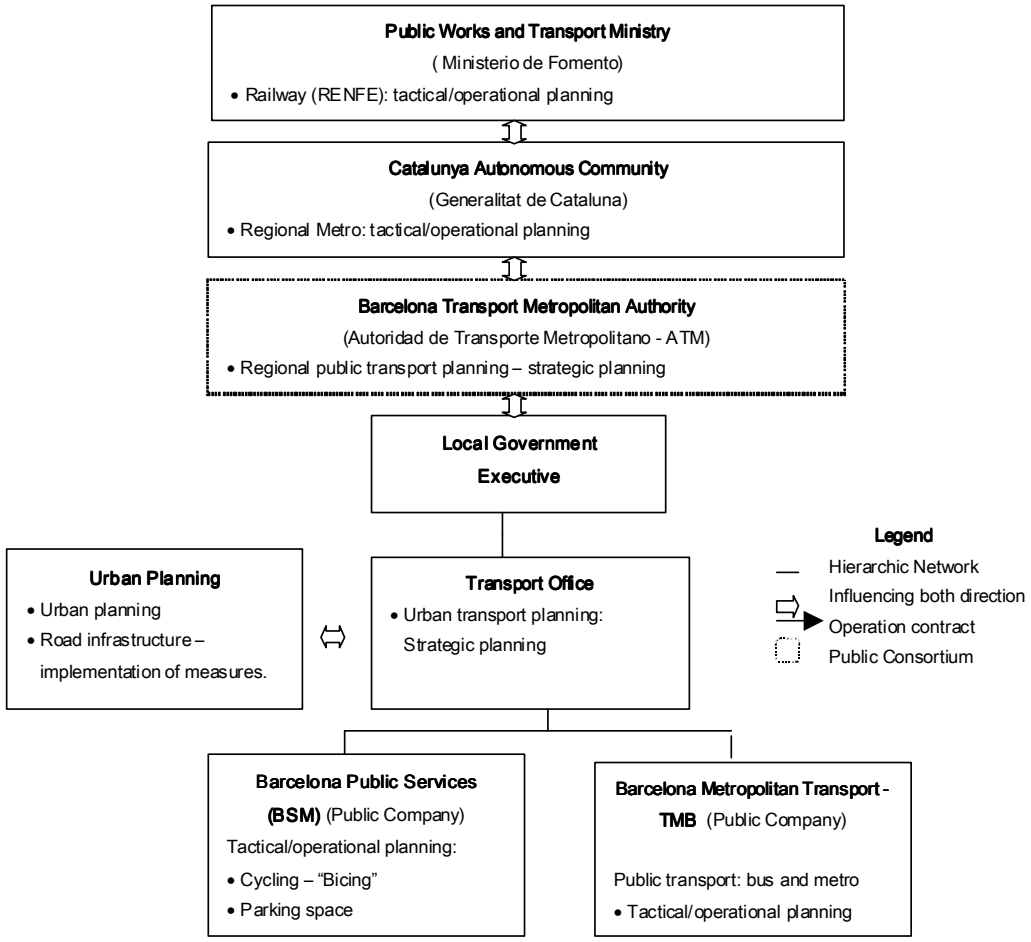


Figure 55: Urban transport planning processes in Barcelona: Actors – Strategic Level. Source: from the author

4.1.2.4.2 Tactical/operational level

The actors involved on the tactical/operational level are the same as presented in Figure 54 above.

According to Gomila (2008, interview) the city government administrative strategy is responsible for the direct administration, at the city hall public offices, of all tasks related to strategic planning and for the creation of a public company to supply services to the population, considering that meanwhile, the separate and indirect administration of public companies involves the possibility of implementing the measures fast with more effectiveness and efficiency.

At the tactical/operational level the public companies are in charge of operating parking spaces for cars, the public bicycle service (bicing) and public transport, and are also responsible for planning these services in the short term. They organise the process of planning according to the master plan and the guidelines coming from the Transport Office or ATM.

Planning and implementation of measures related to signalling and pedestrian zones fall under the direct responsibility of the Office for Urbanism.

4.2 BOGOTÁ

4.2.1 City Overview

Bogotá is the capital of Colombia, located in the Northwest of South America, 2,640 meters high in the Andes Mountains. The municipality has around 6.8 million inhabitants in an area of 1,700km², within a region of around 8.0 million inhabitants. More than 15% of the population of Colombia lives in Bogotá. The number of inhabitants continues growing in the city and in the surrounding region.

View from Monserat mountain. Source: from the author

The annual population growth rate in 2006 was 2.4%. The data shows that the highest percentage of the population is made up of the younger age groups. The city attracts migrants from other regions of the country, and also the fertility rate is high when compared to cities in Brazil or in Europe for instance. It is above two births per thousand, per year (Bogotá, 2008).

According to a Bogotá report (2008), the city is the main cultural and economic centre in Colombia. It is the home of the highest number of industrial plants, retail outlets and services in various economic sectors. Commerce and services make up 74% of Bogotá's economy, while industry makes up 24%.

Since 2001 Bogotá has been an international reference point for urban transport planning, especially in reference to the high capacity passenger transport offered by their bus system. The bus corridor "Transmilenio" is today well-known worldwide as a successful transport solution, especially considering their overcoming of public transport problems in a relatively short time and with low investment.

Besides that, the great challenge for the city is related to urban and regional planning and social aspects. But there is no doubt that efforts have been made towards the city's development since the nineties. The documents analysed in this study show a great investment coming from various government levels to organise the legal and institutional bases of support for the city's planning and development. Some projects are already a reality. As mentioned before the most famous is Transmilenio, but also it is worthwhile to mention the 350 km of cycle routes crossing the city, the 4,500 parks, the restauration of the city Centre, 45 museums, libraries and others (Bogotá, 2008). Related to public transport, a further step was proposed by the city planners: the implementation of the first metro system in Bogotá. The project is being contracted with investments coming from the federal government and the municipality, supported by international creditors.

4.2.2 Urban Transport

4.2.2.1 Political and administrative organisation

Colombia is a Unitary Presidential Republic[46]. The country is divided into three government levels with specific political and administrative tasks: the federal level, the state level (Departamentos) and the municipalities (Figure 56). The federal law No. 388/97 in article 7, item 4, determines that the competencies concerned with the organisation of the territory must follow the instructions of the National Constitution of 1991 (NC/91), the related laws and the principles of coordination, competency and subsidiary.

Furthermore, the law No. 388 of 1997[47] establishes in chapter II the rules and competences for the municipal organisation. Article 7 sets the extent of authority over the territory organisation exercised by each government level in Colombia, and says that each government unit has to present a development plan and a territorial organisation plan (POT). The same article determines that the metropolitan region must write its own metropolitan development plan. The metropolitan plan must present "las normas obligatoriamente generales que definen los objetivos y criterios a los que deben acogerse los municipios al adoptar los planes de ordenamiento territorial en relación con las materias referidas a los hechos metropolitanos"[48] (Law 388/97, Art. 7, item 3).

The National Development Department (DNP) is the federal institution responsible for the execution of laws regarding territorial and development planning in the government levels. To accomplish the task the DNP established guidelines and specific policies for urban development. For instance, the document COMPES 3260/2003 (Colombia, 2003) establishes guidelines for the planning and implementation of high capacity public transport in Colombian cities.

According to the law 388/97 the different Colombian states are responsible for the organisation of their territory. They must present a development plan and a POT concerned with their own obligatory tasks. In addition, the states must co-operate and present the guidelines for the planning of the cities in their territories. The plans must include aspects of land use, environment, social and economic development, and infrastructure, for instance transport.

In Colombia the municipalities have political and administrative autonomy. However, it is "determinada por el carácter prevalente de las disposiciones dictadas por entidades de mayor

[46]National Constitution of 1991 (FC/91), Article 1°.

[47]The Law number 388 of 1997 establishes the rules and guidelines for the organisation of the territory in Colombia.

[48]The general obligatory norms that define the objectives and criteria for the municipalities in the adoption of the master plan, when the matters refer to metropolitan issues.

ámbito en la comprensión territorial de sus competencias o de mayor jerarquía en materia de interés supramunicipal"[49] (Law 388/97, article 7, item 4).

Bogotá has a special condition as a local government unit. The city is the district capital of Colombia, the capital of the Cundinamarca state and the centre of the metropolitan region of BOGOTÁ. Therefore, it has its own development plan and its own POT, separated from the Cundinamarca state and with a fund to support its implementation. Figure 56, shows the distribution of responsibilities related to transport among the different government levels in Colombia.

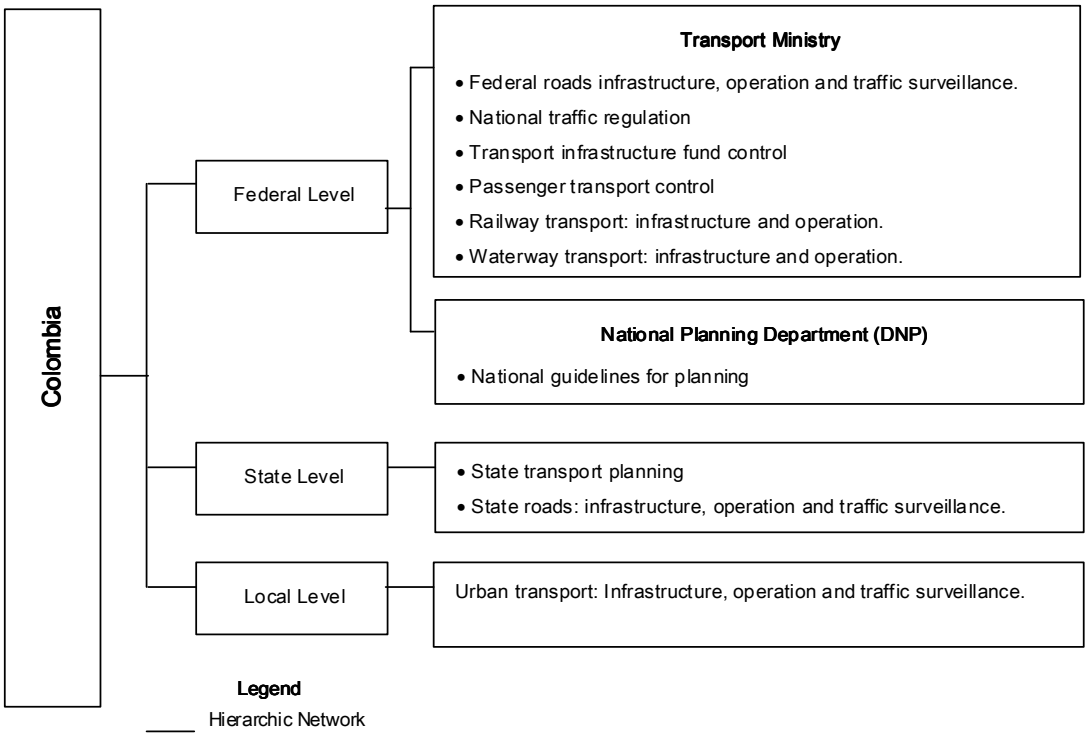


Figure 56: Transport in Colombia: distribution of the responsibilities of government levels. Source: from the author

Figure 57 shows the institutions responsible for urban transport in Bogotá. The State of Cundinamarca is responsible for the state road infrastructure and operation, and for passenger transport in the metropolitan region and the state.

At the local level the Mobility Secretary (secretaria de movilidad) and the Urban Development Institute (Instituto de Desarrollo Urbano, IDU) are the responsible institutions for urban transport planning and transport infrastructure. Nevertheless the Planning Secretary (Secretaria Distrital de Planeación, SDP) writes the guidelines for developing the master plan.

[49]Determined by the prevalent character of the regulations of higher level entities, taking into consideration territorial competences or higher hierarchical interests concerning supra-municipal matters.

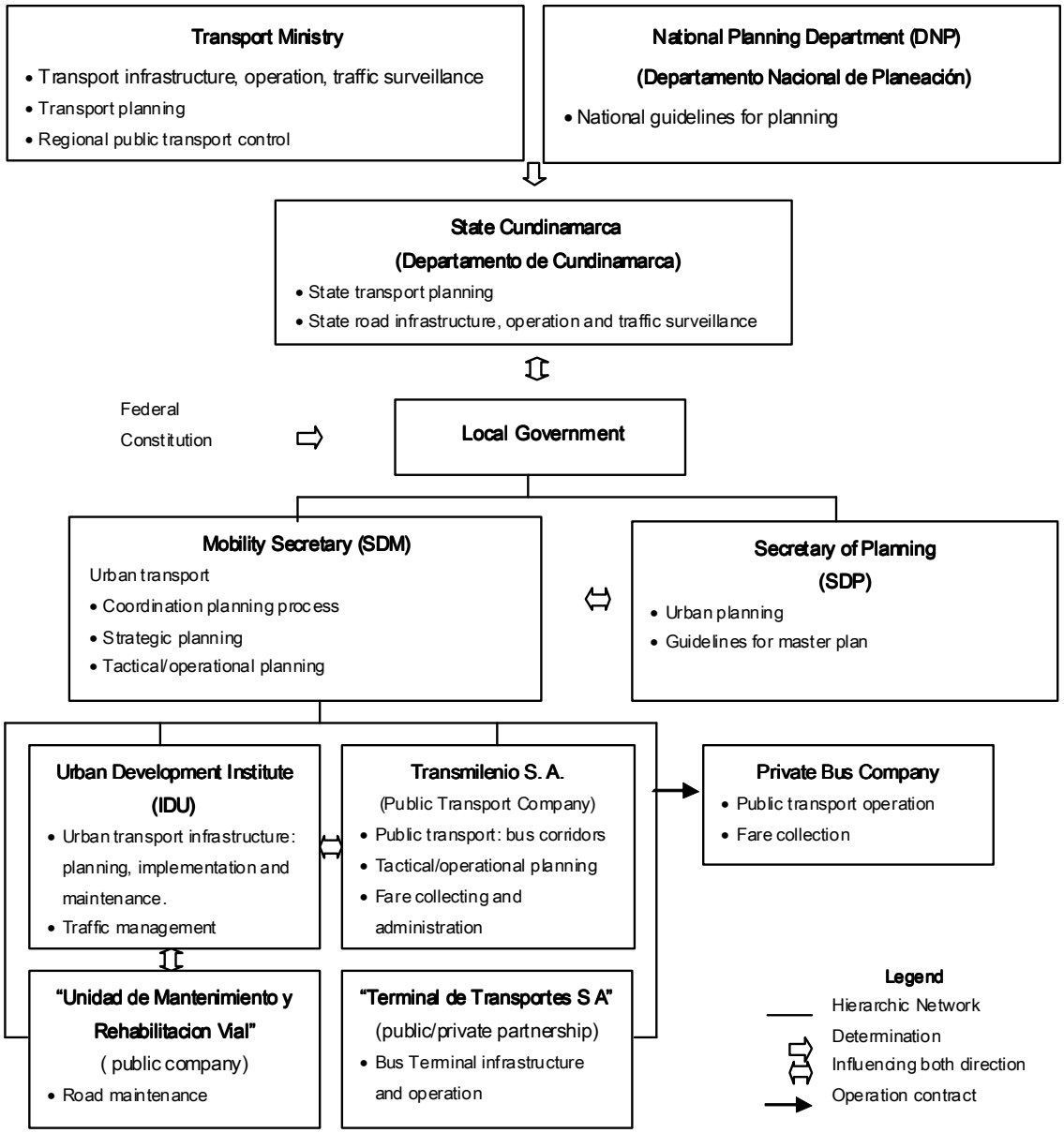


Figure 57: Urban transport organisation in Bogotá.

The Mobility Secretary, a government department created in 2007, has the responsibility of:

> Articular las acciones del sector de la movilidad, integrando las acciones del Instituto de Desarrollo Urbano, la Unidad de Mantenimiento y Rehabilitación vial y las empresas Transmilenio S.A. y Terminal de Transportes, bajo las políticas establecidas en el plan maestro de movilidad y con los criterios de participación y corresponsabilidad entre el sector público y el privado[50] (Bogotá, 2007).

[50]Representing and acting on the interests of the mobility sector, integrating the activities of the urban development institute (IDU), the "unidade de mantenimiento y rehabilitación vial" and the public companies Transmilenio S.A. and Terminal de Transportes, following the policies established by the mobility master plan and the criteria of participation and partnership between the private and public sectors.

The IDU is responsible for the planning, implementation and maintenance of road infrastructure, cycle routes, pedestrian zones and public transport infrastructure.

Public transport is planned and co-ordinated by the mobility secretary. The bus corridors and the feeder buses are operated by the public company “Transmilenio S. A.” (TM). Transport by bus and micro-bus, outside the integrated system TM, are operated by individual bus drivers and by private bus companies.

4.2.2.2 Planning – 1928 to 2008

Bogotá was founded in the year 1538 by Spanish settlers (PMM, 2006). It is located on a high “*plateau”* in the Andes Mountains at more than 2,600 metres above sea level. The city is flanked by a “wall” of hills to the East that limits its growth in this direction and determines the city’s elongated shape and its growth to the south and north, where there is a flat topography. The main roads run from south to north, with some high capacity roads travelling west.

According to IDU (2008), the first effort to organise urban planning in Bogotá was the creation of the organisation “Junta Metropolitana de Obras Publicas” (public works metropolitan group) in 1928. This organisation encompassed public institutions whose objective was to establish the legal basis for the development of urban planning.

In 1936 the Austrian architect Karl Bruner presented an urban development plan to Bogotá. He foresaw the expansion of the city and presented for the first time the concept of roads and pavements as public spaces. However, a complete plan for road infrastructure was not designed until 1945, by the “Sociedad Colombiana de Arquitectos” (Colombian Architects Society). Five years later, the French urban planner Le Corbusier developed a new plan for Bogotá with a road classification proposal. Afterwards this plan was expanded by the urban planning office with guidelines for territory organisation and setting the priorities for implementation (IDU, 2008).

In the seventies the urban population increased and new areas were opened for housing. At that time, there was an increase in non-regulated occupation of open areas in the city. Additionally private companies started constructing new neighbourhoods, leading to much greater participation in the real estate market (IDU, 2008). The city administration was under pressure to prepare a coherent plan and with the required urban infrastructure to deal with the expansion. According to the IDU (2008), the public authorities concentrated more effort on trying to regulate the private activities of the constructors using agreements, and matters relating to the urban plan were left aside. “En las decadas entre los setenta y los noventa, la planeación orientaba simplesmente a stisfacer as demandas generadas por el mercado

inmobiliario, sumada a la inmigración descontrolada, terminó por producir un crecimento insolidario, inquitativo y ineficiente de la ciudad"[51] (IDU, 2008).

The FC/91 establishes that the municipalities have to present and execute a local development plan with guidelines for economic and social development, and a local master plan (Plan de Ordenamiento Territorial – POT). The federal law No. 388 of 1997 regulates the CF/91 in the matters related to territory organisation and states the guidelines for its planning. According to this law the stated plans have to be in "armonía con las políticas nacionales y los planes departamentales y metropolitanos"[52] (Law 388/97).

According to article 9 of the law No. 388/97, the master plan (POT) must be adopted by the municipalities. It is "el instrumento básico para desarrollar el proceso de ordenamiento del territorio municipal. Se define como el conjunto de objetivos, directrices, políticas, estrategias, metas, programas, actuaciones y normas adoptadas para orientar y administrar el desarrollo físico del territorio y la utilización del suelo".[53] The development plan refers to the "programas de gobierno de cada alcalde durante su período"[54] (Cundinamarca, 2007).

In 1995 the Japanese Agency JICA was contracted to develop an urban transport plan. According to (PMM, 2006) the plan's focus was on road infrastructure and the solutions presented required high investments for its implementation. The measures proposed to solve the traffic problems were based on elevated motorways, bridges and tunnels. These measures required high investments and also involved dramatic changes in land use to open space for the constructions.

Considering that the government could not afford the investments needed to implement the measures proposed by JICA, the new mayor started discussions, in 1998, to develop a transport plan that focused on public transport and was built on an investment plan that the city could afford.

The legal basis was prepared following the FC/91 and the law 388/97. In 2000 the urban master plan (POT) was published: the mayor's Act No. 619. The chapter concerning public transport presented as the main measure the planning and implementation of a high capacity public transport system.

[51]From the seventies to the nineties, city planning was oriented towards meeting the demands of the real estate market. This policy, coupled with uncontrolled immigration, produced urban growth that was not in a spirit of solidarity, and not equitable or efficient.

[52]Harmony with the federal policies, the state and metropolitan plans.

[53]The basis of developing the process of the organisation of the municipal territory. It is defined as the set of objectives, guidelines, policies, strategies, goals, programs, actions and norms adopted to orient and manage the physical development of the territory and the land uses.

[54]Government plans of each mayor during his mandate.

In spite of the fact that the master plan contained guidelines for a railway system, the mayor was influenced by the successful results of the BRT in Curitiba, proposing a daring new project called "Transmilenio" as a structural public transport network (Morales, 2008, interview). According to Cain et al. (2006):

> "For many years, the suggested solution to Bogotá's inefficient public transportation was to build a heavy rail metro system. There were a total of 10 attempts to implement heavy rail in Bogotá between 1947 and 1997 (Lleras, 2003). These attempts were continually thwarted by the high capital expenditures involved and opposition from the operators of the traditional public transportation system" (Cain et al., 2006).

The advantages of the project were concentrated mainly on two points: a fast solution to the chaos of urban transport, based on an affordable investment. In spite of some criticisms (mainly from those who agreed with the former rail system project), there is no doubt that Transmilenio brought about a great advance in Bogotá's public transport.

At that time public transport in Bogotá was controlled by individual bus drivers, operating mainly with micro-buses. The service was not planned by the city and not regulated. The so-called "penny war"[55] was the method of establishing the fare, and was the unwritten rule among bus drivers. There was no timetable or any regulations for the service. The result was an oversupply of buses and bus drivers. The high number of buses coming to the city centre, together with the cars, caused great congestion in the main arterial roads. Additionally, due to the geographical location of the city and the proximity of the mountains, air pollution levels were intolerable for the population.

The Transmilenio project combines trunk lines (bus corridors) with feeder lines (neighbourhood lines supplying the trunk lines). The project's proposal was to implement the network in phases. The phases number one and two were quickly and successfully implemented and they are in operation today. Phases three to eight (Figure 58) remain under discussion considering technical and financial availability.

[55] "Penny war" was the way the individual operators used to compete with each other for custom. The bus drivers stopped in the middle of the street where people gathered on the pavements to wait for buses, and tried to negotiate the fare by haggling, and to attract the users based on offering discounts of a few cents. This behaviour caused great traffic congestion in the main streets of BOGOTÁ.

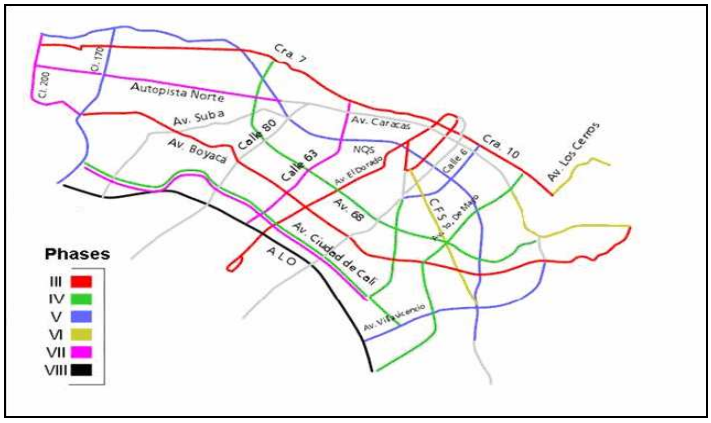


Figure 58: Transmilenio: phases of the plan not yet implemented. Source: Cain et el. (2006).

The urban master plan of 2000 was modified in 2003 by the act 469/2003. In 2004, Act No. 190 revised some points of the two previous acts and organised the text in one single document.

An important point revised by the law 190/2004 related to the regional context. The objective was to create a legal basis for the establishment of agreements between the government institutions to promote regional development.

The Cundinamarca state development plan (2008 to 2012) proposes in chapter 2.4 the government programs to promote regional development. Chapter 2.4.1 describes the sub-program “Movilidad para la integración y el desarrollo” (mobility for integration and development). The text says: “promocionarán y pondrán en marcha programas y proyectos de interés común entre la Nación, Cundinamarca, Bogotá, y otros entes territoriales e instituciones, que entren a fortalecer la Región, propiciando la inversión territorial, social y la promuevan en el nivel nacional bajo un esquema de inversión compartida”[56] (Cundinamarca, 2008).

Nevertheless, regional development and planning are great challenges to the Bogotá government today. The city offers most of the workplaces in the region and in the country. Therefore, it attracts migrants from other regions, who come to find work. Most of these people live in the surrounding metropolitan region. Commuting increased in the region in recent years because there are more workplaces available as a result of economic growth in Bogotá.

Despite the legal basis and the government plan statements, a regional transport plan does not exist. Additionally there is no regional planning institution in charge of the planning and operation of regional transport comprising the twenty municipalities of the metropolitan region of Bogotá (Castro, 2008, interview).

Today the Transport Ministry controls regional passenger transport. However the lack of a regional plan gives opportunities for non-regulated transport to serve the population, and

[56]Programs and projects in the common interest of the nation, Cundinamarca, Bogotá and the other territorial entities and institutions that strengthen the region will be promoted and implemented. The objectives were social and territorial cohesion, and the promotion of the region at national level using its share of the investments.

encourages conflicts between them and the regulated transport in Bogotá (Castro, 2008, interview).

4.2.2.2.1 Urban Master Plan of 2000 (Plan de Ordenamiento Territorial – POT), complemented and modified by Law 190 of 2004

The Bogotá urban master plan (POT) was developed by the municipality. It has been in effect since 2000, under the mayor Act No. 619/2000. The approval of a master plan in Colombia normally has to be made by the city parliament. However, the plan of 2000 was validated by a mayoral act supported by Law 388/97, article 26. It states that if the parliament has failed to vote on a master plan proposed by the executive sixty days after its presentation, the mayor has the authority to publish an act to validate the plan regardless. The POT of 2000 was modified in 2003 by the Act No. 469/2003 and it was put together in a single document in 2004 by the mayor's Act No. 190/2004.

The objective of the plan is the organisation of the territory in general. Additionally it states the norms for land use and urban development. Regarding urban transport, the main statement is that it is mandatory to develop a sectoral transport plan. Article 44 of the Act 190/2004 establishes that "los planes maestros como instrumentos estructurantes del primer nivel de jerarquización en el planeamiento urbanístico, mediante los cuales se establecen los objetivos, políticas y estrategias de largo plazo. De igual manera establece en el artículo 46 como prioritaria la expedición del Plan Maestro de Movilidad"[57] (Act 319/2006).

Moreover, the POT (Act 190/2004) provides the concepts for urban transport development. It describes the elements of the network (article 126 of the act 469/2003) and the relation with the land use and the main urban functions. The same article says: "el subsistema de transporte se estructura alrededor de los modos de transporte masivo: metro, Transmilenio y tren de cercanías, dentro de un marco institucional regulado y controlado por la autoridad de transito."[58] (Act 469/2003, article 126).

4.2.2.2.2 Development Plan (Plan de Desarrollo)

The development plans are the responsibility of city governments, as expressed by the federal law 388/97. It is obligatory for all levels of government: federal, state and the municipalities. It has to be presented at the beginning of each new government period. The plan establishes the policies and the guidelines for reaching goals within this period. The development plan has to present the budget and its distribution into each area of public investment. For instance the

[57]The master plans are a first-level structuring instrument of urban planning. The long-term objectives, policies and strategies are set according to the master plan. Similarly, Article 46 states that the development of the mobility master plan is a priority.

[58] The transport subsystem is structured from high capacity transport: metro, Transmilenio and the regional train. The transport system is regulated and controlled by the transport authority.

current federal development plan (law 1151/2007)[59] presents the investments for each region of Colombia and for each area. For Bogotá, transport is one of the areas with the highest amounts of investment. Additionally, the mayor has to present the city development plan covering the period of his mandate.

4.2.2.2.3 Mobility Master Plan of 2006 (Plan Maestro de Movilidad – PMM)

The Mobility Master Plan (PMM) of 2006 was adopted by the mayor's Act No. 319/2006.

Figure 59 below shows the mobility master plan concept valid for Bogotá since 2006. This figure shows that the process of planning involves two levels: territorial and sectoral. The connection and the interaction between the two levels of "territorial planning" and "sectoral planning" take place through the "logistic of the territory", "en la medida en que no solamente afecta al sistema de movilidad sino a la prestación de otros servicios"[60] (PMM, 2006, chapter II).

On the first level the interaction between "land use" and "transport flows" are planned. At the sectoral level the object of planning is the interaction between "transport" and "infrastructure", made through the "logistic of the mobility". "La logística de la movilidad se ocupa, entonces, de garantizar los flujos de personas y carga a través de las diferentes infraestructuras de espacio publico y de los modos que por las mismas circulan"[61] (PMM, 2006, chapter II). The mobility master plan was developed based on this concept, considering that "la movilidad es un elemento esencial más no suficiente para garantizar el desarrollo urbanístico y económico deseado de la ciudad y la región"[62].

[59]The federal law N° 1151/2007 establishes the Federa l Development Plan for the period of 2006 to 2010 (Colombia, 2007).

[60]Because it not only affects the mobility system but also the supplying of other services.

[61]The mobility logistic has the task to guarantee the flow of people and freights using the different infrastructures of the public space and the transport modes available.

[62]Mobility is an essential element but not sufficient to guarantee the expected urban and economic development to the city and the region.

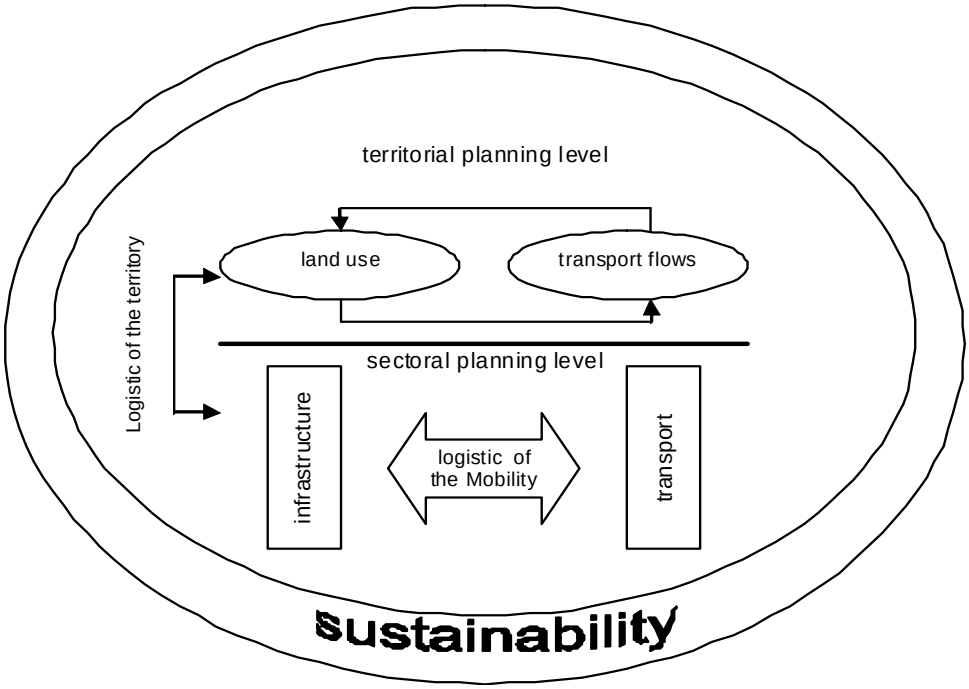


Figure 59: Mobility master plan concept. Source: designed on the basis of PMM (2006).

According to the concept shown in Figure 59, the interactions produced by the levels of planning (territorial and sectoral) have direct impacts on urban sustainability. Therefore, the plan presents in its twenty chapters guidelines and measures to satisfy the proposed concept. According to the plan (PMM, 2006) the implementation of the transport measures based on these principles will produce positive impacts on urban development and will contribute to the sustainability of the city.

The measures presented are in accordance with Article 126 of the act No. 469/2003 (POT revision). The urban transport network is made up of a high capacity public transport system: Transmilenio, metro and regional train. Additionally, non-motorised transport and individual motorised transport complement the network.

Today, the project to implement the metro is being contracted. According to the mobility master plan (PMM, 2006) the objective is to integrate in the future the existing individual network infrastructure and operation (transmilenio, cycle routes, transport by micro-bus and pedestrians) into a single urban transport network in Bogotá.

4.2.2.2.4 Cycle Master Plan of 1999 (Plan Maestro de Ciclo Rutas – CMP)

In 1999 the mayor of Bogotá published the cycle plan. The plan's main objective was "mejorar la movilidad urbana e interurbana y reducir la contaminación en la ciudad de Bogotá mediante el impulso al empleo de la bicicleta, como medio de transporte"[63] (Bogotá, 1999).

[63]To improve urban mobility and reduce pollution in the city of Bogotá by promoting cycling.

The plan proposed the construction of around 300 km of cycle routes, distributed throughout the city, connecting the city centre to its neighbourhoods. The plan also presents institutional organisation and strategies to implement the infrastructure and promote its use. Figure 60 shows the schema of the proposed network.

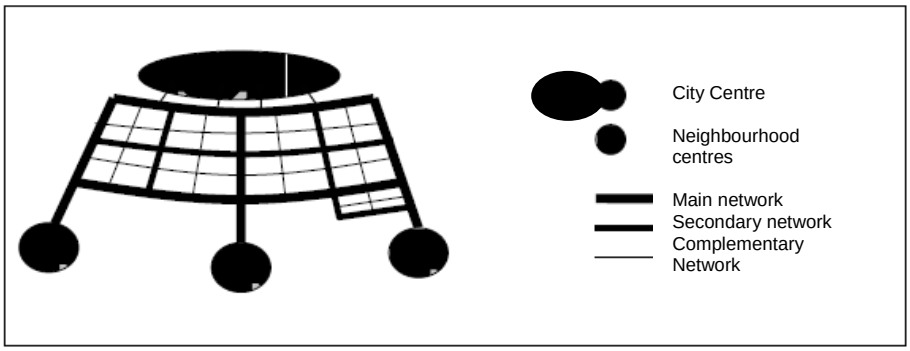


Figure 60: Functional schema of the proposed network. Source: Cycle Plan 1999.

The PMM (2006) maintains the cycle plan of 1999 with small adjustments mainly relating to the facilities where transfers are made to other means of transport, for instance buses.

The results of the plan are considered by the administration and the population as successful, considering that in less than ten years most of the infrastructure was implemented and day by day attracts more users. Furthermore, the cycling plan in Bogotá is today recognised as an international case, presented at various conferences around the world. The common agreement of the experts is that the consistency of the plan, combined with the institutional organisation and the political decisions were the basis for its success (Movilization, 2008).

4.2.2.3 The Urban Transport Network

4.2.2.3.1 Public Transport

Public transport in Bogotá is 58% of the modal split. The city has a bus corridor (rapid transit – BRT) as a structural transport system: the well known “Transmilenio” (TM), implemented in 2001. In the peripheral zones the microbuses and the vans (busetas) run disconnected from the TM network. The mobility secretary is responsible for the planning and co-ordination of the public and private operators. However, today there is no effective planning or control for the services operated by micro-buses and vans. According to Morales (2008, interview) the mobility secretary does not have enough administrative support to take over the task.

a) Bus Corridor: Transmilenio

Transmilenio started its operation in 2001. Today there are 84 km of bus corridors (trunk lines) and more than 500 km of feeder lines. Around 1.5 million passengers are transported every day.

Fare collections and the administration of Transmilenio are the responsibilities of a private company contracted by the operators (Cain et al. 2006).

> "TransMilenio uses pre-paid contact-less smartcard technology. Cards are charged at nearby ticket booths and automatically debited at the turnstiles. Cards can only be purchased inside the stations, which can cause queuing problems. Turnstiles are used to direct passenger flow and automatically charge the contact-less card. Fares are collected by a private concessionaire that deposits daily revenues in a trust fund, which is distributed weekly to system agents. The fare collection system includes producing and selling electronic cards, acquiring, installing, and maintaining equipment for access control, information validation, processing, and money handling."

Figure 61 shows the Transmilenio network in operation today. The trunk lines are served by buses which arrive every three minutes. In spite of this, the buses are still overcrowded during peak hours. According to Castro (2007) the buses operate at peak periods with a capacity of seven passengers/m².

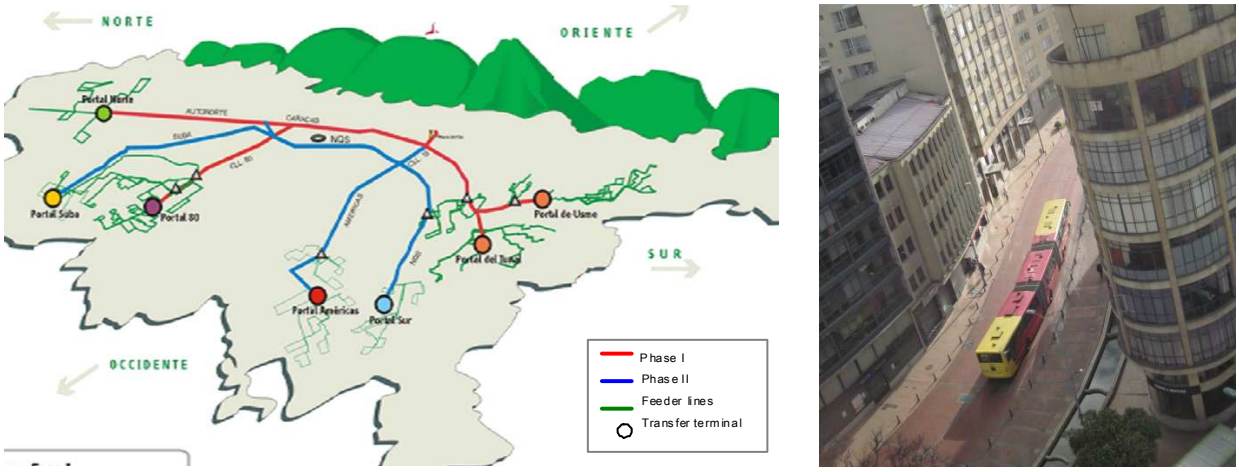


Figure 61: Transmilenio network in operation. Source: Transmilenio (2008); (Picture from the author).

b) Micro-bus

The service is organised by the micro-bus operators. The lines cover the peripheral zones of the city and are operated by individual or associations of operators. Approximately 420 thousand passengers are transported by micro-bus in Bogotá daily.

Source: from the author

c) Van "Buseta"

The service transports around 650 thousand passengers per day in 6,300 vans. This figure means that ¼ of the passengers transported daily in public transport in Bogotá are served by these individual operators. The services are organised and operated by the vans' owners, without any control from the government.

4.2.2.3.2 Private transport

a) Motorised individual transport

In Bogotá 15% of daily trips are made by private cars. The city has a fleet of more than a million private cars (PMM, 2006).

According to the MMP (2006) one of the main problems for urban transport in Bogotá is the low quality of the road infrastructure. The reports from the IDU show that 53% of the road infrastructure is in bad condition, against 28% showing good results in the evaluation (PMM, 2006). Table 25 below shows the road classification according to the PMM 2006.

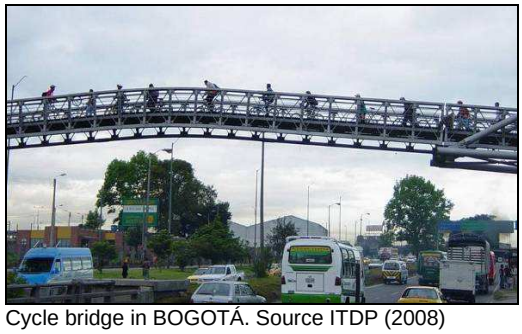
Table 25: Road classification in Bogotá.

Road Infrastructure Classification			
Type	**Location**	**Function**	**Use**
Main arterial roads	Municipality to metropolitan region	Interurban connections	High capacity roads for private and public transport.
Complementary arterial roads	Inter-city connections	Medium and long distance connections in the city.	High capacity roads for private and public transport.
Intermediary roads	Inter-neighbourhood connections.	Distribution between the arterial roads; alternative inter-neighbourhood connections.	Private and public transport in shared or exclusive lanes. Light cargo.
Local roads	Within the neighbourhoods.	Local distribution inside the neighbourhoods, local access to the lots.	Private transport, cycling and light cargo.
Cycle Routes	According to the cycle plan.	Bicycle traffic	Work, leisure and others
Pedestrian Zones	According to the projects.	Open spaces and pavements exclusive for pedestrian use.	Pedestrians
Rural roads	Rural areas.	Access to the private areas and lots.	Rural transport in general.

Source: adapted on the basis of the Bogotá Mobility Master Plan (PMM), chapter 7 (2006).

b) Cycling

Cycling makes up 3% of the modal split in Bogotá. The infrastructure is composed of more than 350 Km of cycle lanes. The flat topography from North to South enables its easy implementation in that direction. However, the topography can vary in the direction of East to West, and there are pathways connecting the neighbourhoods to the city centre as showed in Figure 60 above (Morales, 2008, interview).



Cycle bridge in BOGOTÁ. Source ITDP (2008)

Most of the cycle routes were constructed together with the implementation of Transmilenio, as part of the concept. Connected to the stations are more than 1,500 bicycle parking lots, and the cycle routes follow the paths of the bus corridors, in separate lanes to the right of the lanes designated for private cars.

c) Walking

The planning and infrastructure of the pedestrian zones come under the responsibility of the IDU. In Bogotá, walking makes up 15% of the modal split. The infrastructure available for pedestrians includes pavements, squares and pedestrian pathways. The PMM/2006 forecasts new investments for the improvement and expansion of the existing infrastructure. It is worthwhile to highlight the investments made to renovate the much deteriorated City Centre in order to improve pavement conditions and sanitation. Urban design was explored to create pathways and corners with banks and gardens to make the spaces more attractive and safe for pedestrians.

Furtheremore, some roads were redsigned in order to recover spaces from traffic lanes used only for cars to construct cycling routes and pavements for pedestrians. This picture shows one of those examples. In the City Centre late evening some streets sections are closed for cars and used for walking and cycling, creating a lived public space around restaurants and universities that are open during this period of the day.

Source: From the author

4.2.2.4 Urban Transport Planning Process in Bogotá

a) Actor-network

The process of planning in Bogotá is organised and co-ordinated by the mobility secretary (SDM), following the statements of the National Planning Department (DNP) guidelines, the POT and the PMM. However the urban planning secretary (SDP), which is on the same political and administrative level as the mobility secretary, has authority over specific tasks related to urban transport, regulated by law or by mayoral act. The IDU is in charge of the construction of roads and pavements and public transport infrastructures.

The two secretaries are subordinated to the mayor, who is the main decision-maker for all projects related to urban transport. He possesses ultimate political and administrative authority. As discussed before, the urban master plan and the mobility master plan were adopted under a mayoral act. When a new mayor starts his mandate he has to present a “development plan”. This plan presents the government program for the coming years of his mandate. Besides the measures from the POT and the sectoral plans, according to the law No. 388/97, the mayor can carry out new initiatives and also reformulate the plans. The possibility to come up with new initiatives and the extension of them depends largely on his political ability to convince his counterparts to agree to the new ideas and measures (Morales, 2008, interview).

Figure 62 shows the actors directly involved in the urban transport planning process. The planning secretary has the task of evaluating all projects that have an impact on land use. The secretary gives the license for construction and is in charge of the execution of the POT.

The mobility secretary, besides being in general co-ordination of the planning process (execution of the PMM), is in charge of the contracts with the public transport operators and the co-ordination of the public company Transmilenio and the IDU, and is in charge of public and private transport planning. The IDU is responsible for urban transport infrastructure planning in all phases of the planning process, except the decision phase.

The plans are developed by technicians from the institutions involved, and also consultants are contracted for specific projects. There are no permanent commissions or committees in charge of urban transport planning in Bogotá.

The participation of the general public is represented through the city council. The council can present "acuerdos"[64] (agreements) related to urban transport for specific matters. Additionally the general public have the "call centres"[65] of the public institutions at their disposal. Organised groups can participate through their association or NGO[66]. Participation occurs with the announcement of important specific projects. The meetings and special commissions are organised according to the subject or with communities and entities that receive the impact of a project.

[64] In Bogotá the city council does not present or vote on laws. The legal documents resulting from its work are called "agreements". The agreements give guidance to the mayor relating to specific matters of interest to the population. The legal documents from the mayor are the "Decretos" (Acts). The laws are voted on by the federal parliament.

[65] The call centres are run by the communitarian departments of the public institutions. The general public can give their opinions or ask for services from the responsible departments. The matters are evaluated and answers are given. The departments' staff analyse the solicitations and can agree with them or not. It depends on technical or political convenience (Morales, 2008, interview).

[66] Non Governmental Organisation.

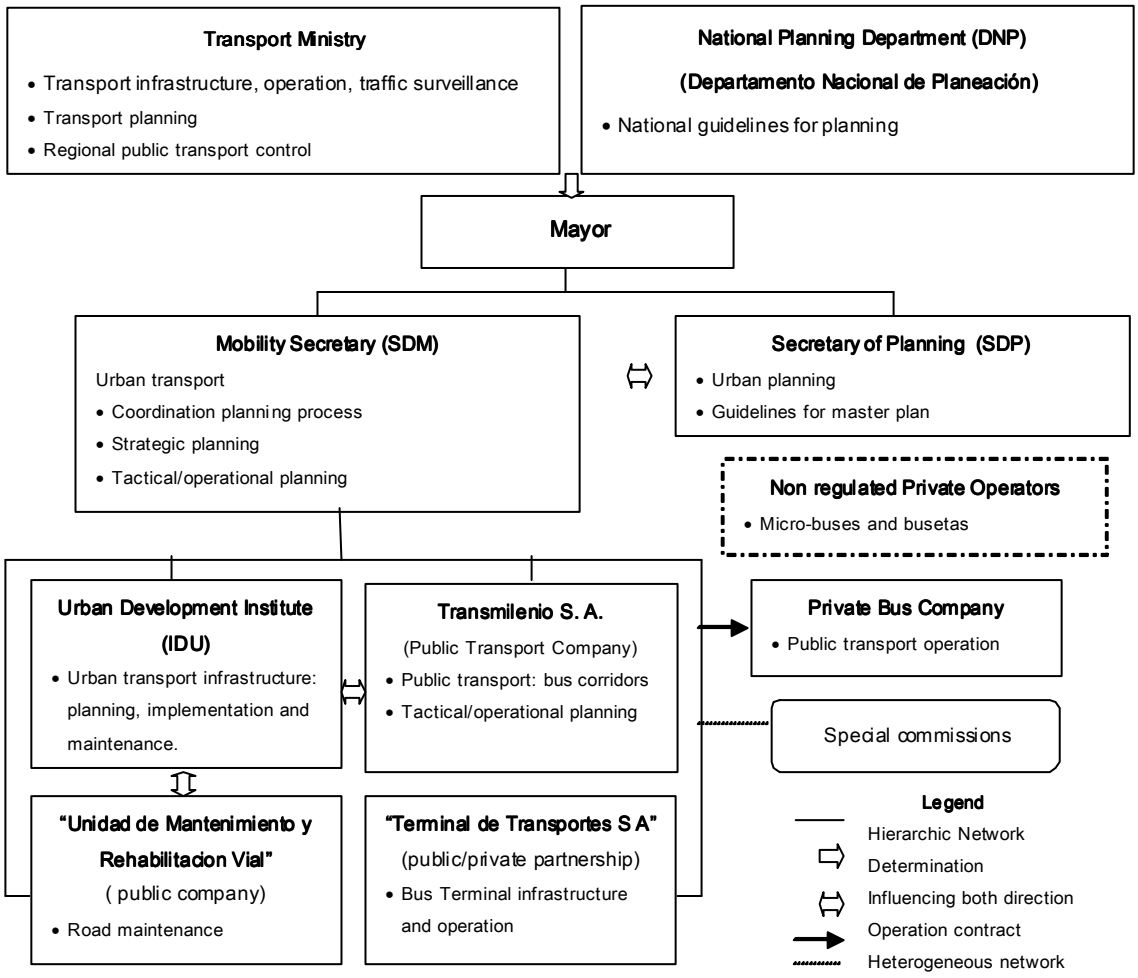


Figure 62: Urban transport planning processes in Bogotá: Actors. Source: from the author

b) Information

Information used for planning in Bogotá is mainly based on the development plan, master plan and mobility plan, the legislation from the three government levels, the data from the public institutions (statistics, norms, internal manuals) and additionally, the projects developed by the public institutions or by consulting companies.

4.2.2.4.1 Strategic Level

The actors involved in the process of planning at the strategic level are shown in Figure 62 above. At this level the mobility secretary coordinates the planning process. However, some projects are the responsibility of the IDU in terms of the examination of measures and the implementation phases - mainly projects relating to public and private transport infrastructure. Transmilenio is in charge of planning high capacity public transport by bus, under the co-ordination of SDM.

It is important to mention the strong participation of the federal government at the strategic level in Bogotá. The fundamental basis is that the federal level affords 70% of the investments for high capacity public transport in Colombia. The decisions about the investments are taken in the COMPES (Consejo Nacional e Politica Economica e Sociales). The COMPES comprises the

ministries of different areas and its head is the president of Colombia. Additionally, other projects of infrastructure can also be decided on the COMPES. It depends on the amount of investment and the political consequences of the plan (Morales, 2008, interview).

The mayor is the main decision-maker (This confirms what Ardila-Gomez, 2004, wrote). It also takes political orientation from the political parties and from the federal government to start a plan and to decide on the measures. As the political decisions are taken, the technicians from the public institutions take over the development of the plans.

The plans are based firstly on the development plan, supported by the POT and the PMM. The conflicts are solved mainly on the political level. But the technicians are called by the mayor to support him with technical argumentation.

4.2.2.4.2 Tactical/operational level

The planning process at a tactical/operational level is organised by the institutions, as shown in Figure 63. At the top is the mayor as the main decision-maker. The strategies for planning are held by the mobility secretary. However each institution takes over their tasks at this level with their own technical and administrative resources. The plans follow the guidelines of the MMP and the solutions created by the technicians of the institutions or by contracted consulting.

The IDU leads the planning process relating to urban transport infrastructure. Transmilenio is in charge of planning high capacity public transport by bus. Moreover, public transport by micro-bus and vans (busetas) works independently of the formal planning established by the public institutions and the master plans. The individual operators organise the service themselves. According to Morales (2008, interview) the mobility secretary has already had the initiative to organise the routes and the contracts, but still not succeed in establishing the planning for the service.

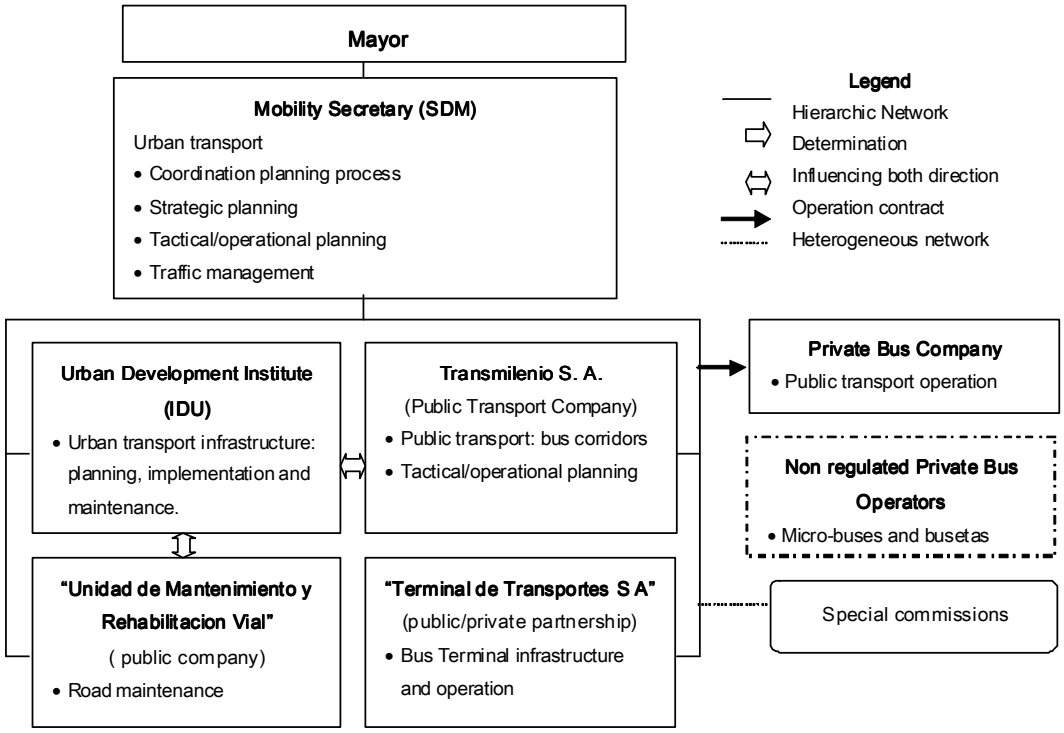


Figure 63: Urban transport planning process in Bogotá: Actors – tactical/operational level. Source: from the author.

4.3 CURITIBA

4.3.1 City Overview

Curitiba is the capital of the state of Paraná, located in the South of Brazil. The municipality has more than 1.7 million inhabitants in an area of 432 km², within a region of 3.3 million inhabitants. Today the population is growing faster than most other cities in Brazil. In 2002 the annual population growth rate was 2.07%, compared with the figure for Paraná state (1.06%) and all of Brazil (1.3%) (IBGE, 2010).

Source: IPPUC (2007)

However, during this decade the growth rate has started to decrease. The population consists mainly of young people aged between 20 and 40 (IBGE, 2010). These numbers, besides the fertility rate, are the result of internal migration. Migrants of diverse origins are attracted to the city by the work offered in commercial and industrial plants. It also attracts temporary residents for the numerous technical schools, research centres and universities.

Curitiba is worldwide recognised by its urban and transport planning, together the solid institutions in charge of them. The city proposed already in the early sixties a co-ordinated urban and transport plan concept, that is known today as Bus Rapid Transit (BRT), what gave the guidelines for the city expansion under the Transit Oriented Development (TOD) concept over the years.

The standard of living in Curitiba is one of the highest in Brazil. In 2002 the city received the prize of “Cidade Sustentavel” (sustainable city) for its special urban conditions, considering social and cultural aspects, thirty-one parks, many squares, green streets, boulevards and avenues, and the “Universidade do Meio Ambiente” (University of the Environment).

Curitiba Metropolitan Region is one of the most developed regions in Brazil with regards to social and economic aspects. Many successful and innovative solutions in the fields of urban development and environment have been initiated in Curitiba. Many industries in the fields of transport (e.g. cars, buses and trucks) and iron, steel and food processing are also located here.

The high percentage of the population with incomes corresponding to the upper and middle classes gives Curitiba a special position in the regional market (Curitibasa, 2007). As a result of the high incomes, the demand for products and services generates constantly high activities in production and commerce. The city also receives a large number of visitors for business, tourism, health care, shopping and other services.

All these aspects together bring about special challenges for urban and transport planners: the city needs to find solutions for the many problems relating to its rapid growth in a changing environment, keeping in mind avoiding to loose the gains of the past.

4.3.2 Urban Transport

4.3.2.1 Political and administrative organisation

Brazil is a presidential federal republic, organised in three autonomous government levels (political and administrative): federal, state and municipal (Figure 64). The Federal Constitution of 1988 (CF/88) establishes the obligatory tasks for each level. Furthermore, the states have their own constitutions and the municipalities have what is called the organic law (a form of municipal constitution). These laws establish the political and administrative organisation of the territory based on the tasks coming from the CF/88 and create others according to local needs and interests, since they are not in conflict with the federal constitution.

The CF/88 distributes the basic responsibilities of transport of passengers and freight to the three government levels that exist in Brazil (Figure 64). Urban transport comes under the responsibility of the municipal government's level according to Art.30 (CF/88). The CF/88 declares that public transport is essential[67] and is the priority for investments in transport. The Federal Law 12,587/2012 displays the guidelines, principles and concepts for urban mobility within the Brazilian territory. These rules must to be followed for the establishment of public policies and obligates the cities to develop and approve the mobility plan in their municipal parliaments. The law also states the obligation of public discussion and participation for the development of the plans.

Additionally, Art.183 (CF/88) determines that the municipalities are responsible for urban planning and development. The cities have the authority over their territory and have to organise it. The Federal Law no. 10,257 of 2004, called "Cities Statute" is the regulation for this matter. This law displays the guidelines for urban development and states the rules and requirements for writing a city master plan and the sectoral plans. All those with populations over 20 thousand inhabitants must present and approve an urban master plan in their municipal parliaments. The Ministry of Cities is in charge of the execution of this law and of the establishment of general guidelines for urban planning. This Ministry also funds special urban strategic projects (projects with high social, economical and environmental impacts).

Within the Ministry of Cities is found the National Traffic Department (DENATRAN). This department is the highest authority of traffic regulation and administration in Brazil. It is responsible for implementing the federal traffic laws and the decisions of the National Traffic Council (CONTRAN). Additionally, DENATRAN is responsible for the national data bases of traffic statistics and also for operation and surveillance on federal roads.

In 1997 the Brazilian Traffic Code (CTB, Law 9,503/1997) was approved by the federal parliament, setting the framework for the organisation, management, surveillance and signalling of road traffic involving all three government levels. The CTB determined the financial schema

[67] The mayor has the personal responsibility of providing public transport for everyone, and must observe the principles of continuity and universality.

covering the three government levels and also created the legal support for technical and administrative cooperation among the levels and public institutions for developing transport infrastructure and services.

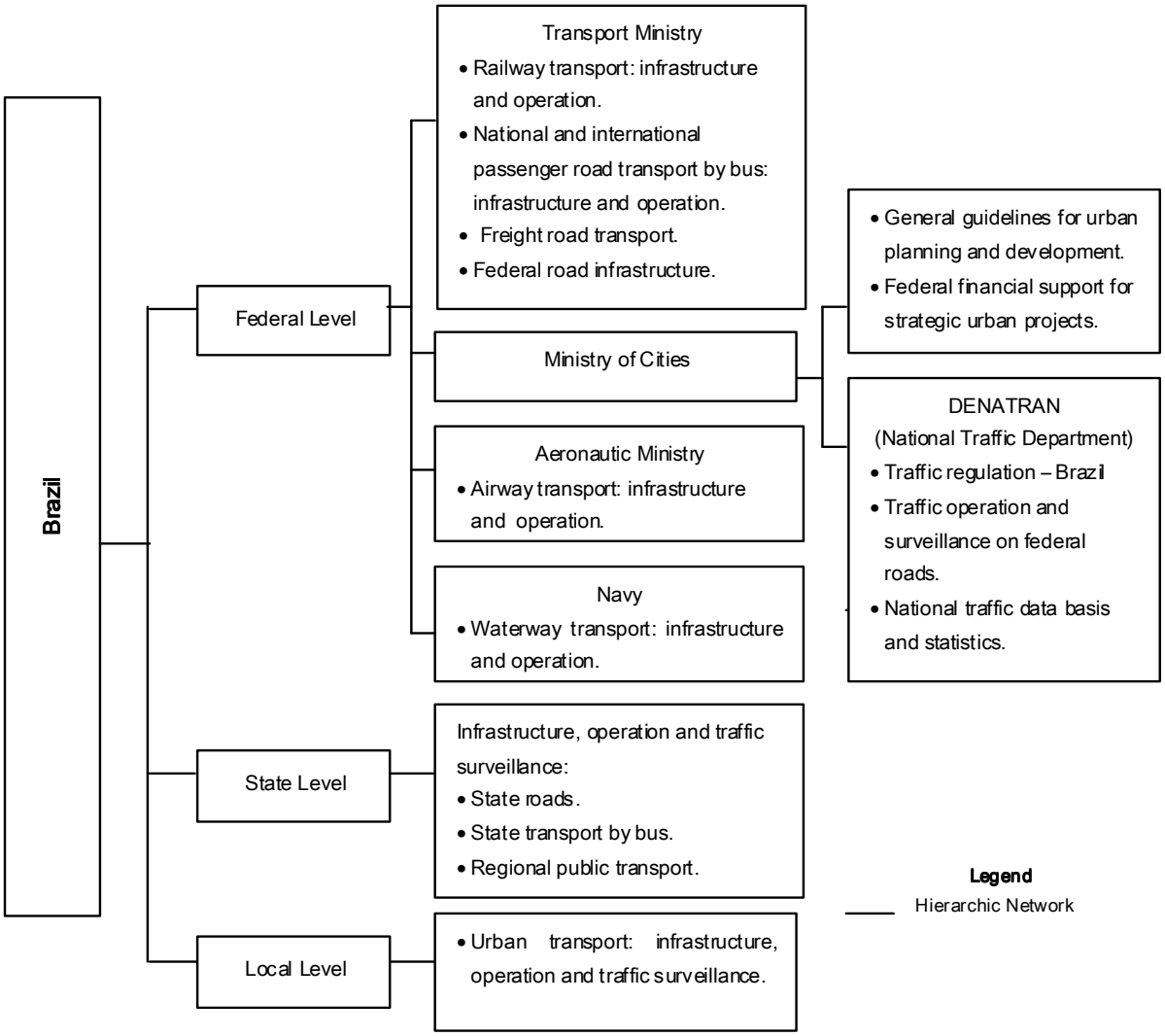


Figure 64: Transport in Brazil: distribution of responsibilities for government levels. Source: from the author.

Each state controls long distance passenger road transport operation and infrastructure in their territory and in their metropolitan regions. In the metropolitan regions the states are also responsible for the regional metro operation and infrastructure.

The three government levels are autonomous in administration and decision-making regarding their specific tasks, but the CF/88 allows new regulations in order to create cooperation amongst the levels for supplying services and infrastructure for the population. The matter is regulated by the Consortium Law no. 11,107 of 2005. According to this law, responsibilities and services can be transferred to other government levels or public institutions using a co-operation agreement or by composing a consortium among different governments to develop specific tasks or services. This legal instrument is very often used by the municipalities as it gives flexibility for the government to create solutions to solve transboundary problems of urban transport or of other areas of the municipal administration. It is possible to develop plans,

operate services or implement infrastructure, for instance by constructing or operating a road intersection (when a federal road crosses an urban area for example), planning and operating urban transport and others (Gonçalves & Couto, 2007).

In Curitiba two institutions are responsible for all activities concerned with the organisation, planning and implementation of measures, and the operation of urban transport. One is the "Instituto de Pesquisa e Planejamento Urbano de Curitiba" (IPPUC – Curitiba Research and Urban Planning Institute) and the other is the urban and regional transport company "Urbanização de Curitiba S. A." (URBS). These institutions are public companies and belong to the municipality of Curitiba. They were founded in 1965 with the objective of implementing the master plan for the city.

Figure 65 shows the institutions responsible for urban transport in Curitiba.

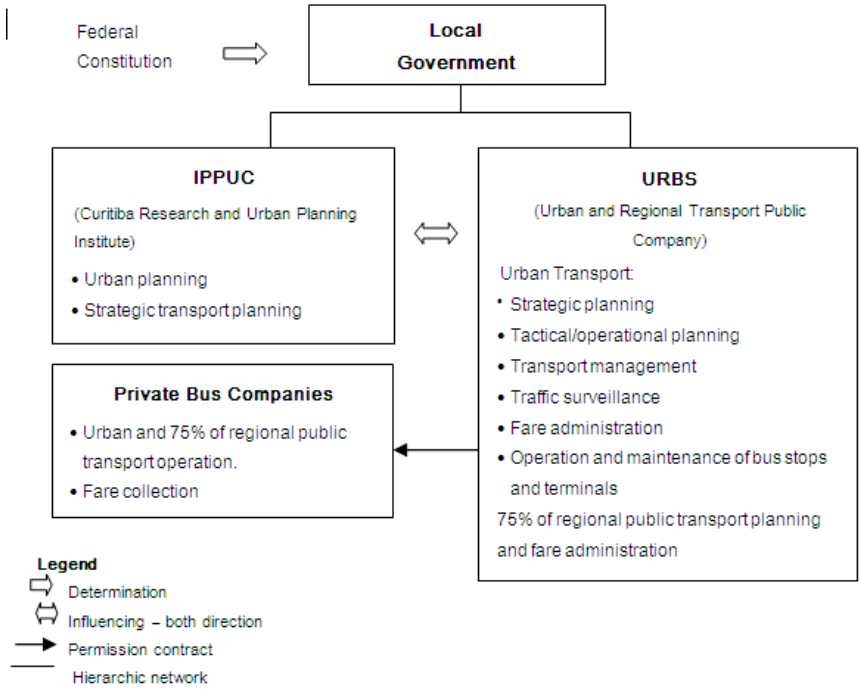


Figure 65: Urban Transport Organisation in Curitiba. Source: from the author.

The IPPUC is responsible for urban planning in general. The responsibility of urban transport planning is shared with the URBS. Strategic transport planning is coordinated by IPPUC and it has URBS support in supervising the development of technical concepts and the implementation of measures. The remaining activities of urban transport are taken over by the URBS.

In managing public transport the local government, represented by the municipal company URBS has the following tasks: planning and implementing measures, fare administration, operation and maintenance of the bus terminals and bus stops, regulation of transport operation and traffic surveillance. The operation of bus services is under the direct responsibility of the URBS, which hires private companies through "permission" contracts. The regulation is voted on by the local parliament.

Besides URBS responsibility of local urban transport, in 1996 it took over 75 percent[68] of public transport operation and infrastructure in the metropolitan region. The government of the State of Paraná transferred the activities of planning, management, surveillance and operation to the URBS on the basis of a government cooperation agreement (Consortium). The agreement was based on technical and financial justification. For one hand they wanted to develop an integrated public transport network for the entire region and on the other hand to use the technical and financial existing capacity of URBS on managing, planning and operating urban transport, in a way to optimise costs and quality for the services (interviews, 2007, 2008).

4.3.2.2 Planning – 1943 to 2007

Curitiba was established in the seventeenth century at a cross-section of roads connecting the North to the South of Brazil and connecting the West of the country and Paraguay to the harbours on the Atlantic coast. In the beginning the city experienced spontaneous growth. The increase of the population over the last century with immigration coming from Europe and other regions of Brazil motivated the government to plan the city.

In 1943 a French urban planner, Alfred Agache, presented Curitiba´s first comprehensive master plan, known as the "Agache Plan" or the "Plan of the Avenues". This plan designed a circular and centralised city with large avenues, planning the infrastructure for the growth of private transport, following the approach of the main Brazilian cities.

The measures of the Agache Plan were not completely implemented because of the high investments required. At the beginning of the sixties a group of local planners proposed a study to develop a new master plan motivated by the problems the city was facing. Even though the population at that time was only around 400,000 inhabitants, traffic problems had started to increase in the city centre. Additionally, the planners were trying to give a new orientation to the city's growth which was different from the configuration of the first master plan (centralised city) and of other Brazilian capitals. The main examples are the federal capital Brasilia and the state capitals Goiania and Belo Horizonte. These cities were designed and constructed on new open spaces keeping in mind the concepts of sprawling landscapes, with an infrastructure of roads connecting areas of low density to the downtown core mainly for commuting.

An integrated master plan was developed in 1965. The concepts of the new plan were based on three main pillars: land use, public transport and street network. The three sides of the triangle are environment, social and economic development, towards a sustainable city, as shown in Figure 66 below.

The idea of 'Urban Acupuncture' proposed by the architect Jaime Lerner (Landry, 2008, p.377) directed the attention on the rehabilitation and the intervation in the specific areas within the urban tissue, especially in the city centre. The areas were chosen according to the level of impact the measures could bring to improve the urban development.

[68] The cities of the metropolitan region of Curitiba served by the cooperation agreement represent around 75% of services provided daily by public transport for the entire region.

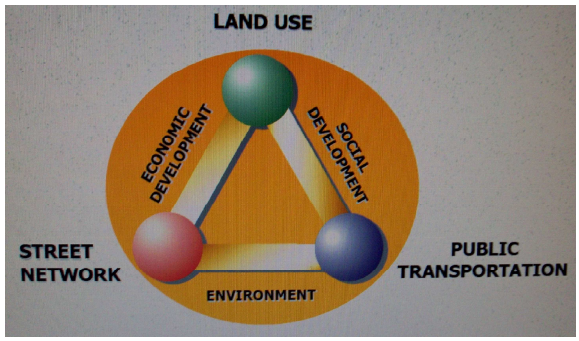


Figure 66: Curitiba´s Master Plan from 1965: basic concept. Source: IPUC (2007).

This plan changed the concept of the centralised city to a linear development along structural axes (Figure 67), designing a Transit Oriented Development (TOD). The transport axes are the instruments that give direction to the proposed development and the basic design to the city. Land use is organised using the transport structure as a basis. Figure 67 shows a typical cross section of the axis. In the centre of the axis is the mixed-use "structural sector" (a set of roads and bus stations) and high-rise buildings. Away from the centre the land use zones are organised into residential zones (ZR)[69], combining commercial and service uses, decreasing in density with increasing distance from the structural sector.

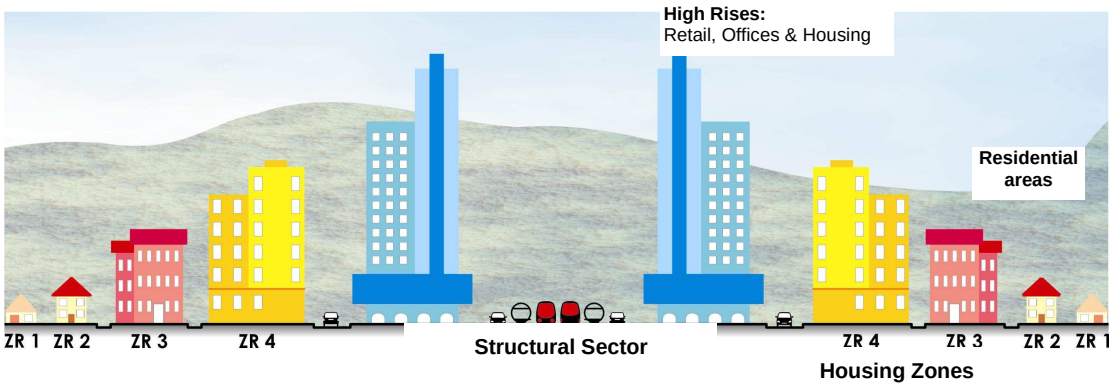


Figure 67: Typical cross-section schema of a structural development axis: land uses and densities Source: adapted from URBS (2007).

The details in Figure 68 and 65 show a schema of the structural axes designed as a threefold road system. It is composed by the structural sector in the centre of the axis and by two one-way roads in parallel, a block away from the centre, defining the highest density in the city.

[69] As the the distance of zones (ZR) increases from the structural sector, where the BRT and the high capacity roads are located, the density of the land use and also the road and public transport capacity decreases as well. The logic is that the highest density is combined with the highst transport capacity – private and public transport. These areas are characterised by mixed land uses, combining residential, commercial and services uses.

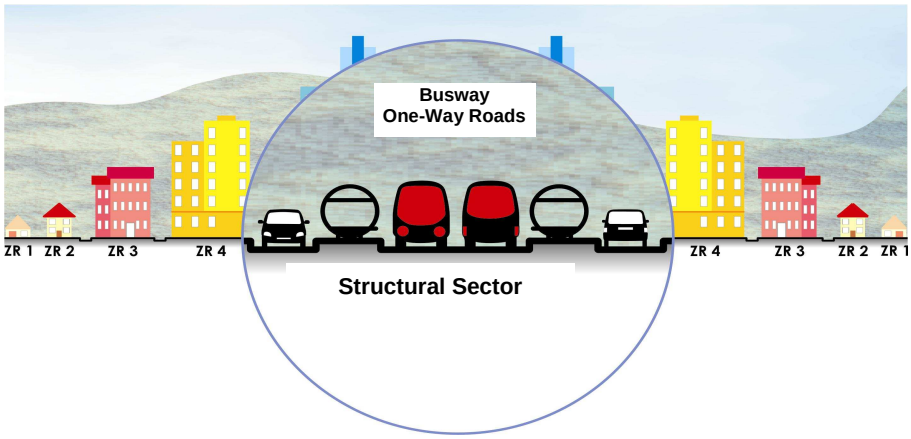


Figure 68: Cross-section schema of structural sector: Bus lanes and one-way roads. Source: adapted from URBS (2007).

Figure 68 shows a cross-section schema detail from the “structural sector”. It is composed of two one-way roads for motorised individual transport plus the bus lanes with two dedicated lanes and the bus stations, known as the “tube station” because its concept was inspired by the London tube.

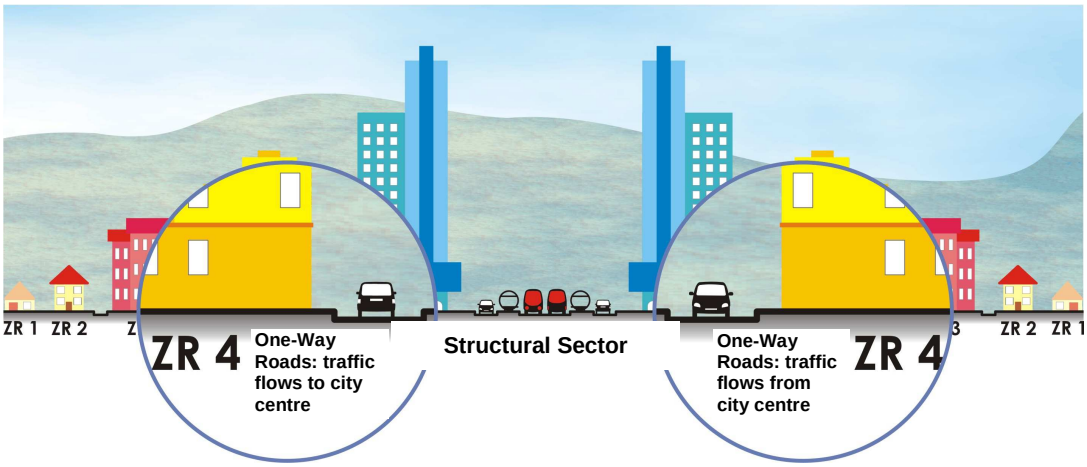


Figure 69: Structural Sector: High capacity roads – neighbourhood access for private and public transport. Source: adapted from URBS (2007).

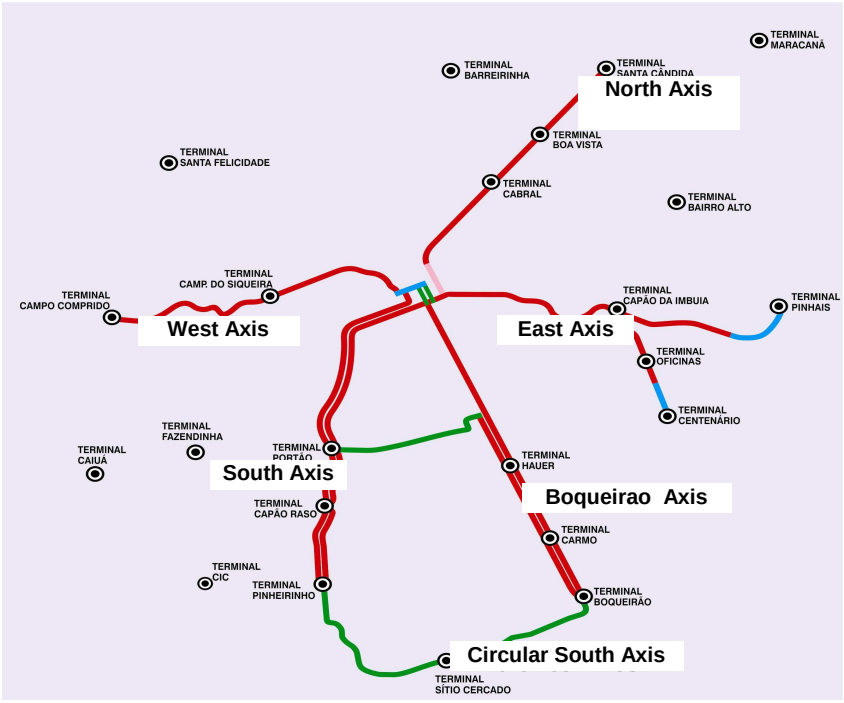
Figure 69 presents in detail a schema of the one-way high capacity roads which are a block away from the structural sector and are used for private and public transport (express service), connecting the neighbourhoods to the city centre.

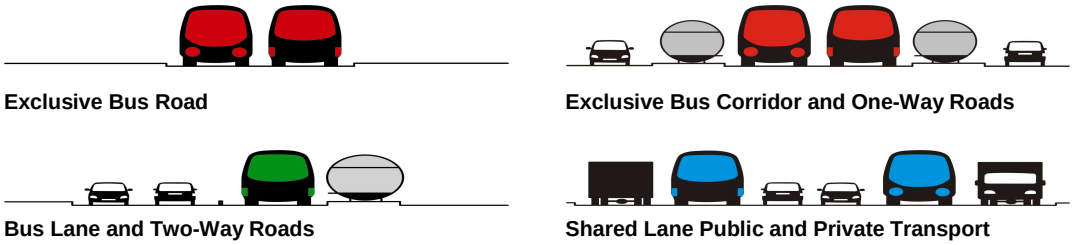
The threefold road system offers high capacity for public (BRT passengers/hour/direction) and private transport. According to Figure 68 and 65 it serves the highest density of land use. On the structural sector the construction of the highest buildings is allowed (without a limitation of number of floors), with retail-commercial facilities on the ground and first floors. The remaining floors can be used for offices and housing.

Moving away from the structural sector there is a decrease in density in the land use zones. In the nearest zone ZR4 (residential zone 4) the buildings are limited to a minimum of 8 floors and a maximum of 12 floors. Also, the high capacity roads give way to smaller local streets. From ZR3 zone (three to five floors) to ZR1 (restricts floor area to the size of the plot), land use is restricted for residential areas with the possibility for local retailers, such as grocers and other small shopkeepers, to set up business (URBS & IPPUC, 2007, interviews).

The integrated master plan designed in 1965 started its implementation only in 1971. At that time the Mobility Plan "Plano de Mobilidade" (PLAMOB) was developed along with the political conditions suitable for its implementation. In 1974 the first 20 kilometres of infrastructure for the structural axis was opened in Curitiba. This axis is the structural North and South axis (Figure 70) and it began to form the Bus Rapid Transit Network (BRT).

Figure 70 shows a schema of the different designs of the structural axes existing in Curitiba. Their implementation was done in five stages from 1974 to 1982. The evolution of the road infrastructure (bus lanes and private transport roads) in each axis was designed according to the technical requirements and availability of land.





Exclusive Bus Road

Exclusive Bus Corridor and One-Way Roads

Bus Lane and Two-Way Roads

Shared Lane Public and Private Transport

Figure 70: Structural transport axes in Curitiba and the design of different cross-sections. Source: URBS (2007).

- Exclusive bus road: two exclusive lanes for articulated buses;

- Exclusive bus corridors and one-way roads: these combine the exclusive bus road in the centre with two lanes for high-capacity buses, flanked by two one-way roads for private transport, providing direct access to buildings;
- Bus lanes and two-way roads: high-capacity buses and private transport run on the same road in both directions, using exclusive lanes;
- Shared lanes: public and private transport run on the same road in both directions.

Figure 71 gives us an impression of the result of fifty years of planning. It is possible to see that the shape of the city is exactly as it was planned in 1965. Around the main axes there are the highest buildings, and the density decreases as one moves away from them. Today, 10% of the whole population of Curitiba lives on the structural axes. And from the city centre to the North, 70% of the space around the axis is already occupied and the South offers possibilities for new constructions, as we can see in Figure 71 below.

North View

South View

Figure 71: Linear development: View of the structural axes North and South. Source: URBS (2007).

According to Ceneviva (2007, interview), the urban form is a result of the implementation of the measures foreseen in the plans driven by the urban development concept shown in Figure 66: the integration between economic and social development, environment and transport as a basic concept for city development. Moreover, the solid technical and administrative bases established by IPPUC and URBS follow the rules of the application of the plans.

Curitiba´s mobility plan has evolved continuously, creating a culture of urban transport planning for the city where public transport and non-motorised transport have priority for investments. The responsible institutions (IPPUC and URBS) have received political and technical support throughout the years. According to Cervero´s (1998) evaluation:

> "One of the best, most sustainable transit systems anywhere today flourishes in Curitiba, a medium-sized city metropolis in southern Brazil. A remarkably efficient all-bus network has evolved that blends the very best features of a metro and conventional transit using surface streets – a veritable surface metro."

The sustainability presented over the years has received the support of the population. Ceneviva said: "um conceito e uma estrutura de planejamento foram criados para a cidade e a

população se tornou os reais proprietátios dos mesmos"[70] (Interview, 2007). The population accepted the city plan as an urban solution and the planners used it as a basis for the development and implementation of the measures.

4.3.2.2.1 Urban Master Plan of 2004

In 2004 the Law No. 11,266/2004 was approved by the municipal parliament. This law forms the regulation of the Curitiba urban master plan. The objective of this revision to the plan was to reconcile the old plan with the new statements of the federal Law No. 10.257/2001, the so-called "Cities Statute" (Estatuto da Cidade).

The plan establishes the policies and guidelines for the urban development of Curitiba and the connection to the metropolitan region. It

> "Complementa as diretrizes estabelecidas no Plano Preliminar de Urbanismo e no Plano Diretor de Curitiba, instituído pela Lei nº 2828, de 10 de agosto de 1.966, e incorpora as políticas e diretrizes propostas e sucessivamente implantadas no Município, em conformidade com as orientações estabelecidas para o desenvolvimento das etapas de implantação do Plano Diretor de Curitiba" [71] (Curitiba, 2004, Art. 2º).

In the section "Urban and Environment Policies" can be found the chapters "Urban Structuring" and "Urban Mobility and Transport". Art.9 establishes the guidelines for urban structuring concerning land use, densification and the shape of the urban tissue. Item 1 determines that the planning ought to "consolidar a conformação linear de crescimento e adensamento da Cidade com a integração do uso do solo, sistema viário e transportes, respeitando as restrições ambientais e estimulando os aspectos sociais e econômicos"[72] (Curitiba, 2004, Art. 9º).

The chapter "Urban Mobility and Transport" establishes the general guidelines for the urban transport of passengers and freights. It reaffirms the structural axes for private and public transport according the plan of 1966. Additionally, it establishes the general concepts for the structuring of the public transport network defined as a macro-hierarchy of the network in the urban space and the connections to the metropolitan region. The main guidelines for urban transport are based on two principles: firstly, the prioritisation of public transport in the transport network; and secondly the expansion of the integrated network into the metropolitan region where it is not served today.

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[70] In English: "A concept and a planning structure were created and the population became the real owners of the planned city".

[71] In English: Expands the guidelines established in the preliminary urban plan and in the urban master plan, approved by the Law 2828, of 10th August 1966, and incorporates the proposed policies and guidelines implemented in the municipality, in accordance to the orientations established for the development of the implementation phases of Curitiba's master plan.

[72] In English: Consolidate the linear growth and densification of the city, integrating land use, road infrastructure and transport, respecting the environmental constraints and promoting the social and economic aspects.

4.3.2.2.2 Urban transport Master Plan of 2008 (Plano de Mobilidade Urbana e Transporte Integrado – PlanMob Curitiba)

The urban transport master plan (PlanMob/08) was a designation of the urban master plan as one of the sectoral plans for the city. The main objective was to present the specific guidelines and rules for the organisation and operation of urban transport. The PlanMob "é um documento que consolida as políticas urbanas setoriais estratégicas para o desenvolvimento da cidade"[73] (Curitiba/2008).

Having as a backbone the urban master plan and the guidelines of the federal "cities statute", the PlanMob/08 presents a summary and possible future scenarios for urban transport in Curitiba and its metropolitan region. The plan also presents guidelines for the institutional organisation, and goals and measures to be accomplished by the year 2020.

The development of the plan was coordinated by the IPPUC. A work group was organised with technicians from the URBS and other municipal departments, and with the special participation of technicians from the state and federal governments for specific issues. The public's participation was involved through the creation of a thematic camera in the IPPUC Advisory Council (Conselho Consultivo do IPPUC – CONSECON).

The focus of the PlanMob Curitiba is the metropolitan region. It is organised into four main areas:

- Accessibility: understood as the ability to have free access to all areas of the city for diverse purposes, using one of the means of transport available, with efficiency and efficacy. The focus is the universal accessibility for all the population, with elimination of any barriers for those with less ability to move with autonomy, giving especial attention to the availability of information.
- Transport infrastructure and traffic engineering.
- Public Transport: focus on the prioritisation of public transport in the transport network, optimisation of the integrated network (RIT), implementation of the metro in the North/South axis and the enlargement of the RIT in the Curitiba metropolitan region.
- Freight transport: determining obligatory and preferential routes for freight transport in Curitiba and its metropolitan region, minimising the impact of freight railway in the urban area, zoning and reorganisation of the freight distribution centres, promoting the integration of these centres into the national and international freight terminals (airway, maritime and railway).

The PlanMob was developed following organisation into four phases:

- Phase of problem analysis – diagnosis;

[73]In English: Is a document that consolidates the strategic sectoral urban policies for the development of the city.

- Phase of examination of measures – the assessment of scenarios and alternatives;
- Preliminary proposal – presentation to the population: the plan was displayed for a month to the population for open discussion, to receive suggestions for improvements in the final version;
- Final proposal – decision-making and final approval by the parliament in 2008.

4.3.2.3 The Urban Transport Network

4.3.2.3.1 Public Transport

The public transport network was designed according to the transport master plan of 1965, which was reviewed in 1971. The network has evolved continuously since 1974 when the operation of the first bus corridor (BRT) started. Today 40 percent[74] of all journeys in Curitiba are made on public transport.

Public transport in Curitiba operates only on the basis of bus technology. The integrated urban and regional transport network was designed combining different types of buses for each specific type of line. For each type of line a specific type of bus was designed, according to its operational characteristics: capacity, internal and external lay-out, and bus stops. The lines work as an integrated transport network (RIT[75]) covering the whole area of the city and the municipalities from the metropolitan region part of the consortium. Figure 72 shows a schema of the different types of lines operating today in Curitiba.

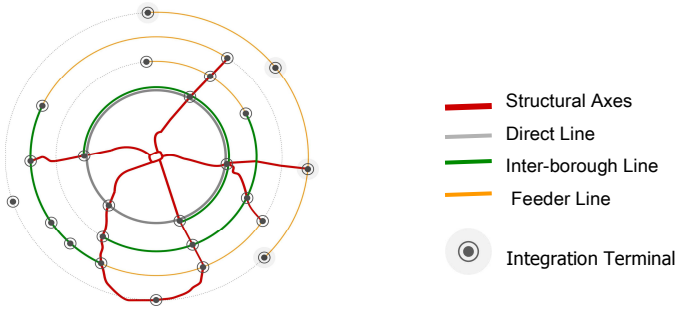


Figure 72 – Integrated public transport network in Curitiba. Source: adapted from URBS, (2007).

The setting of fares in Curitiba follows the guidelines and general mobility concept established for most of the Brazilian cities. It involves a single price covering the whole urban area, called the “social fare”. The federal constitution guarantees that all citizens have the right to move freely. The local government has to provide public transport for everyone who needs it, even if they cannot pay for the trip. Moreover, it should be considered that in Brazilian cities the highest percentage of public transport users live in residential areas located on the peripheral urban

[74] Mobility data from the case study areas is shown in Annex 1.

[75] RIT is the acronym for “Rede Integrada de Transportes” (integrated transit network). It is the original name for the public transport network of Curitiba.

zones[76], and most of them belong to the lowest income classes. Furtheremore, the highest transport cost is for transporting people living in these zones.

Constrained by their limited budget and the lack of subsidies, the solution for the cities was to transfer the costs from those with lower incomes to those with higher incomes. This was possible using a kind of crossed subsidy in which the fare has a single price for the entire area of the city. The people with the highest income make the shortest trips and fewer transfers, but have to pay the same price for a ticket. In the end the costs are distributed and covered by all the income groups. This is possible because the public company URBS controls the budget, the revenue and the costs. The private companies are paid per kilometre of service, considering their costs and a fixed profit rate.

The private bus operators are in charge of fare collections. Ultimately the bus companies transfer their daily revenues to the trust fund run by the URBS, which is the company responsible for the administration of the total budget and its distribution amongst the bus companies.

Fare payment uses pre-paid contact-less smartcard technology. The cards are charged at nearby ticket booths and automatically debited at the turnstiles. The cards are purchased inside the public transport stations or in specific shops. Turnstiles are used to direct passenger flow and automatically charge the contact-less card. The fare is discounted at the point of first entry into the public transport system. Afterwards the passenger can transfer freely, as much as is needed, among all lines connected to the RIT. The condition for the free transfer is that the passenger cannot leave the bus outside the terminals or the tube station.

Figure 73 shows a bus corridor and a tube station in Curitiba.

Figure 73 Structural axis: tube station. Source: from the author

Today the city centre is the final destination for only 30% of passengers. In 1974, the figure was 93% travelling to the central area (URBS, 2007). This behaviour changed along with the changing shape of the city, according to the concept of linear city (TOD). The growth of the

[76] Different from cities located in the most developed countries, in Brazil many settlements designated to the lowest income people were historically constructed in the city's outskirts, many times disconnected of the urban tissue, leaving in between the so-called leap-frogs, or empty spaces. Therefore, they need to travel long distances for commuting or for other activities in the city Centres.

commercial and service areas (Figure 73) located along the main axes caused a decrease in trips to the central area. Also in some bus terminals there are facilities to attract the users, such as the "Rua da Cidadania" (a multi service area, banks, etc.).

e) Taxi

The taxis system is managed by URBS, who gives permission to private individual operators to serve the population. The services are regularly monitored by the transport authority. They have fixed stops at regulated parking spaces. The fare is calculated by URBS and monitored electronically. The services has high acceptance by the population due the availability, reliability and affordable prices.

4.3.2.3.2 Private Transport

a) Motorised individual transport

In Curitiba the modal split shows that 22% of trips are made by car. The city has a fleet of around 1 million vehicles. The average number of inhabitants per private car is 2.5. (about 507 cars per 1000 inhabitants) The speed limit of the main axes and sectoral roads (Table 26) is 60 km/h. The road infrastructure is classified according to Table 26 below.

Table 26: Curitiba road classification.

Road Infrastructure Classification			
Type	**Location**	**Function**	**Use**
Structural Roads – priority connection	Municipality area. Main structural axes.	Urban connections between structural sectors. Concentration of commerce and service.	High capacity corridors for private and public transport.
Sectoral Roads	Connection between regions	Connection between municipality regions, neighbouring counties, central and peripheral areas. Articulation with the structural axes.	High capacity private and public transport.
Collecting Roads 1	Within the neighbourhoods.	Distribution between local and sectoral roads. They concentrate the local services and retailers, such as groceries and small shops.	Private and public transport. Light cargo. Cycling.
Collecting Roads 2	Within the neighbourhoods.	Local traffic distribution within the neighbourhoods, characterised by low speeds.	Private transport and cycling.
Collecting Roads 3	Periphery zones	Internal connection within the social districts, focusing their use on the specific interests of the region.	Private and public transport. Cycling.

Source: adapted from Law no. 9.800/2000 (Curitiba, 2008).

b) Cycling

There are around 140 km of cycle routes in Curitiba. The main cycle network in Curitiba has the function of connecting the thirty-one parks of the city. But there are also cycle routes on other streets through the city. The data shows that 5% of trips in Curitiba are made by bicycle. The main purposes of these trips are work and leisure.

c) Walking

In Curitiba 21% of the modal split is walking. The first exclusive pedestrian zone was “Rua das Flores” (Flowers Street), constructed in 1972. This street became a concept for the other pedestrian areas in the city. It was a symbol of the new urban concept implemented in the seventies by the architect Jaime Lerner, the mayor of Curitiba at that time. Cervero, (1998, p.265) describes this event: “the fastest, simplest thing that could be done in implementing the Master Plan was to convert downtown streets to pedestrian ways.” At the time, this measure was strongly opposed by retailers, but they could not stop the decision. Their influence was small, as Brazil was less democratic at that time, and was in fact a military dictatorship. Today the plan has the broad acceptance of the population and commercial owners.

Source: IPPUC, 2007

4.3.2.4 Urban Transport Planning Process in Curitiba

a) Actor-network

A combination of various experts from the public institution URBS, which is in charge of urban transport in the city, and the urban planning organisation IPPUC, are responsible for urban transport planning. On a strategic level the work is done by a team composed of both institutions, IPPUC and URBS. The tactical/operational level is under the responsibility of URBS.

Permanent commissions or committees do not exist. Public participation occurs through public audience or periodical surveys. The planners develop the measures and make the analysis. During the process they can also invite related municipal departments or other institutions to participate at round tables, analysing documents and the impacts of the measures or, if necessary, promoting workshops or seminaries. These meetings are not legally formalised by any kind of formal organisation or legal support.

The sequence of actions and decisions in the “problem analysis”, “examination of measures”, “implementation” and “evaluation” phases, are carried out by IPPUC and URBS, following the Master Plan and their technical manuals. During the “decision” phase, the mayor and politicians (city council, deputies and other political representatives) become active on a strategic level. The mayor is the decision maker but the politicians can ask for the evaluation of the projects before the final decision. Additionally, at this level, at the end of the process, the measures are presented to the population through public audience. At the technical/operational level the planning process is carried out by the technicians from URBS and at the end of the process the measures can be discussed with representatives of the affected municipality region and with the private bus company.

Thereby, the discussions during the public audience and the meetings with the private bus company and the municipality regions do not have the power to change the plan. Improvements

can be done using the results of the meetings. However, the main objective is to inform the companies and the population about the new measures before the implementation.

Figure 74 below shows the actors involved in the planning process in Curitiba.

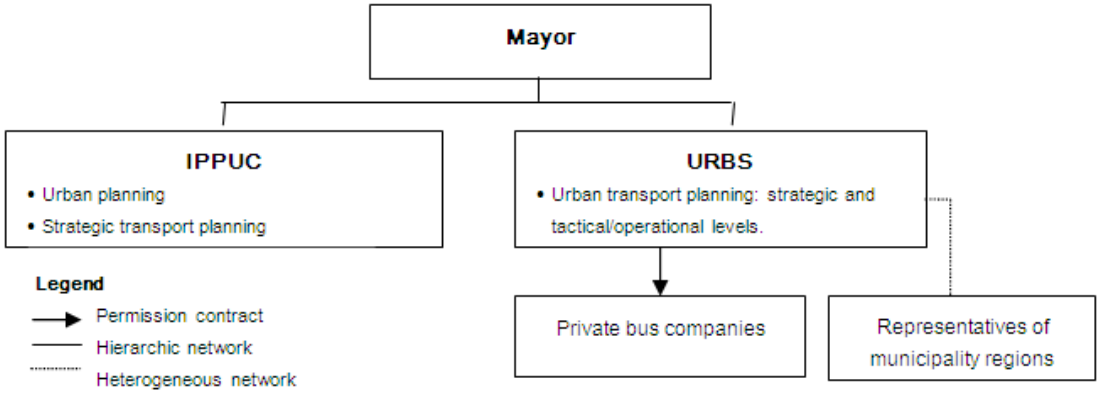


Figure 74: Urban transport planning process in Curitiba: Actors. Source: from the author.

To understand the concept of planning in Curitiba, one has to take into account the participation of the two institutions mentioned in Figure 74 above. They have attracted strong support in the city over the years. Based on this support, the planning process is being developed and implemented. Cervero (1998, p.265) analyses the way of thinking and deciding in Curitiba as follows:

> "Curitiba´s world-class bus system is a product of many ad hoc, incremental decisions – most aimed at doing things quickly, pragmatically, and at an affordable price. Guiding these decisions, however, was an overarching vision of the future [...]. While important decisions were made piecemeal, a clear vision of the future ensured that they added up to something meaningful, combining this with the political adroitness and dedication of activists."

To start the process at the strategic level, the first input comes from the top. The mayor is the most important decision-maker in the process. At the beginning of the seventies the mayor had more power to make decisions. Brazil had a special political and financing structure, where the mayors of the state capitals were chosen by the President of the Republic, and credits for infrastructure existed. In Curitiba the mayor was an architect and came from IPPUC. Therefore, the local government had good conditions to make drastic decisions and implement the new concept of the urban transport plan.

However, the decisions made did not follow the national orientation that decided for high investments in road construction to support private transport. In Curitiba the decision makers decided to follow the Master Plan and construct a linear transit-oriented city (TOD), based on low cost strategies to design an urban transport network and on technologies developed by local technicians working for the government together with private companies from the region. The main investments in Curitiba were for public transport. It was Curitiba's local government that designed the concept of BRT.

It is important to note that since the seventies there has been very little change in the concept of the urban transport plan. Therefore, the population only checks the new measures that have direct impacts on the various groups within the community. According to the representatives of URBS and IPPUC there was no significant opposition to the measures, considering that concepts for urban transport are a part of the culture of the city.

b) Information

Curitiba has a good data base in operation among its different institutions, and generates technical publications in Portuguese and other languages. This material is available on websites or published in books, brochures, reports and magazines, in electronic or paper versions. The technical publications of IPPUC are an example of this as well as the data base of the Economic Development Company – CURITIBA S.A (municipal company), published in five languages (Portuguese, English, Spanish, German and French) (PMC - Prefeitura Municiapal de Curitiba, 2007).

Also, the technical concepts of urban transport are defined by the technicians of IPPUC and URBS, and presented in the above publications and in the master plan. These concepts together with the internal data bases and statistics are the basis for supporting the development of measures and for making decisions.

4.3.2.4.1 Strategic level

The actors formally involved at the strategic level are the mayor and the two public institutions IPPUC and URBS. The organisation and co-ordination of the process are made by IPPUC and URBS (Figure 75). As mentioned before, there are no commissions or committees working on the urban transport planning process in Curitiba.

In recent years five projects have been developed at the strategic level: urban master plan revision, the urban transport master plan – PlaMob, “Improvements on the existing corridors project”, the “Linha Verde Project” and the “Metro Light Project”. Analysis of these projects (documents, papers, reports, interviews) provided the tools required to understand the urban transport planning process in Curitiba.

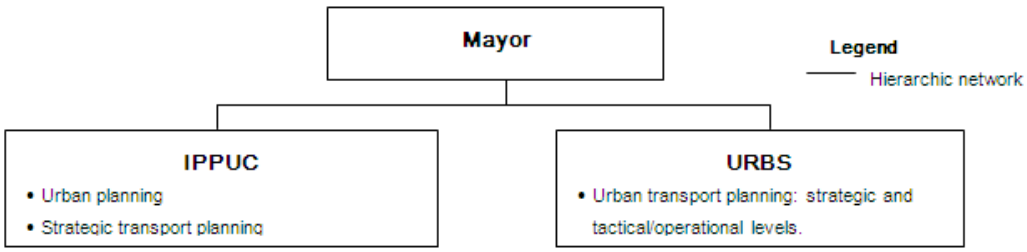


Figure 75: Urban transport planning process in Curitiba: Actors – strategic level. Source: from the author.

The main characteristics of the planning process at the strategic level in Curitiba are summarised in the following three points:

- Phase of pre-orientation: At the start of the process there is always political influence, even if the master and urban transport plans are respected.
- In all phases URBS and IPPUC work together. The technical concepts are established by the technical staff of both institutions and they are followed through the phases of the planning process.
- Phase of decision: the measures are presented first to the mayor and the politicians. Afterwards, they are presented to the population in public audience to inform them and to ensure public validation of the plan.

The analysis of the process showed that the technical institutions are always in control of the plan and lead the process through the phases of planning. There is a unitary decision maker and a low diversity of actors influencing the process. The decisions are made based on the concepts developed by the planners, who have strong influence on the final decision (Ardila-Gomez, 2004)

4.3.2.4.2 Tactical/operational level

URBS controls urban transport planning process at the tactical/operational level. URBS coordinates the planning process during all phases: analyses the problem and carries out the development, implementation and evaluation of the measures. Representatives of the municipality regions and bus companies participate during the decision phase. However, this is the only stage of the process during which these groups participate, the stage in which the proposed plan is presented with the objective of explaining and validating the measures.

At the phase of examination of measures the planners use the master plan, the technical manuals and periodic surveys to support the development of the projects.

Figure 76 below shows the actors involved in the planning process at the tactical/operational level.

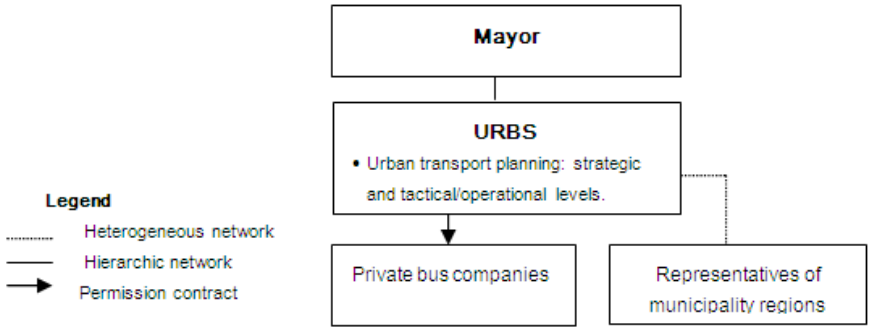


Figure 76: Urban transport planning process in Curitiba: Actors – tactical/operational level. Source: from the author.

4.4 PORTO ALEGRE

4.4.1 City overview


Source: from the author

Porto Alegre is the capital of Rio Grande do Sul, the southernmost state of Brazil. Today 1.4 million inhabitants live in the city, in an area of around 500 km², within a region of 4.0 million inhabitants. The city has one of the highest percentages of elderly people among the population, with 8.3% aged 65 or more, compared to the other Brazilian state capitals, for instance Curitiba with 5.7%, and all of Brazil with 5.8%.

The most important economic sectors in the city are commerce and services, education (there are many secondary and technical schools, faculties and seven universities) and government departments. Porto Alegre metropolitan region has the fourth highest GDP in Brazil. Also, the city is very politically active and forms a formidable voice within the federal government. Most of the Brazilian presidents of the past came from Rio Grande do Sul and formed their political ideas in Porto Alegre.

The city has a strong political tradition, including the frequent participation of citizens at local, regional and national levels. Historically many political and social movements started in Porto Alegre and then spread to other regions of Brazil. “Orçamento participativo” (participative budget) is one such local movement. The World Social Forum also took place in the city on several occasions. Recently, a major event was the “World Conference on the Development of Cities”, promoted by the Brazilian government, UNESCO and other worldwide institutions.

In spite of this background, the city has many problems considering urban development. Plans were presented by different levels of government, but through the years none could solve the main problems concerning land use, urban transport, environment and the social discrepancies between rich and poor.

Concerning urban transport, the city has traditions in the regulation, control and operation of public transport. The public transport company Carris operates bus lines in the city and is one of the oldest bus companies in Brazil. Their innovative solutions in the operation and management of public transport won them national quality awards several times. Also the public company “Empresa de Trens Urbanos de Porto Alegre S. A.” (TRENSURB) that operates the regional metro has been presenting good results for the services and efficiency in the operation, increasing the demand in the last years.

4.4.2 Urban Transport

4.4.2.1 Political and administrative organisation

Transport institutional organisation for Porto Alegre on the highest hierarchy is in accordance to the seccion 3.3.2.1, in this chapter where the city of Curitiba is presented.

In Porto Alegre the three government levels participate in planning and operating local and regional urban transport. The general rule for Brazil is that the state level is responsible for the regional metro. However, in the metropolitan region of Porto Alegre the regional metro is planned and operated by the federal company TRENSURB. The state level, represented through the Foundation of Metropolitan Planning (METROPLAN), is in charge of regional bus operation and planning. These transport systems connect the regional transport network to Porto Alegre urban transport network.

A federal motorway (BR 116), planned and operated by the federal transport ministry, crosses the region. It is the main connection between the North and the South of Brazil and also connects Brazil to Argentina. The major industrialised zones of Brazil are located along the more than three thousand kilometres of this motorway from South to North, generating a high traffic volume and a high traffic density in the urban area. Additionally, the state roads cross the regional area and channel traffic into the centre of Porto Alegre. Finding solutions for the impacts in land use and local mobility and for the advancement of the services within these areas requires an agreement among the three government levels that are responsible for the roads and services.

At the local level, planning, management, infrastructure and the operation of municipal urban transport are under the responsibility of the municipal government, through the Public Company (EPTC). Besides EPTC four more municipal departments are involved in the urban transport planning process: Planning Municipal Secretary (SMP), Decentralised Governance Secretary (SMDGAE), City Strategic Administration (SMGAE) and Accessibility Municipal Secretary (SMGL). The participation of different areas in the process of planning enriches the analysis of the problem and the development of the measures. But on the other hand the process of decision becomes more complex, considering that they have the same level of empowerment and each one is seeking to reach the objectives of their own policies (Interviews, 2007).

Public transport by bus is planned by EPTC and the operation is transferred to private companies by concession contracts and to CARRIS (public bus operator), which operates the main lines and corridors.

Figure 77 below shows the institutions involved in managing urban transport in Porto Alegre and the connections to the metropolitan region.

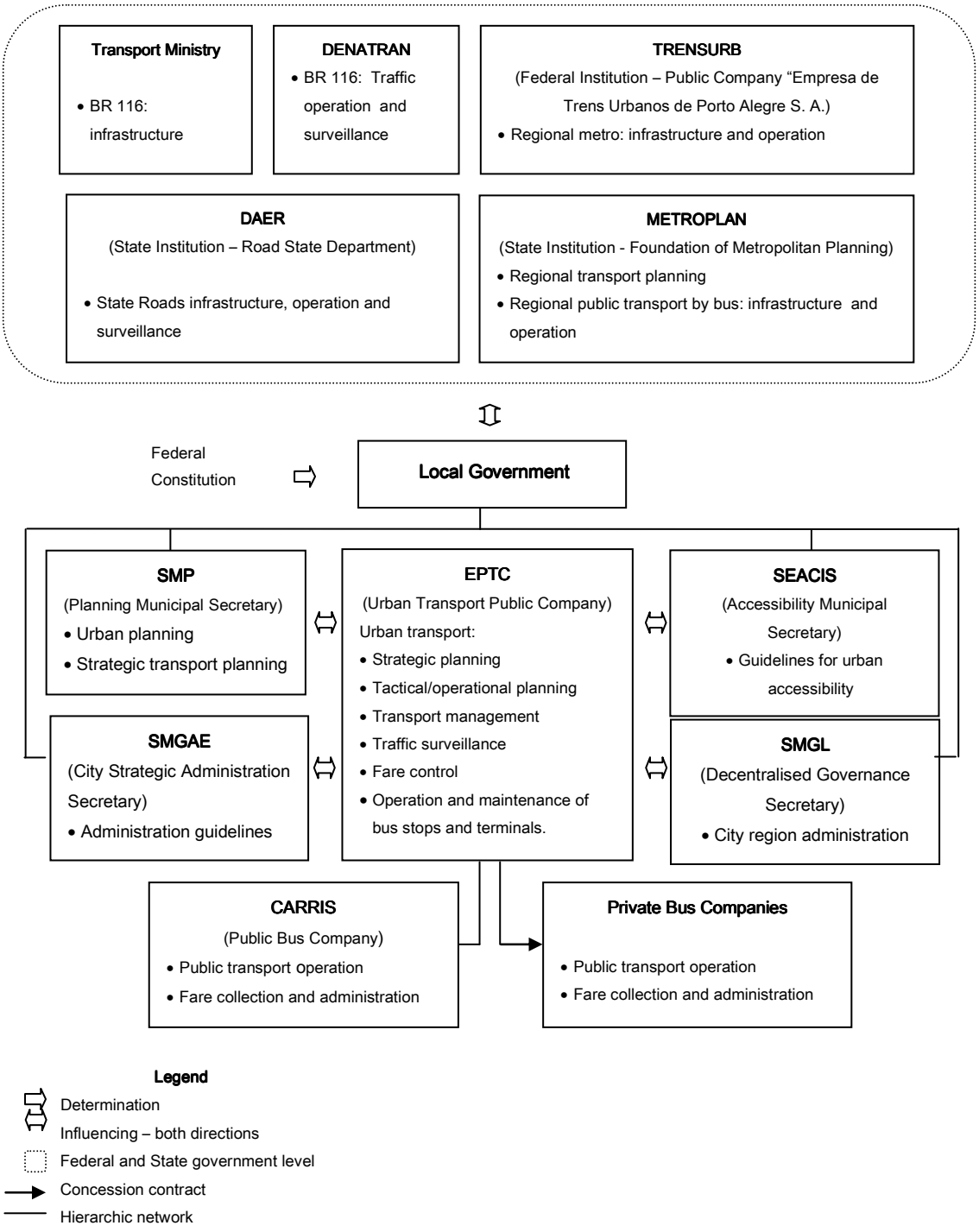


Figure 77: Urban transport organisation in Porto Alegre. Source: from the author.

As well as municipal public transport such as buses, Porto Alegre is served by the regional metro, planned and operated by TRENSURB, and the regional buses planned by METROPLAN and operated by concessionary private bus companies. These services offered by federal and state institutions interfere directly with the urban transport network considering the share of the demand and use of the transport infrastructure. The city has to provide infrastructure (for instance, roads, signalling, bus stops, pedestrian facilities) what requires investments but the

share or financial support from the federal and state institutions needs sometimes long time for planning and negotiation.

Analysing the administrative structure, it is possible to conclude that there is no effective integration between the institutions regarding urban transport planning in the metropolitan region of Porto Alegre. A regional transport plan does not exist. Today the planning process for the metropolitan region is organised by commissions and committees for specific projects or, in general, each institution develops their plans separately. Therefore, the development of a master plan requires first of all the establishment of a “common planning arena” for the entire area which works permanently, involving the institutions of the three government levels.

4.4.2.2 Planning – 1942 to 2007

The city of Porto Alegre started at a harbour and has been expanding towards the interior. As a consequence the roads have a radial structure with a semi-circular city centre as their focus. The urban area underwent spontaneous and unplanned growth at the beginning. Afterwards, several studies were presented and some measures were developed throughout the years. Until the introduction of the first master plan, most of the studies could only set up road infrastructure.

The first urban master plan was implemented in 1959. This plan was developed by local planners based on drafts and studies presented between 1942 and 1959. The plan was innovative for that time as it set norms to be followed by four urban functions: housing, employment, leisure and road infrastructure. For the first time there was a scheme where residential areas were divided into units of housing, and industrial and commercial areas were planned (Ferrari, 2007) according to the ideas of the Modernist movement.

The road infrastructure followed the same pattern as the one designed before 1959. The plan took over the study from the architect Arnaldo Gladosch called “As Linhas Gerais do Plano Diretor – Contribuição ao Estudo de Urbanização de Porto Alegre” or Gladosch Study (General Lines of Planning – contributions to the study of urbanisation in Porto Alegre), which defined the routes of the roads as perimetral and radial.

The physical area of the city covered by the plan was at that time a very densely populated area where regulations were urgently needed because the fast and spontaneous growth. The impacts of the plan on the city, especially with regard to high-rise buildings can still be seen today: in the city centre it is evident that the high-rise buildings are pasted onto each other.

In 1975 a new effort was made concerning planning. At that time the federal government proposed guidelines to support the development of plans at the federal level and especially in the metropolitan regions. The objective of these programs was to face the fast growth in the state capitals and in the surrounding areas influenced by the “wave” of economic growth and the high rate of GDP in Brazil during the seventies. Additionally, in the seventies the urban population surpassed the rural population for the first time and the metropolitan regions was

very attractive because most workplaces were concentrated there. The consequence of this "wave" was fast urbanisation without a planned infrastructure.

To overcome the lack of organised planning the federal public company "Empresa Brasileira de Planejamento de Transporte" (GEIPOT) was founded with the task of developing a basis and developing the fundamental concepts for transport planning in Brazil in the seventies. At the state level the Foundation of Metropolitan Planning (METROPLAN) was set up in Porto Alegre. This institution was in charge of developing the "Master Plan for the Metropolitan Region of Porto Alegre" (PLAMET/PA), supported by GEIPOT, the Ministry of Transport and Planning Secretariat of the Presidency of the Republic (SEPLAN).

It is worth mentioning that one of the guidelines issued by the plan was the development of municipalities located in the different States of Brazil, from North to South, along the federal motorway BR-116. The objective was the consolidation of these municipalities as commercial and industrial centres. The measures had a strong impact on the transport network in the region, especially concerning the connections to Porto Alegre.

The surveys made for PLAMET/PA showed that the forecasted volume of passengers along the BR-116, in the medium term could not be served by the bus services currently offered. The train system (Federal Railway S/A – RFFSA) in operation in the suburbs of Porto Alegre and Sao Leopoldo at that time transported only a small percentage of the total volume of passengers due to the bad conditions of the infrastructure. Additionally, it required a complete renovation in order to replace or supplement the bus service (Ferrari, 2007).

Therefore, the decision to solve the high capacity public transport for the region was to implement a suburban metro to substitute the train. The first measure was the creation of the federal public company "Empresa de Trens Urbanos de Porto Alegre S.A" (TRENSURB) and in 1985 the operation of the regional metro connecting the metropolitan region to the city centre of Porto Alegre began, following the first railway tracks laid with the support of German planners to connect Brazil's German communities to the city.

In 1979, twenty years after the first urban plan, a second urban master plan was implemented in Porto Alegre. The plan, called the First Urban Development Plan (First PDDU), consolidated into a single legal text the whole set of rules, standards and concepts that were previously distributed across many different documents and laws. For the first time the planning covered the municipal territory and defined the urban and rural areas. The urban area was divided into parts of extensive and intensive use. In addition, the First PDDU introduced community participation in the planning process, albeit in a very limited way (Ferrari, 2007).

The PDDU proposed an expansion of the urban area highlighting the characteristics of the landscape and environmental preservation. Previously these aspects were not considered or included in the plan. The urban area was divided into intensive sectors called *Territorial Planning Units* (UTPs), classified according to trends of use and occupation of land. The urban system and the rules for control of building constructions were defined as a consequence of the use of each sector (territorial units for residential, mixed, commercial/services and industrial).

Also, so-called functional territorial units and areas of special use (areas of cultural/historical value, aesthetic value, etc.) were created (EPTC, 2007). The road infrastructure followed the same basic design of the first plan. In addition, it proposed the expansion of the network and of the capacity of the main connections.

The First PDDU was valid for 20 years. During this period a lack of regulation updates occurred, showing a discrepancy between some of its proposals and the reality of the city. There were visible aspects concerning the expansion of road capacity, such as the need to acquire a large amount of private ground for public construction. A new plan was presented in 1999 by the Complementary Law No. 434 (Master Plan for Urban Development and Environment – PDDUA).

4.4.2.2.1 Urban Master Plan of 1999: Urban Development and Environment Plan (PDDUA)

The current urban master plan, PDDUA, was made at a time when the city was changing with regard to economic, social and environmental aspects. Additionally, in July of 1999 the First Master Plan for Urban Development (First PDDU) completed 20 years of implementation. Therefore, a revision was necessary to cover the new national and international guidelines and the expansion of the city.

The new plan proposed to be not only a normative plan like the older ones, but a flexible strategic plan with the possibility of making changes whenever the urban dynamic would require it. In addition the participation and decisions of the community were to be considered (Bianchi, 2000).

Today Porto Alegre concentrates most of its activities in the city centre as a result of the implementation of the three urban plans. More than 50% of the city's total workplaces are located there (EPTC, 2000). Urban transport data shows that 81.5% of morning peak journeys terminate in this region, with 46% of its demand coming from private transport. Six bus terminals are located in the historic zone, attracting 83% of total peak hour journeys (EPTC, 2008). The long distance bus station, the regional bus terminals and the metro stations are also located in that zone.

The road network follows the pattern that started with spontaneous growth and the lines proposed by the Gladosch studies. The routes are radial starting at the city centre (harbour) and extending inland, connecting the main centre of activities to the residential areas. The road structure and the concentration of activities in the city centre require the existence of high-capacity central terminals for public transport. This condition has been presented by the technicians as an important constraint for the optimisation of the operation (EPTC, interviews, 2007). Other idea is to promote de-concentration of activities from the City Centre.

The proposed structuring for the city in PDDUA is shown in Figure 78. The structuring of the space proposes mixed land use. The plan considered the historic centre as a special traffic zone and created the "corredores de centralidade" which are areas of preferential use for

commerce and services located on the arterial roads. This measure proposes the spread of the commercial and services zones into the city, with the objective of de-concentrating the city centre.

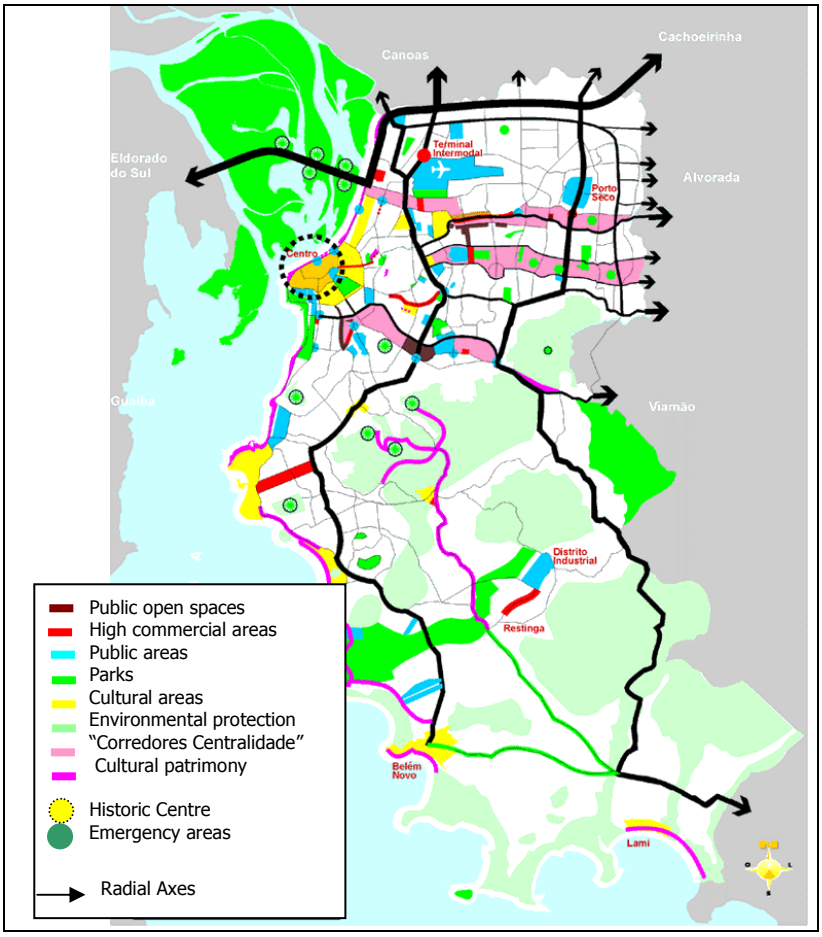


Figure 78: Porto Alegre: Urban development strategy. Source: Adapted from Master Plan (PDDUA 1999).

According to Bianchi (2008), the main goal proposed by the urban master plan of 1999 for urban transport was the development of a sectoral plan, considering urban mobility as a priority strategy for the city development. This goal includes the complementation of the basic road network and its functional classification, adding appropriate technologies for traffic management. Moreover the prioritisation of public transport, walking and cycling and the standardisation of cargo transport were required. In addition the plan proposed to establish centres of integration and for transferring passengers and cargo. It created guidelines for recovering public spaces that are today used as parking places, and for using them instead for the circulation of pedestrians, cyclists and vehicles. These policies encourage the construction of parking garages and set strict rules for new constructions which have to include parking places in the private area.

The master plan classifies the road infrastructure according to its location, functions and uses (see as the priority for investments among all inestments for transport infrastructure.

in the next section of this chapter). The plan specifies the function, the use and the rules for private and public constructions. Also a priority hierarchy for public investments was determined. The infrastructure for public transport and non-motorised means of transport has the priority for investments among all inestments for transport infrastructure.

Figure 79 below shows the main routes of the proposed urban transport network and the location of the bus terminals according to the current master plan (1999). The plan maintains the radial structure starting in the city centre but including the development of new axes in northerly and southerly directions as a support to distribute traffic away from the East/West axes, working as radial roads and creating new traffic zones for heavy traffic.

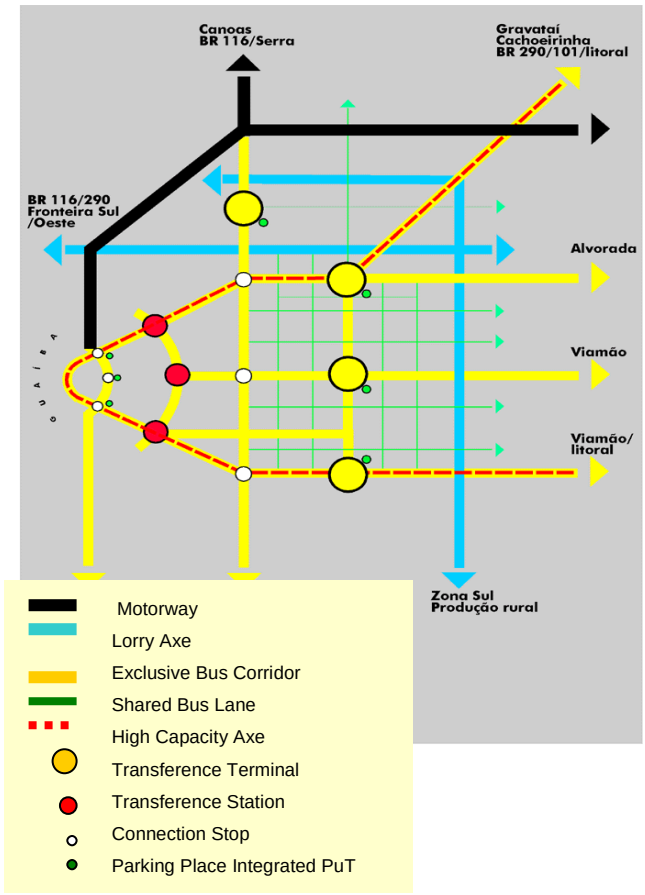


Figure 79: Urban transport network strategy: main axes. Source: adapted from Master Plan (1999).

4.4.2.2.2 Urban Transport Master Plan

The public transport master plan is a requirement of the Master Plan for Urban Development and Environment of Porto Alegre (PDDUA) and the federal laws (City Statute and national policy guidelines for mobility). It was published in 2000 and states the guidelines and strategies for planning public transport. The measures recommended for infrastructure and operation of the transport network has 2013 as the target year for the end of the plan. It sets the general guidelines for urban transport planning and the specific guidelines for the public transport network for 15 years in the city.

The proposed public transport network presented in this plan is a result of the evaluation of four different scenarios, based on the operational and performance indicators. The chosen network sought the best combination of the two goals of increasing the competitiveness of the service (reduction of trip time and need for transfer), and reduction of social and environmental impacts (emissions of pollutants).

Figure 80 shows a scheme of the chosen scenario. It intends to reflect the public transport infrastructure required for urban development according to the master plan PDDUA, which is promoting the decentralisation of economic activities and employment in new areas of the city (EPTC, 2000).

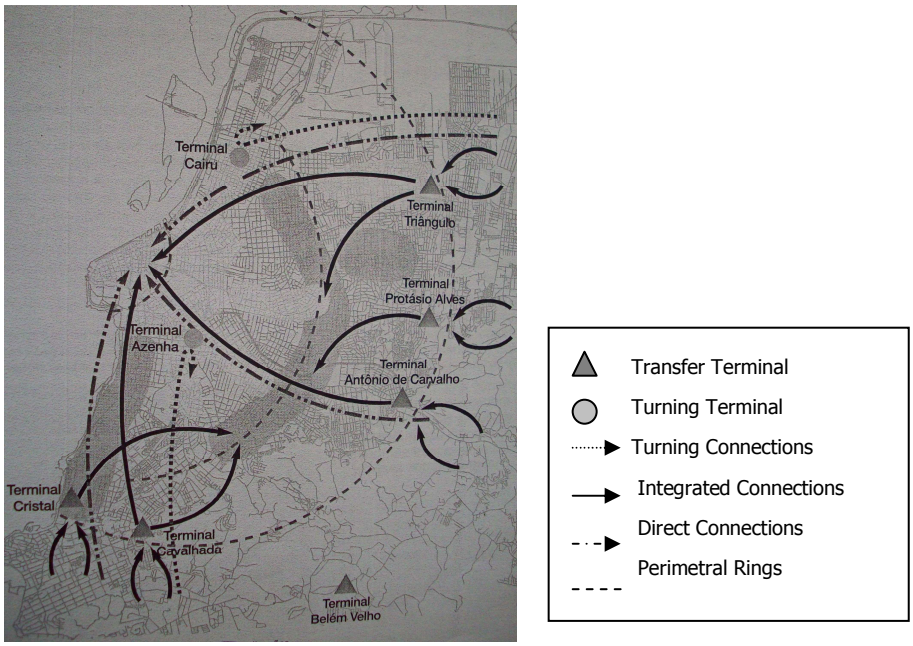


Figure 80: Urban transport network concept: Chosen scenario presented in the urban transport master plan. Source: adapted from EPTC (2000).

The proposed public transport network is based on the bus system. It includes bus corridors (BRT), feeder lines and transfer terminals.

The following elements are considered in the planned network:

- Transfer Terminal: located outside the city centre. It concentrates passengers coming from the neighbourhoods using the feeder lines and channelling this demand into bus corridors (BRT) to the city centre.
- Turning Terminal: located in two zones of high density of commerce and services, between the historic centre and the second ring. It connects high density neighbourhoods using bus corridors.
- Turning connections: bus lines of high capacity connecting the neighbourhoods directly to the turning terminals.

- Integrated connections: bus corridors of high capacity (BRT), connecting the transfer terminals to the city centre.
- Direct connections: express lines, planned to operate at high speed to connect the neighbourhoods directly to the city centre.
- Perimetral rings: transversal roads connecting the city from North to South. One example is the third perimetral inaugurated in 2006. It is a corridor for public and private transport.

4.4.2.2.3 Cycle Plan

The master plan PDDUA/1999 in the chapter "Urban Mobility Strategy" states, in item I, Article 6, that "*public transport, pedestrian and cycling is priority."* Then a cycle plan was published in 2008 in order to fulfil the guidelines to provide infrastructure and management for the city. The implementation of this plan has the objective to promote non-motorised transport, which is, cycling, seeking to improve the environmental conditions and to offer a new alternative of urban transport to balance the current network. Additionally, the measure has social reasons. The economic data of EDOM/2003 shows that higher rent-paying families make on average 3.6 trips per day and lower income families achieve only 1.4 trips per day, which is a more than twofold and nearly threefold difference (EPTC, 2008). The survey showed that cycling is an alternative to increase mobility for the low income population. This policy has the support of the federal government. It is part of the program of "social inclusion" from Brazil's Ministry of Cities.

4.4.2.3 The urban transport network

4.4.2.3.1 Public transport

The modal split shows that 37% of journeys are made by public transport, and the number of journeys per person per day is 1.6. Public transport in Porto Alegre operates three types of services: bus system, "lotacao" (micro-buses) and regional metro (TRENSURB).

a) Bus

Municipal public transport by bus in Porto Alegre is under the responsibility of the Municipal Government, through SMT and the public transport company (EPTC). The system consists of 341 bus routes, with a demand of around 1 million passengers per day. The total fleet is 1,594 vehicles. The services are operated by 15 company dealerships. The network is shared into operational basins, operated by three consortia of private companies and the municipal public company Carris (EPTC, 2007).

The transfers between buses and TRENSURB are made in five of the six stations existing in Porto Alegre. The passengers who intend to make transfers must buy the "integrated ticket". Then they are allowed to use 20 lines in the municipality of Porto Alegre. Three of them are circular lines used to distribute the passengers in the city centre from the end station to the city centre.

The municipal government has been investing in measures that result in priority for public transport on the road infrastructure. One of them was the construction of around 50 km of bus corridors on the main radial roads, connecting the city centre to the neighbourhoods and residential areas. Despite large investment made by the government, the operation of the network was not adequate for the new infrastructure.

Source: from the author

Today the bus corridors and terminals have almost reached the limit of their capacity. A large number of lines (both urban and from the metropolitan region) operate on them, resulting in high frequencies and congestion in the area closest to the city centre, which is the destination of most people who use the bus service.

The fare for the bus system in Porto Alegre has a single price for the entire city (*social fare*). This concept has implicit social aspects, involving a cross-subsidy: people of higher income who live near the city centre indirectly subsidise those of lower income who live further away.

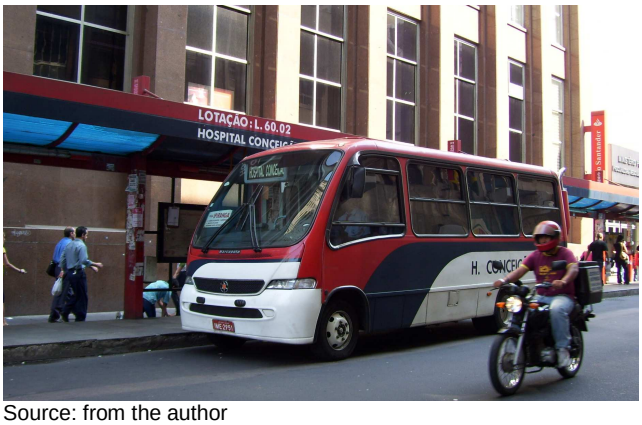
The revenue and the costs are administrated by a trust fund. It was established by municipal law (main regulation of urban transport in the municipality of Porto Alegre). The trust fund has the aim of promoting the economic and financial balance of public transport by bus, providing the *social fare*, to rationalise the costs and to remunerate the concessionaires as set out in the concession contract. The objective is distributing the costs and the revenue among the lines in a way to balance the total budget and cover the deficits, considering that there is a lack of subsidy for the services.

The fare is paid using pre-paid contactless smartcard technology. The cards are charged at nearby ticket booths and automatically debited at the turnstiles. The cards are purchased inside the stations for the structural and direct lines or in specific shops. Turnstiles are used to direct passenger flow and automatically charge the contactless card. This system gives some facilities to the passengers such as security, and also to EPTC as it permits operational controlling of data, for instance trip time, trip purpose and speed.

b) Micro-bus “Lotaçao”

The service “lotação” (micro-buses operating with a high level of service and express service) was created by municipal law in 1977, to fulfil a gap between conventional public transport (by bus) and private transport. The objective is the rapid connection of the neighbourhoods to the historic centre. The micro-bus has a capacity of 21 seats. The buses do not stop only in fixed stops. They are also allowed to serve the need of the passengers for boarding and alighting at different points along the routes. Moreover, it is prohibited to transport standing passengers.

There are currently 29 main routes in operation, with a total fleet of 403 micro-buses carrying about 51 thousand passengers per day. The value of the fare is determined by EPTC. Today it is around 42% higher than the bus fare and it is a single price for all lines. For this service it is not permitted to make a transfer without new fare payment (EPTC, 2001).



Source: from the author

c) Regional Metro – TRENSURB

The regional metro operated by Empresa de Trens Urbanos de Porto Alegre S.A (TRENSURB) connects the Metropolitan Region (five municipalities) to the centre of Porto Alegre. TRENSURB currently operates one line that is 33.8 km long, with 17 stations and a fleet of 25 trains (each train having four carriages). The maximum charge (hourly demand) is 21,600 passengers, in each direction, transported in 20 trains. Eight kilometres of the line run through Porto Alegre, and around 35,000 passengers per day have their origin and destination within its territory. TRENSURB receives passengers from 147 bus routes with origins in the municipalities of the metropolitan region. Around 40% of the total daily demand has Porto Alegre as its destination. This generates demand for the local network, where 2,000 passengers are carried every day using the integrated ticket (TRENSURB, 2008).

TRENSURB is controlled by the Federal Government. As distinguished from the bus system, the rail system receives subsidies from the controller, amounting to around 50% of the costs and investments (TRENSURB, 2008).

d) Aeromovel

The service started to run in 2013. There is one line connecting the airport to the stations of TRENSURB. That was a solution to avoid the long traffic jams in the streets conneting the North of the city and the City Centre to the international airport using public transport. This short track has the function of conncting three important transport modes: the regional train station, the international/national bus station to the international airport. This airport serves the States of Santa Catarina and Rio Grande do Sul. Many people come by bus or by train to start international flights there. But after arriving at the bus and train stations in Porto Alegre people faced the long congestions by taxi to reach the airport and the difficult connections from the train stations.

e) Taxi

The taxis system is managed by EPTC, who gives permission to private individual operators to serve the population. The services are regularly monitored by the transport authority. They have fixed stops at regulated parking spaces. The fare is calculated by the EPTC and monitored electronically. Taxis are a real transport service alternative in Porto Alegre to overcome the

bottlenecks of the traffic and the lack of connections in the transport network etween the different modes. The services has high acceptance by the population due the availability, reliability and affordable prices.

4.4.2.3.2 Private Transport

a) Motorised individual transport

Porto Alegre has a total fleet of around 600 thousand vehicles. 450 thousand of them are cars, which relates to 3.3 inhabitants per unit. Car journeys represent 36% of the modal split. The data of EPTC shows that during the morning peak around 82% of journeys have the central area as the destination, and 46% travel by car. Therefore, the speed at that time is around 11 km/h (EPTC, 2007). Also in the city centre problems occur concerning parking spaces and inadequate areas for the boarding and alighting of public transport and the circulation of pedestrians and cyclists. This results in many accidents, congestions, delays and losses of time.

The main road infrastructure in Porto Alegre is classified according to the functional classification stated in the master plan and adopted by EPTC.

Table 27: Road Classification according to the Master Plan (Porto Alegre).

Road Infrastructure Classification			
Type	**Location**	**Function**	**Use**
Transition Roads (V.1)	Municipality to metropolitan region	Interurban connections	High capacity roads for private and public transport.
Arterial Roads (V.2)	Development corridors, radial and perimetral axes, low density areas.	Serve high density zones Make the connection between low density areas and the districts.	High capacity transport: private transport, public transport corridors and cargo.
Collecting Roads (V.3)	Productive zones and within the development zones.	Distribution among local and arterial roads. Local connections.	Private and public transport in shared or exclusive lanes. Light cargo.
Local Roads (V.4)	Within the neighbourhoods.	Local distribution inside the zones and neighbourhoods, characterised by low speeds and intense local access.	Private transport, cycling and light cargo.
Cycle Routes (V.5)	According to the cycling plan.	Bicycle traffic	Work and leisure
Pedestrian Zones	According to the plan and special projects.	Open spaces and pavements exclusive to pedestrian use.	Pedestrians
Access (V.7)	Intensive occupation areas.	Access to the private areas and lots.	Access to garage and pedestrians access pathway.

Source: on the basis of the master plan annex 9.1, sheet 1(1999).

b) Cycling

Despite the old cycling plan of 1981 Porto Alegre still does not have an adequate infrastructure covering the city for this means of transport as an effective alternative within the urban transport network. The survey EDOM/2003 shows that 1% of the modal split is cycling and 31% of the trips have the purpose of work, used mainly by people of low income.

Porto Alegre has only two permanent cycle routes, both located on the edge of the Guaíba River. The others use the infrastructure of public and private transport. The corridor of Perimetral III is the main North-South link in Porto Alegre for buses and private transport. On Sundays and during holidays it is closed for cars and the lanes are used by cyclists, pedestrians and skaters. According to observations and reported by users the main constraints for the use of cycling is the long distances covered for commuting coupled with the lack of infrastructure and service designated to serve these mode of transport. Furthermore they cited the overload traffic in the main traffic zones that cause many traffic accidents for the under-privileged users of these routes.

c) Walking

Walking represents 23% of the modal split in Porto Alegre. The master plan PDDUA (1999) defined that public transport and non-motorised private transport have priority for public investment. However, walking is still the greatest challenge in the urban and private spaces, and within the urban transport nework connections of Porto Alegre.

Source: from the author

There are no clear guidelines for developing the infrastructure or for managing it for pedestrians. The plans did not have a concept of networking all transport modes. Traditionally the implemented measures had the focus to solve motorised transport. Therefore, the city constructed in the past many bridges and viaducts intending to make the connections from the city to the motorways, crossing the river and going to the inland settlements. But this infrastructure did not cover the needs of non-motorised transport modes.

The existing infrastructure is not adequate considering the principles of universal accessibility, safety and security for the users. In the connections to the bus terminals in the city centre and at some cross-sections, pedestrians share the space with cars and buses. There are many conflicts at the cross-sections of the roads and along the pavements the pedestrians very often share the space for walking with vendors and many obstacles. Thare is an area in the City Centre dedicated to pedestrians, but also there the space is overcrowded with obstacles, what makes the zone insecure, and there is no clear signallings of information to help people to move around by walking.

Source: from the author

Source: from the author

4.4.2.4 Urban Transport Planning Process in Porto Alegre

a) Actor-network

The urban transport planning process in Porto Alegre involves commissions and committees composed of different government organisations (technical staff and politicians from diverse areas of government), organised societies, ONGs[77] and broad public participation. Public participation has two ways of entering into the process. One is through Decentralised Governance (SMGL), participating in the "Orçamento Participativo" (O.P.) and Regional Administrative Centre (C.A.R). Another way is through the City Councils.

Porto Alegre has in Brazil a strong tradition of political movements and public participation in the planning arena[78]. This environment has an important impact on the planning process considering the measures adopted and the process of decision. The lack of understanding on the basis of the planning process results in losses of time. Moreover, the lack of continuation in the implementation of the measures is visible in the city. This happen normally, when a political group looses the elections. The winners change their priorities and also most of the administrative and technical staff.[79]

Figure 81 below shows the main actors involved in the planning process in Porto Alegre. Considering the strategic plan, the planning process can be started by the mayor himself or his political staff, or by EPTC. In all phases of the development of the plan EPTC is responsible for leading the process until the phases of the implementation and evaluation of the measures. Special commissions or committees are composed of technicians from the institutions involved in developing the plan. Theoretically, as shown in Figure 81, general public participation should be involved at the strategic level. But observing the process is effective at the tactical/operational level and for special groups that are affected by specific measures. For the last situation EPTC calls public audience to discuss the projects.

At the strategic level, the participation of stakeholder representatives from public and private institutions is involved in the Urban Development City Council and Urban Transport City Council during the "examination of measures" phase. Also in that phase the projects are sent to the permanent commissions (CAUGE – Internal Commission for Projects Evaluation, and others for specific issues) to obtain the authorisation to continue to the next phases. If the project is opposed by the CAUGE, it has to go to the beginning of the process to be reviewed or it is

[77] ONGs stands for: Non-Governmental Organisations

[78] Porto Alegre together with São Paulo and Minas Gerais State were at the heart of the political movements that resulted in the most important transformation in the whole of Brazilian history. The most important revolutions started there (for instance, the republican revolution and the military revolutions of the 20th century). Today Brazil is in all aspects a democratic nation. Nevertheless, in Porto Alegre it is important to consider the strong contrasts between popular movements and those from official institutions and their impacts on planning processes over the years.

[79] This behaviour in public administration can be seen in Brazil from North to South. It is not only related to Porto Alegre.

interrupted. In the case of a project with high political interest, the politicians use their influence and their purported ideological values to manipulate the institutions and the population, in order to reach their desired conditions for the final approval.

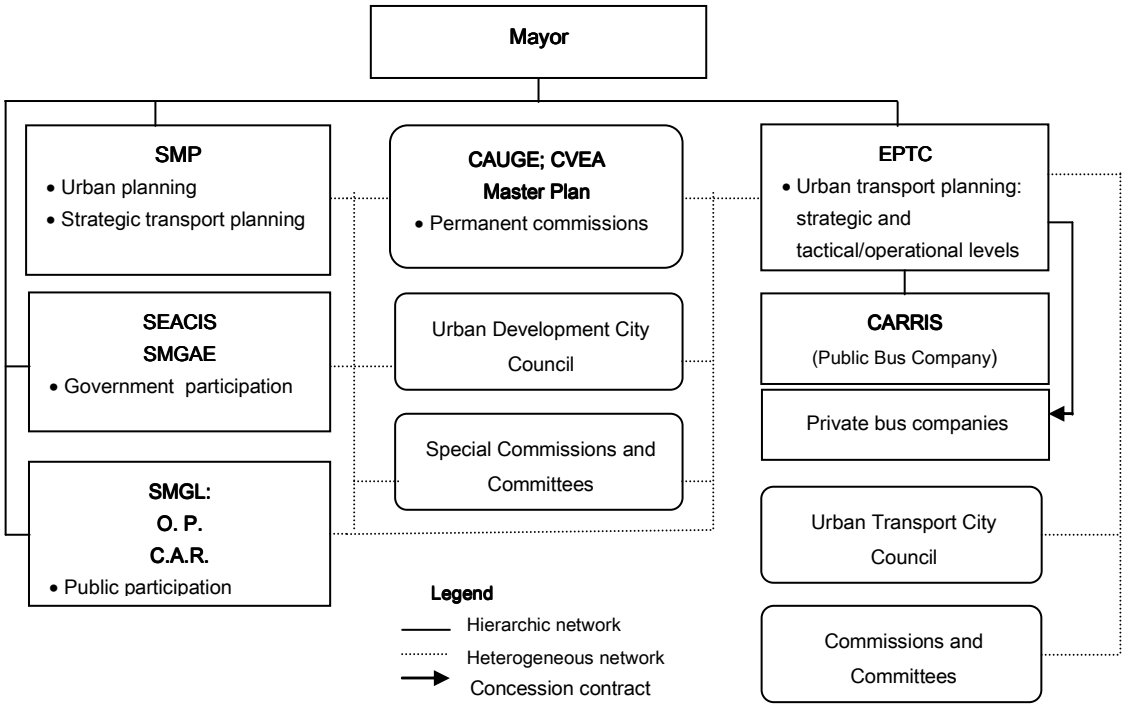


Figure 81: Urban transport planning process in Porto Alegre: Actors. Source: From the Author.

The participation of the internal commissions and the city councils in the strategic level of the planning process is regulated. This means that every plan has to follow the rules, steps and established phases in order to be approved and implemented. The rules and procedures are regulated by municipal laws and internal acts from the mayor and from the head of EPTC.

At the tactical/operational level, public participation is involved in the planning process through O.P. and C.A.R. (see Figure 82). In addition, stakeholder representatives of the society participate in the process via the urban transport city council.

Figure 82 below shows a schema of the structure proposed by Decentralised Local Governance (SMGL) in Porto Alegre to organise the planning process for the city involving a broad participation of the population in general. The structure is not completely implemented. The proposal was strongly criticised. One important criticism was from the O.P. because there are some conflicts of interests because of the “social network” organisation. This happened in spite of the fact that they are organised on the same social basis and work as a social movement controlled and organised by communitarian organisation.

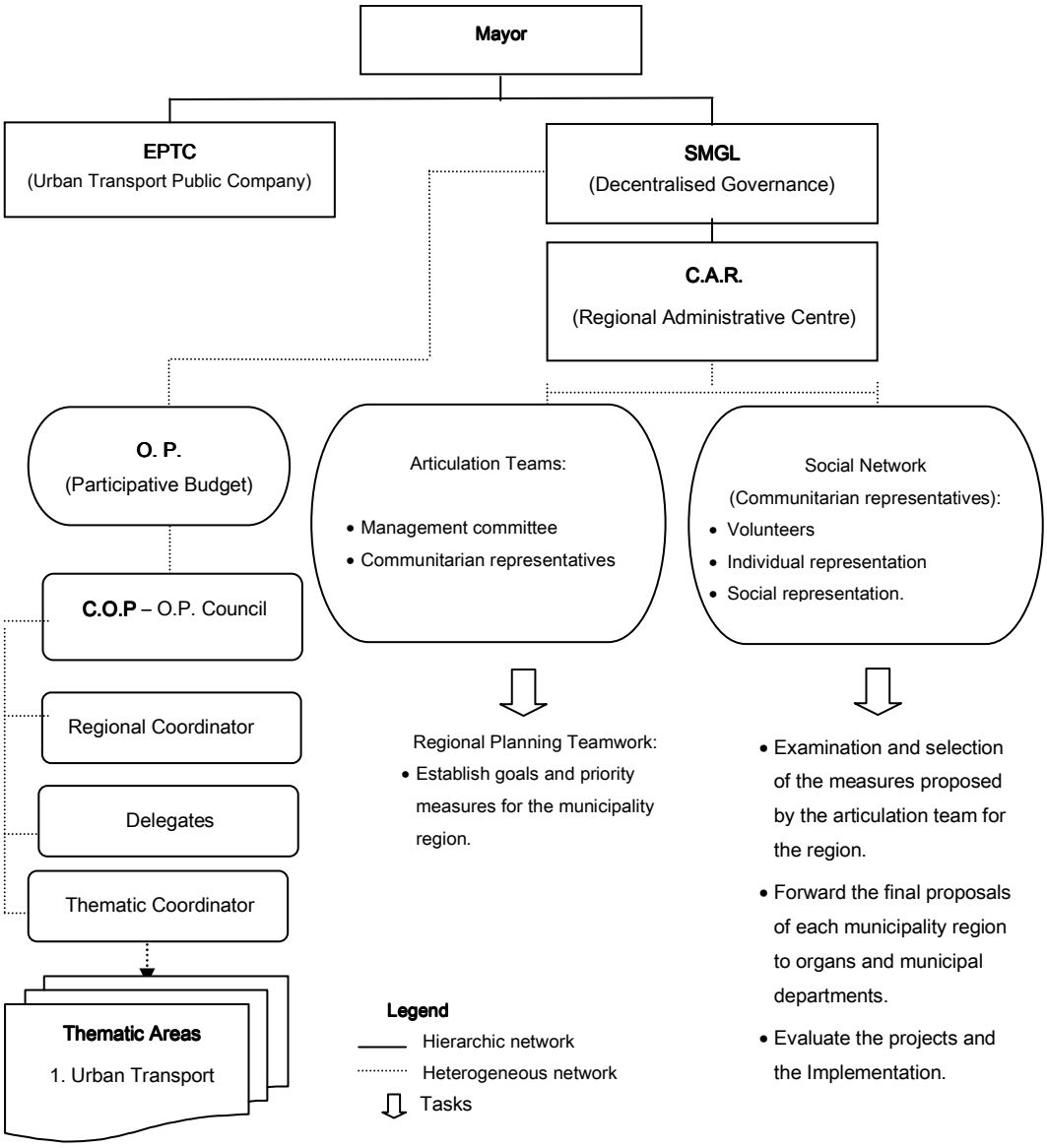


Figure 82: Decentralised Governance: Urban transport planning process in Porto Alegre – tactical/operational level. Source: from the author.

Considering Figure 82, it is O.P. and the Regional Administrative Centre (C.A.R.) that are functioning today. C.A.R. was installed in seventeen municipality regions. It has administrative staff from the City Hall receiving the requests of the population and handing them to the municipal departments. It is mainly concerned with administrative mediation between the local population and the municipal government. The proposed organisation concerned with the articulation teams and social networks does not work properly today in the sense of having an effective participation in the planning process for the city.

- Participative Budget (O. P.):

O.P. was organised by communitarian representatives in 1989. The basis for the origin of the social movement was to restore the self-confidence of the people at a very important moment in Brazilian history (end of military regime) and to organise broad public participation in government decisions. At that time the country was immersed in a deep economic depression

and in a deep political crisis after 25 years of military dictatorship. Uprisings erupted around the country led by different groups of society demanding political rights, solutions for emergency needs and freedom of expression. The objective of the forum was to propose measures to solve many basic and urgent problems concerning several areas in the city, for instance, urban transport and health services, which were both constrained by a limited budget. O.P. works with an annual budget for planning and implementing measures. Its vision is very short-term, and does not address the medium and long-term aspects of planning investment. Considering the urban transport plan, Porto Alegre today needs large investments to fill the gap in the city's infrastructure.

O.P. organisation and coordination are made by the O.P. Council. This Council is elected by the population in general. Regional and thematic O.P. assemblies define the priority measures and services for each one of the seventeen municipality regions by open discussions and voting (Figure 83, below). All participants present at the assembly can discuss and vote for measures.

Figure 83: O.P. – Regional and thematic assemblies 2005/2006. Source: Porto Alegre(2008).

The services and measures for the city were classified in sixteen thematic areas and one of them is urban transport (Figure 82). Then the population establishes the order for the priorities and the annual investments for each theme.

b) Information

The examination of the documents (e.g. reports, projects) and the interviews[80] from Porto Alegre shows that in general there is no standard for organising (receiving and offering) information and using them in the planning process, especially for the strategic level. What is regulated by the master plan is followed for the development of the projects. But there is no manual describing the basic concepts and patterns for urban transport specifically developed for the city that explain the whole network (e.g. public and private transport). In reality for each project a committee or a commission is composed and new proposals can be presented. The main projects presented in recent years, like "Portais da Cidade", the cycle plan and "Public Transport Integration in the Metropolitan Region", were discussed in an executive committee or in a commission.

[80] In October of 2007 the interviews were carried out in Porto Alegre with the Executive Administration and technicians from EPTC, and members of some commissions and committees, for instance CAUGE and GEI. In 2008 and 2011 interviews were carried out with high range technical staff and with the EPTC directory. Specific points were checked out later by internet or telephoning.

- Cycle plan: a commission was formed involving representatives from institutional organisations, NGOs, different members from organised societies and the general public. The EPTC co-ordinated the meetings and wrote and presented the plan. The final version was voted on by the city parliament.
- Portais da Cidade: the project was proposed by the mayor and his political supporters. Afterwards it was discussed in an internal commission and developed by the EPTC and other municipal secretaries in charge of planning and implementing infrastructure in the city, and by consultants. The final project was presented to the public in open audiences.
- Public Transport Integration in the Metropolitan Region: a committee was formed with representatives from the municipality of Porto Alegre, the municipalities from the Metropolitan Region within the areas involved in the transport integration, and representatives from the state of Rio Grande o Sul and the federal government for the discussion of the plan. The development of the plan also received the support of a consultant company.

The committee can contract and supervise an external consultancy to develop the plan, as happened in the second and third cases. The concepts presented for those projects were not a hundred percent in accordance with the current patterns or the rules stated in the urban transport master plan.

4.4.2.4.1 Strategic level

The planning process in Porto Alegre at the strategic level is co-ordinated by EPTC. However, SMP plays an important role in the process, as do the SMGAE and the current government. Technical commissions and committees are organised to develop the plan. At the phase of the examination of measures, the projects are sent to the permanent commissions, like CAUGE, for assessment and analysis of possible impacts, before receiving permission to be implemented (Haifuch & Miranda, interview, 2007). The Urban Development City Council and the Urban Transport City Council have important influence on the evaluation of the measures. Many meetings and roundtables are held to discuss and approve the measures in the commissions and on the city councils. Figure 84 below shows the actors involved in the planning process in Porto Alegre at the strategic level.

At the decision phase the projects are evaluated by the mayor and politicians. EPTC takes over the implementation, the evaluation of the measures and the later operation and management of all urban transport plans.

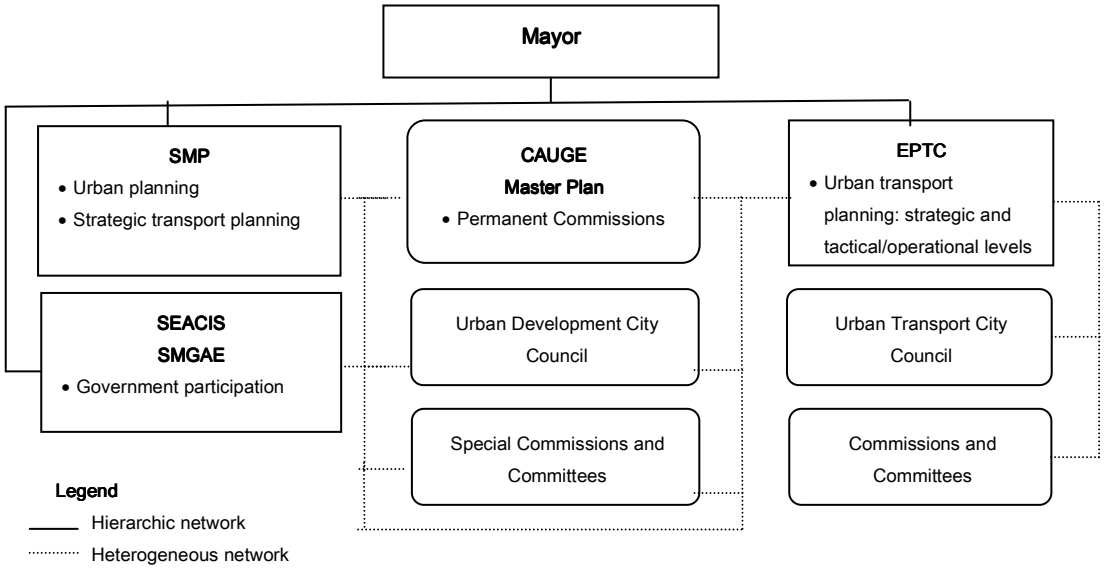


Figure 84: Urban transport planning process in Porto Allegre: Actors – strategic level. Source: from the author.

Figure 85 below shows that today there are five main technical commissions and committees at work, coordinated by EPTC. Each one is in charge of developing a plan for urban transport. Taking those that are working to present solutions for public transport, it is possible to see that the main focus is to solve the high-capacity public transport problem. It shows that contention exists in Brazil nowadays regarding the type of transport system (high-capacity passenger transport - BRT or metro) that can be implemented to operate public transport in cities that have already reached one million inhabitants, considering their constraints. And there is also a lack of clear concepts and guidelines to develop an urban transport plan, which the current urban transport master plan could not provide.

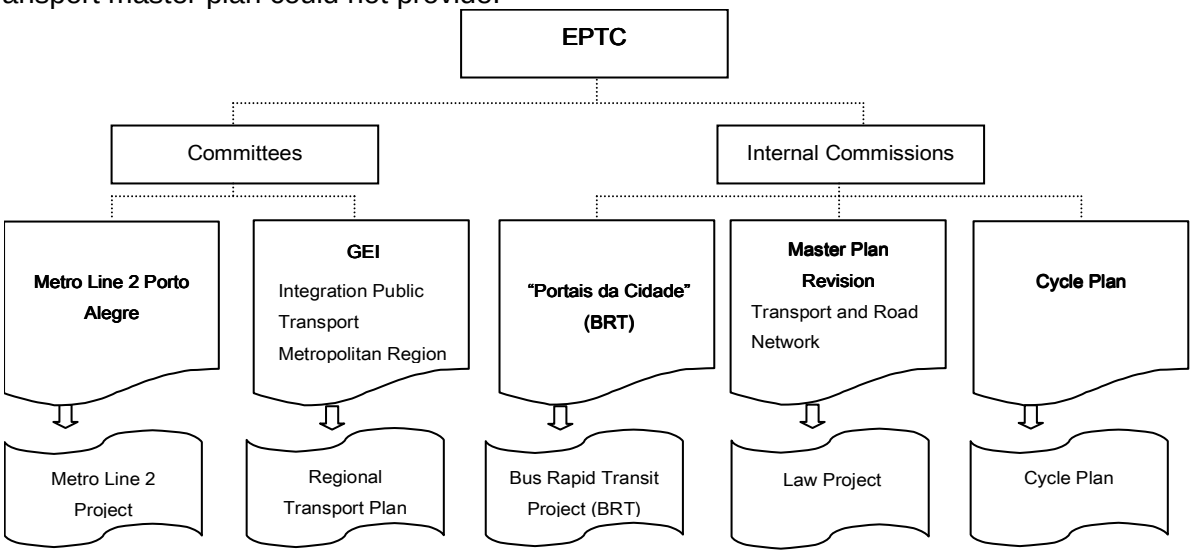


Figure 85: Urban transport planning: strategic planning – commissions and committees in 2007 coordinated by EPTC. Source: from the author.

Members of the commissions and committees shown in Figure 85 above were interviewed in October 2007. The planning process at the strategic level was analysed based on these interviews and the documents presented. Below, one committee is described as an example of the set.

a) Public Transport Integration in the Metropolitan Region:

Figure 86 below shows the organisation of the Committees composed to co-ordinate the planning process of the project "Public Transport Integration in the Metropolitan Region of Porto Alegre". The Institutional Committee (GCI) represents the political level of the organisations. GCI is composed of representatives from federal (TRENSURB), state (METROPLAN) and municipal (EPTC) government levels. The main tasks of this committee relate to creating the political conditions necessary for the development of the plan and its implementation and co-ordination by the executive committee (GEI). Also it creates the financial basis to support the planning process and its future implementation.

The executive committee co-ordinates and develops the plan in all phases, except for the decision phase. GEI is also responsible for contracting and supervising companies to develop specific tasks during the planning process and its implementation.

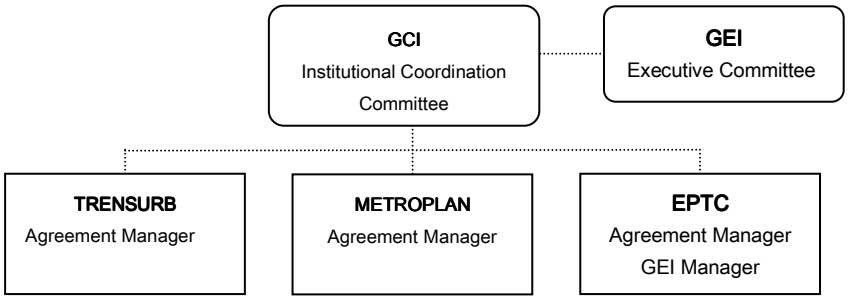


Figure 86: Urban transport integration in the metropolitan region committees. Source: from the author.

The executive committee is composed, as Figure 87 below shows, by technicians and transport experts, and coordinated by a director, representative of EPTC.

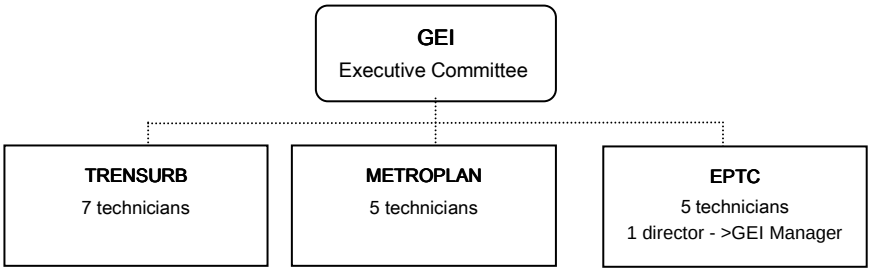


Figure 87: Urban transport integration in the metropolitan region – composition of the members of the executive committee (GEI). Source: from the author, designed on the basis of interview.

The main activities of the committee in the planning process are the organisation of the work plan, problem analysis, data collecting, examination of the required measures, and presentation of the plan. GEI has a weekly meeting to develop the proposed tasks (Moraes & Abreu, interview 2007).

Throughout the process, the actors of the Executive Committee GEI have equal power in the participation of meetings and discussing or presenting measures, but they are not allowed to make decisions. The projects, reports and measures developed by the executive committee are

sent to the institutional committee, who present and discuss them with the political leaders. At this forum the decisions are made.

The quotation below is part of the summary of the diagnostic presented by the executive committee GEI (EPTC, 2007):

> "Objetivamente é possível observar que a situação do planejamento de transporte nao representa uma exceção em relação à maioria das regiões metropolitanas brasileiras. O governo tenta resolver problemas específicos de acordo com os interesses locais. O proceso de planejamento nos três níveis de governo contrasta com o necessário planejamento sistêmico. As leis existentes não são proibitivas, mas insuficientes e abertas a adaptações. A necessidade de um plano diretor para a região é clara tanto para os técnicos, líderes do governo quanto para o legislativo, mas um acordo comum para a devida aprovação ainda não foi possível"[81] (Abreu, EPTC, 2007).

The analysis of this committee shows an example of the organisation of the Actor-network, the flow of information and the process of decision at the strategic level.

4.4.2.4.2 Tactical/operational level

In Porto Alegre at this level the planning process in urban transport can begin in two ways:

- Programs and proposals coming from EPTC, and
- Proposals from the Decentralised Governance (SMGL) – see Figure 82.

Figure 88 below shows a schema of the actors involved in the planning process at the tactical/operational level. Private and public bus operators, the city council and other representatives can participate in starting the process using "solicitations or suggestions" of measures, and in evaluating the proposals of the technical staff from EPTC. Decentralised Local Governance has a most effective participation in the process, as it is explained in Figure 82.

[81] Objectively it is possible to see that urban transport planning in the metropolitan region of Porto Alegre is no exception to most Brazilian metropolitan regions. The government tries to solve specific problems according to local interests. The planning processes of the three government levels contrast with the necessary systemic plan. The existing laws are not prohibitive but insufficient and open to adaptation. It is clear to technicians, government managers and the legislative, that a master plan for the region is necessary, but a common consensus to approve it was not yet possible.

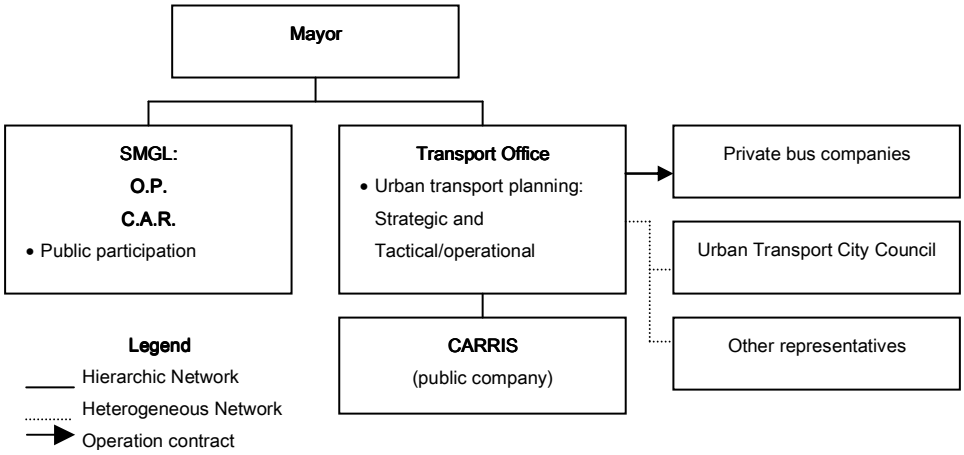


Figure 88: Urban transport planning process in Porto Alegre: Actors – tactical/operational level. Source: from the author.

At the tactical/operational level the phases of problem analysis, development of measures, decision, implementation and evaluation are taken over by EPTC. The company has technical staff and financial support to develop the planning process and lead it. The development of measures at this level is based on concepts and regulations from the company technical knowledge. The company has control over the services delivered by the public transport operators and traffic management, and also it has a good position to make decisions and implement measures in the city. A plan that fulfils the expectations of the actors at this level is one that is in accordance with the technical staff of the company and supported by the decision makers from EPTC. The process follows a technical/bureaucratic style for planning based on the power of the internal commissions and the authority of the technicians and managers on the decision process. However, the strong influence of public participation in the process by O.P. (Orçamento Participativo) must be considered at this level.

Table 28 below shows the results for urban transport investiment priorities voted for by the population in Porto Alegre in the Regional Thematic Assemblies for two years: 2006/2007 and 2007/2008.

Table 28: O.P. thematic assembly for urban transport: Priorities for the investments.

Results of the OP Assembly – Thematic Urban Transport Chosen measures and order for planning and implementation	
2006/2007 – No. of participants: 169	**2007/2008 – No. of participants: 485**
1º Improvement of roads, pavements	1º Improvement of roads, pavements
2°Transport plan: organisation of the urban space for circulation and road construction	2 º Road maintenance
3 º Road maintenance	3 º Transport plan: organisation of the urban space for circulation and road construction and accessibility for disabled people.
4 º Transport infrastructure maintenance – bus terminals and bus stops.	4 º Transport infrastructure maintenance – bus terminals, bus stops and bus lanes.
5º Investment in traffic safety	5 º Investment in traffic safety

Source: OP - Gerência do Orçamento Participativo (2007; 2008)

As the list and the priorities for investments shown in Table 28 above is analysed it is evident that there is a lack of measures and priorities for cycling. They do not appear on the list. The results of this neglect are clearly seen in the bad conditions of the cycling paths and infrastructure around the city.

The population in general can monitor the whole process of O.P. on its website. After the period of assemblies the results of the process remain available for the public. The steps taken by the planning process in each phase and the implementation and evaluation of the measures are also shown on the website.

Figure 89, Figure 90 and Figure 91 below show some procedures from the O.P. website where the selected measures of the round table meetings can be monitored by the public during the phases of the planning process.

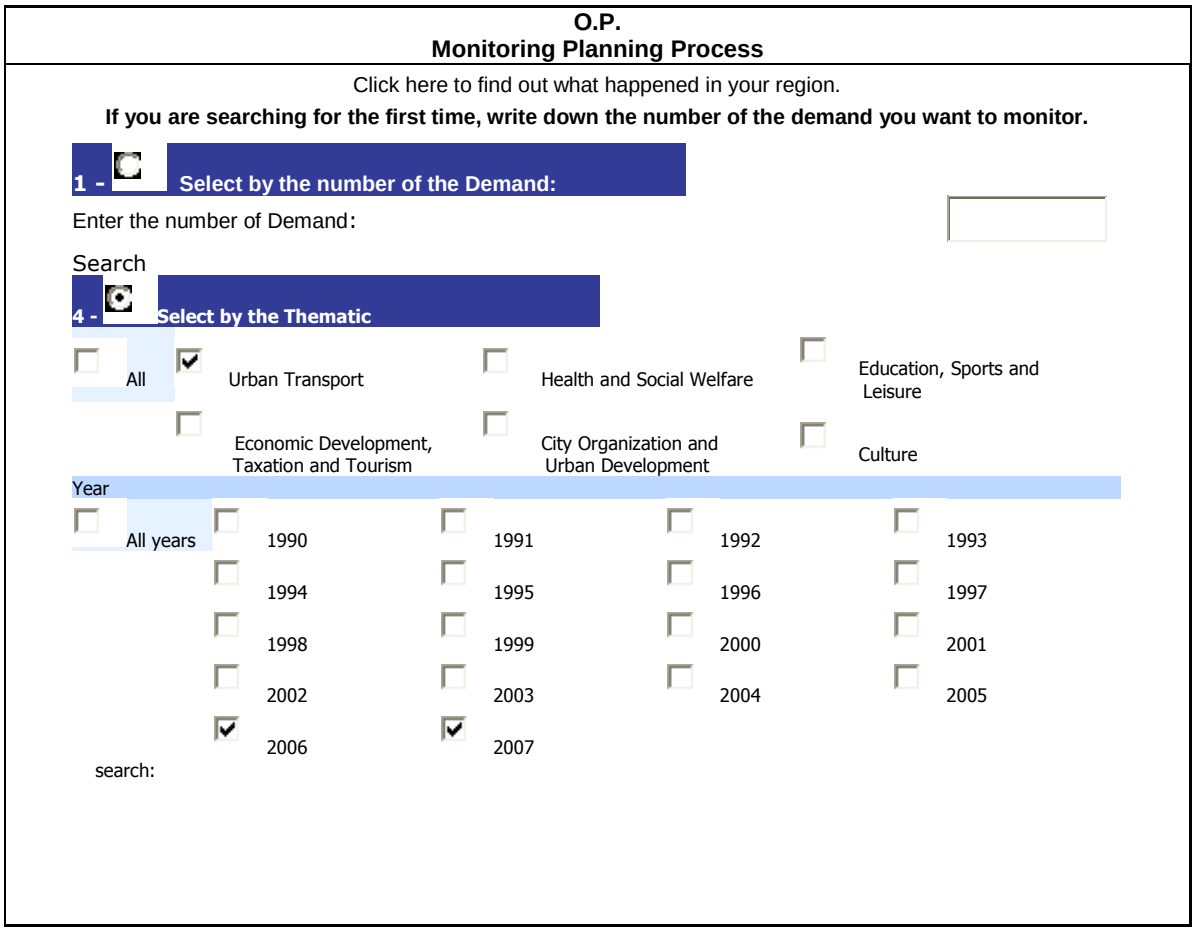


Figure 89: O.P Monitoring planning process – website: 1st step. Source: Porto Alegre, (2008). (original document in Portuguese; translation by author).

Figure 90 shows examples of measures being processed, and the stage of each one within the process.

O.P.
Monitoring Planning Process

Select by Thematic **Year:** 2006/2007 **Thematic:** Urban Transport **Date:** 15/2/2008

SMT/EPTC	2006/2007 – Urban Transport	

Demand	Description	Situation
2006861	Refuge for buses in Av Cavalhada District of Ipanema	In progress
2006865	Refuge for buses at Rua Déa Coufal in District of Ipanema	In progress
20061103	Refuge for buses on Avenue Colonel Marcos – District of Ipanema	In progress
20061206	Pedestrians – qualification of crossings and pavements.	In progress
20061207	Maintenance of bus corridors, terminals and bus stops. Improvements in road infrastructure.	In progress

Figure 90: O.P monitoring planning process – website: 2nd step. Source: Porto Alegre, (2008) (original document in Portuguese; translation by author).

Figure 91 shows the stage of one measure within the planning process, under the responsibility of EPTC.

O.P.
Monitoring Planning Process
Date: **15/2/2008**

SMT/EPTC	2006 – URBAN TRANSPORT
Demand	Description
20061206	Pedestrians – qualification of crossings and pavements.

Step	Evaluation
PROJECT IN PROGRESS	17/12/07

Opinion: Forwarded Prompt previous Licence (PL) for hiring an executive project.

Figure 91: O.P monitoring planning process – website: 3rd step. Source: Porto Alegre, (2008) (original document in Portuguese; translation by author).

Considering O.P., it is possible to conclude that there is broad public participation in Porto Alegre in all phases of the planning process at the tactical/operational level. Documents presented by EPTC and by O.P. show a good coordination between the institutions and O.P. in the planning process. Though there are some conflicts between technicians and O.P. representatives, a broad public participation in the planning process is visible in Porto Alegre at the tactical/operational level.

4.5 STUTTGART

4.5.1 City overview

Stuttgart is the capital of the state of Baden Württemberg, located in the South of Germany, along the Neckar valley. The municipality has around 600 thousand inhabitants in an area of 207km², within a region of 2.7 million inhabitants. In Stuttgart 19% of the population is 65 years old or over, compared with about 14% aged 17 or under. These figures express the reality in the European Union that people are living longer and the fertility rate is low.

Source: from the author.

The negative population growth is compensated for by immigration. In 2006 23% of the population were foreigners (Stuttgart, 2008). According to the European Commission (2005), “immigration brings much-needed young people into the EU workforce”. This workforce is important to the city, considering it has one of the lowest unemployment rates in Germany: 6.2%, against 9.7% for the country (Baden-Württemberg, 2008).

Stuttgart is the “centre of one of the most important economic and agglomeration areas worldwide” (Civitas/Caravel, 2008). The Stuttgart region has the highest number of patents registered in Germany. The innovative environment is a result of the integration between the private companies, government and the high-tech educational institutions (Stuttgart, 2008). The region is well-known worldwide as a mechanical engineering and automotive centre. Moreover, the educational and service sectors have good reputations.

The Trade Fair Centre places Stuttgart on the international scenery of high-tech trade fairs, congresses and business (Stuttgart, 2008). The transport connections into Germany, to Europe and worldwide is guaranteed by the infrastructure of the international airport, the railway and the motorways. Additionally, availability of information and services for visitors are part of the attractiveness.

The tradition in developing transport technology gave Stuttgart the background to coordinate the network No. 8 “Control of Urban Mobility” (URB-AL Program from European Union) in 2001. In 2006 the city took over the responsibility of the network and transformed it into a worldwide platform for discussing mobility. Today, more than 500 cities from sixty-three countries from the five continents are members (Cities for Mobility Office, 2011, interviews).

The standard of living in Stuttgart is one of the highest in Germany. The GDP per inhabitant is 32,600 Euros, (Statistics Bundesamt, 2008) whereas in Germany it is 23,100 Euros (ata from 2004, European commission, 2005). Besides Stuttgart being an industrial and service centre the city offers its citizens a high level of security and a high quality of environment. There are many parks, squares and other public spaces. Culture is also one of Stuttgart’s strengths. The city boasts many diverse museums, theatres, libraries and the well-known Stuttgart Ballet.

4.5.2 Urban Transport

4.5.2.1 Political and administrative organisation

The German Federal Constitution (GFC) of 1949 says that Germany is a democratic social federal republic. The Federal Republic is composed of national, state (Länder) and local government (districts and municipalities) levels. The political and administrative responsibilities are distributed along the government levels following the principles of de-concentration, decentralisation and subsidiarity (Turowiski, 2002).

> "Subsidiarity is the principle that public affairs or matters which fall within the competence of the State ought to be handled by lowest competent authority preferable by the authorities closest to the citizens. A higher level is only considered to be competent when the co-ordination or discharge of duties is impossible or less efficient at the level immediately below" (Schuster[82], 2007).

According to Schuster (2007) "The states have their own constitutions, parliaments, tasks and financial resources". The states have administrative competence with the responsibility of organising their own territories. In addition, according to the principle of decentralisation, they "shall execute federal laws in their own right" (Art. 83 GFC, 1949).

The municipalities have administrative autonomy, following the principle of "self-governance". Article 28 from GFC/49 says that "municipalities must be guaranteed the right to regulate all local affairs on their own responsibility, within the limits prescribed by laws" (GFC, 1949). The responsibilities of the municipality can be voluntary (tasks which the municipalities carry out in their own right) or mandatory (state tasks transferred to the municipalities) (Schuster, 2007).

Moreover, the states regulate their organisation by law and can also delegate and fund local tasks, following the principles of de-concentration and decentralisation. The "Local Authority Law" of the State of Baden-Württemberg determines in the § 2 the tasks and competences for the municipalities: "the municipalities can be obligated by law to perform certain public tasks (mandatory tasks). […] Financial compensation shall be provided if such tasks result in an additional burden for the municipality". [83] Within the mandatory tasks are planning, transport operation and infrastructure.

Within this national hierarchy there is a scale and a separation of responsibilities, decision-making power and funds related to transport planning, infrastructure and operation at the three government levels. According to Sieber (2004), "A complex system of responsibilities and financial transfers between federal government, the states, the districts and the community was developed". The same author wrote that in this system the municipalities "have a certain liberty of decision within the framework of laws and plans set up by the states and the federal government. Financing of roads is very much related to this structure." Figure 92 below shows

[82] Dr. Wolfgang Schuster is the former Mayor (Oberburgermeister) of Stuttgart.

[83] "Local self-government – local authority law of the State of Baden-Württemberg" (Schuster, 2007).

the distribution of responsibilities for the government levels. For Germany the hierarchy starts at a supra-national level, the European Parliament. The distributions of responsibilities can be different for the states and their municipalities, considering that each one has autonomy in organising its own territory and delegates different tasks to the municipalities.

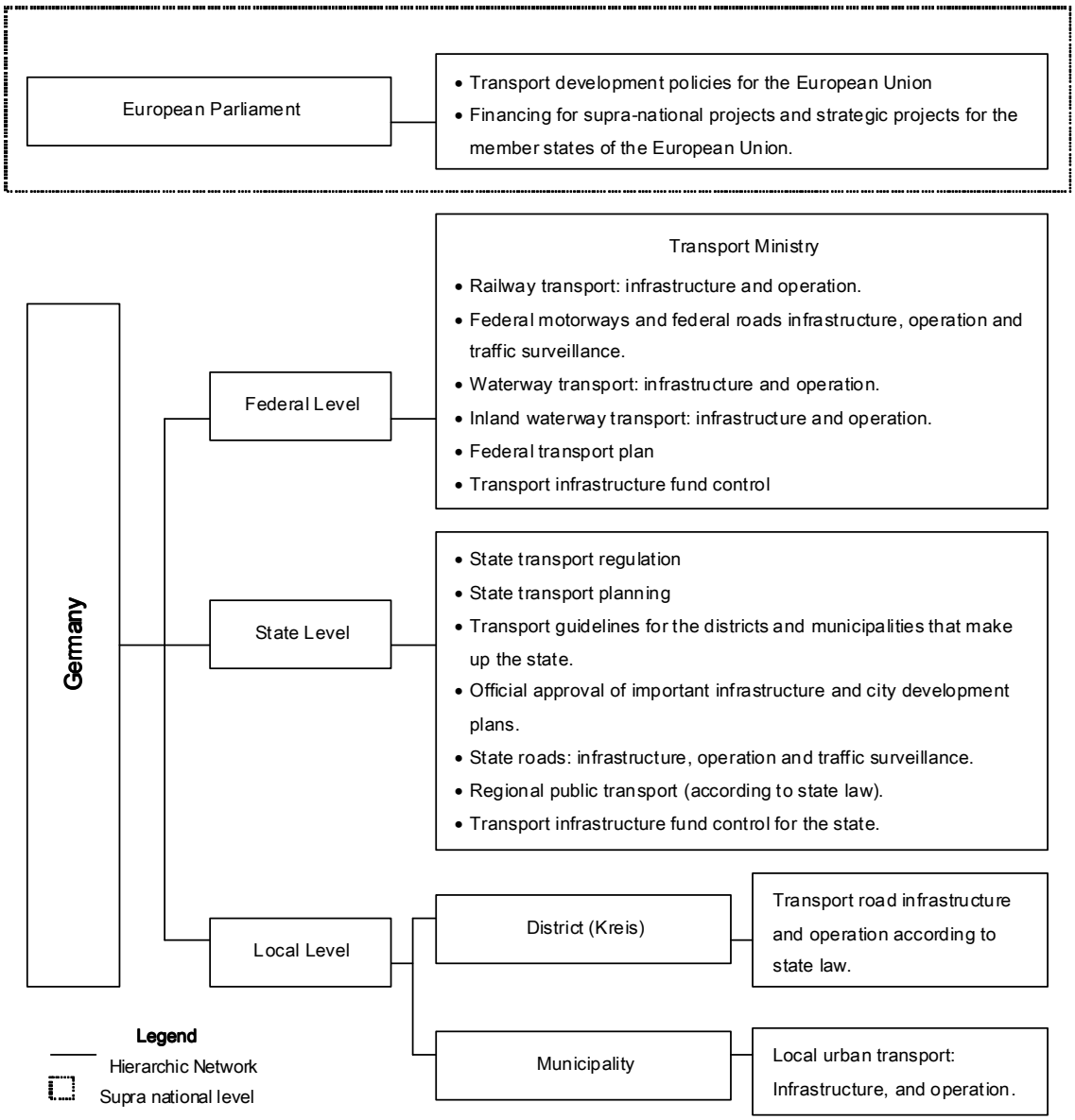


Figure 92: Transport in Germany: Distribution of responsibilities at government levels. Source: from the author.

Urban transport organisation in Stuttgart involves participation from all three levels of government: federal, state and local (see Figure 93). The two federal motorways and the four federal highways crossing the city are under the responsibility of the federal level. One of these highways (B 10) has a section crossing a part of the city centre. It has a high traffic volume. According to the city planners it is one of the highest priority areas for improvements, considering the strong impact on the city (Planning Office, 2008, interviews). However this demands high investment and co-ordination of decision-making in order for the planners at the different government levels to find a solution.

The state of Baden-Württemberg, represented by the Interior Ministry, is responsible for regional train operation, infrastructure maintenance and operation, and the state roads (Interior Ministry, 2008).

The "Stuttgart Region" (Verband Region Stuttgart – VRS) was created by the law of the Baden-Württemberg State. The region has an administrative office in charge of transport and the regional parliament is the decision-maker for matters relating to the greater region. The regional administration has the tasks of co-ordinating planning policies for the region (Stuttgart Region, 2008). The VRS is composed of six districts (each one is composed by a set of municipalities), which is part of the third government level in Germany. The districts co-ordinate regional public transport by bus and provide the districts' roads infrastructure and operation.

The regional metro operation and infrastructure is under the responsibility of the Stuttgart region. Additionally, public transport fare administration for the region is performed by the regional "Public Transport and Fare Association" (VVS). According to VVS (2008) the association is a "public-private-partnership", aggregating transport organizations and the public sector (commissioning authorities) which "balance each other in the association's corporate structure with a 50% share each" (VVS, 2008) VVS establishes co-ordination among public transport operators aiming to provide passengers with an integrated service for the entire region.

The city of Stuttgart accumulates different statuses and functions at the administrative levels: state capital and city government (Landeshauptstadt Stuttgart, Land Baden-Württemberg), centre of the Metropolitan Region of Stuttgart, regional centre (Verband Region Stuttgart), and, district (Landkreis). The mayor of Stuttgart is a district authority and a city authority at the same time. This brings a special challenge related to the harmonisation of local and regional interests, to coordinating the planning policies and leading them to discussion by the different parliaments and to the end decision.

At the local level the mayor has the administrative responsibility for organising urban transport planning, infrastructure and operation. The local parliament is the decision-maker. It "decides all matters which are not in the responsibility of the mayor by law or not transferred to him by the city's parliament" (Schuster, 2007).

In general, the urban transport planning process is organised by the Office for Urban Planning and Environment and the implementation of the measures is the responsibility of the Office for Engineering. The office for public security and order is responsible for the "Integrated Traffic Management Centre" (IVLZ) and statistics Office. Therefore, this office is part of the planning process as well as the Office for Economic Affairs and Finance, which is in charge of the budget. Additionally, the public transport company SSB develops and implements public transport services (tram and bus) for the entire municipal territory of Stuttgart.

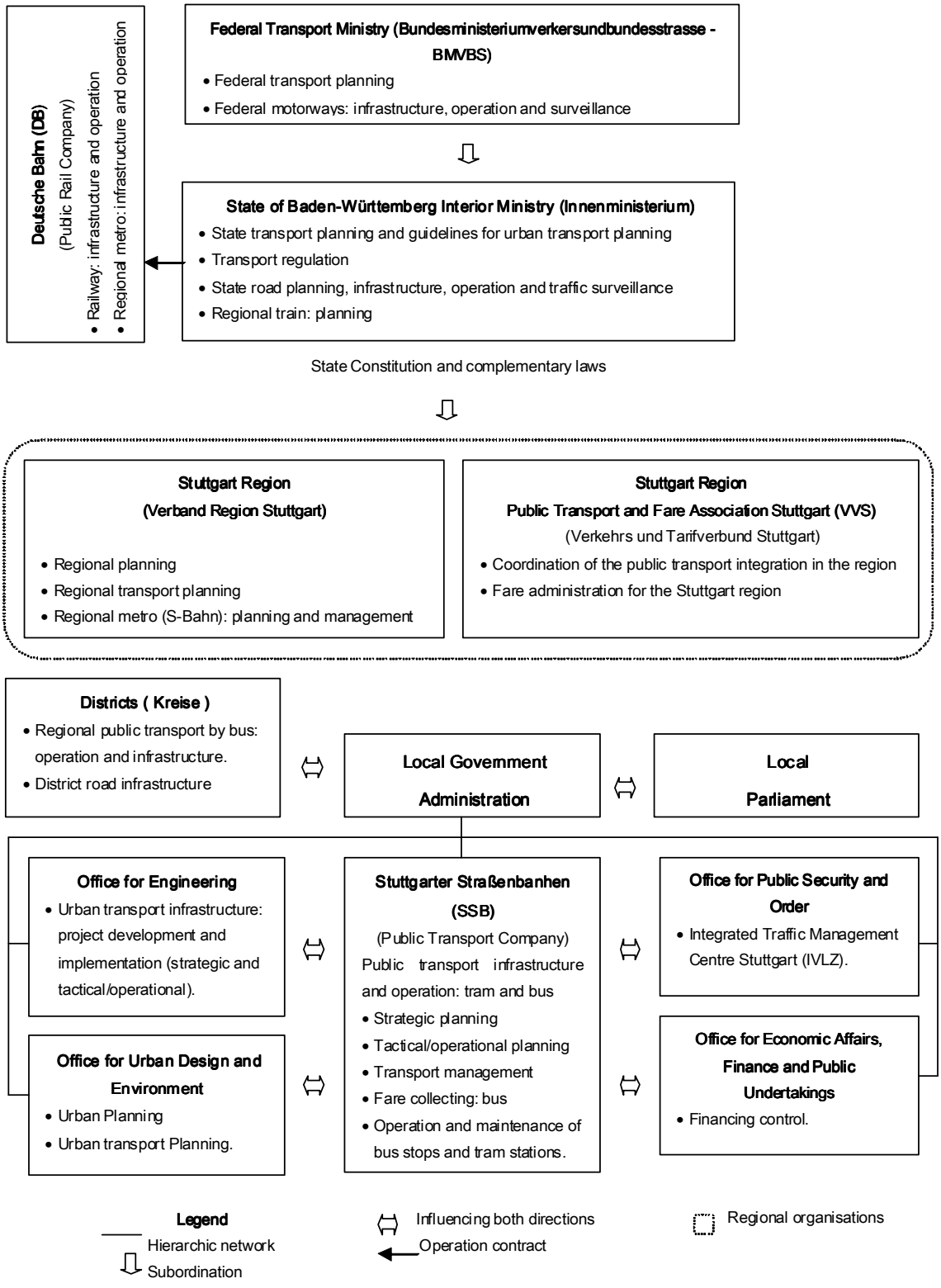


Figure 93: Urban transport organisation in Stuttgart. Source: from the author.

4.5.2.2 Planning – 1950 to 2008

Stuttgart began life as a settlement around the year 950. During the subsequent centuries the areas of housing and the required infrastructure for the city was established. In the period from

950 to 1900 the literature shows the design of road tracks and neighbourhoods that gave the shape of the city centre and the sub-centres in its surroundings (polycentric city[84]) (Stuttgart, 2004).

Stuttgart as it is today is a result of the historic shape modified or complemented by a sequence of planning implemented after the fifties. At this time the city was reconstructed after being almost completely destroyed during the Second World War. The buildings from the beginning of this period have different characteristics. They were constructed using a basic architectural design due to the urgent need for Germany to recover: "Oberstes Ziel war es, den Bürgern der Stadt und den zuströmenden Flüchtlingen so schnell wie möglich ein Dach über dem Kopf zu geben"[85] (Stuttgart, 2004).

The plans after the fifties reaffirmed the characteristics of the polycentric city and set up the required transport infrastructure to connect the sub-centres to the core centre. The tram system had its operation reorganised in 1957. In the sixties it started operating on segregated tracks (Pinto & Gonzales, 2007). The plan of 1962 (Generalverkehrsplan) provides the guidelines for the regional metro (S-Bahn) and for the "city ring", which is a road surrounding the city centre (Stuttgart, 2004). The metro started its operation in 1978. Also in the seventies the tram system was renewed based on a new concept for the trams and for the tracks. The objectives were higher speed and improved quality for the users.

In 1976 for the first time a legal basis created the conditions for a regional public transport organisation for the cities surrounding Stuttgart. Two years later the VVS was founded, bringing about the concept of integrated public transport for the region of Stuttgart. Finally in 1994 the "Verband Region Stuttgart" was set up grouping 179 municipalities (Stuttgart, 2004).

New plans were presented along with this regional organisation. The VRS took over the metro planning and management, and established the integrated public transport system covering the whole Stuttgart region. The city of Stuttgart retained the responsibility for urban transport in its territory, although the urban transport planning follows the concept of regional integrated systems for developing the projects.

To understand urban transport planning in Stuttgart it is necessary to consider the levels of government that exist in Germany. The political and administrative structures for the government levels have impacts on planning structure and organisation. "According to the constitution of 1949, the federal republic of Germany has a decentralised planning system" (Kron, 2007). The government levels have administrative autonomy but also subordinated political decision-making. The Federal level has supremacy over the political decisions and the levels below follow this direction.

[84] The settlement of the city of Stuttgart and of the region was developed in a process of diverse agglomeration of housing and commercial areas for example, connected by the available transport infrastructure. The group of settlements over time came to shape a polycentric city.

[85] "The first target was to give the citizens of the town and the inflow of refugees roofs over their heads as fast as possible".

Considering the planning structure organisation the federal level has a general plan for the federal republic (German Federal Building Code, 2004). Additionally, the states (Länder) have the authority and the responsibility for organising and planning their territories. The regional planning is the core of the planning development. According to Kron (in: Landeshauptstadt Stuttgart, 2007, p.n.a), "in the decentralised system, regional planning is necessary to coordinate and balance the […] planning intentions of single municipalities". For the Stuttgart region, the regional parliament has the responsibility for voting on planning. Figure 94 shows the levels of spatial planning in Stuttgart, from the state level to municipal land use and development planning.

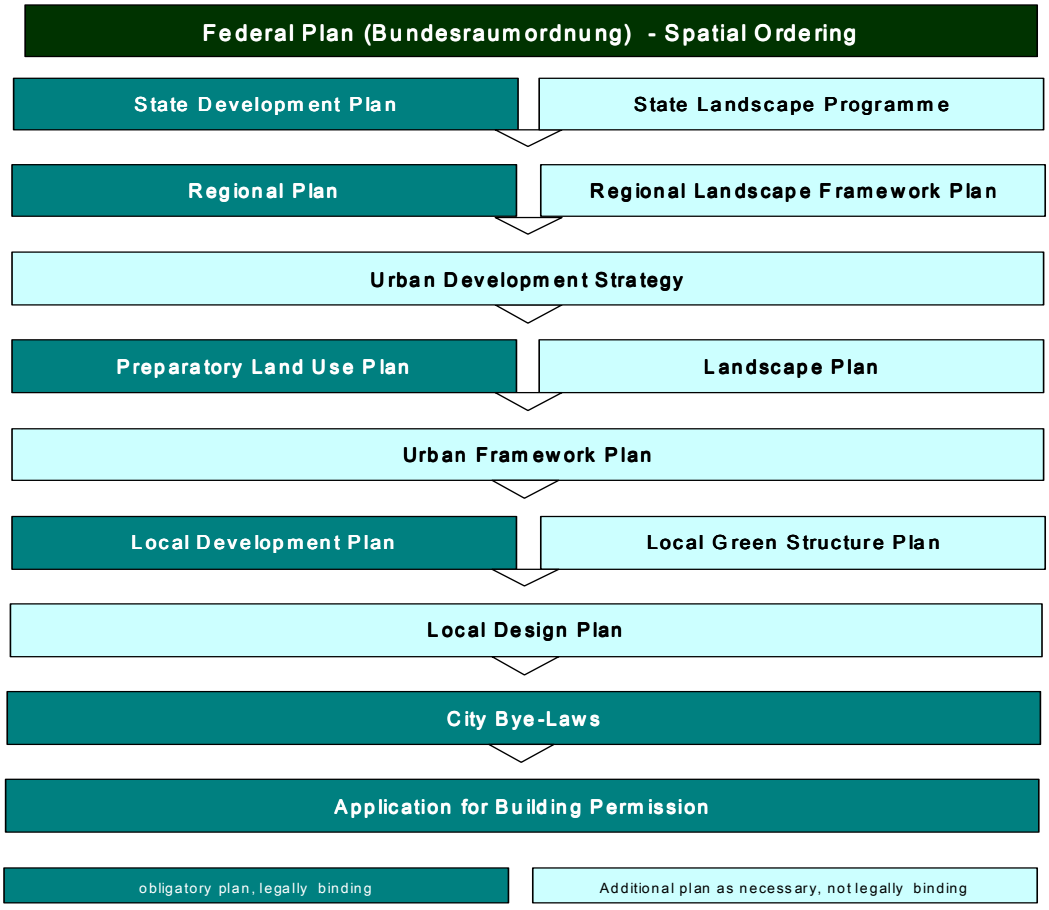


Figure 94: Levels of spatial planning in Stuttgart: from state spatial planning to municipal land use and development planning. Source: Landeshauptstadt Stuttgart (2007).

According to Dühr (2009):

> "The German approach to spatial planning reflects the federal system and it is more regulatory than planning in Netherlands […]. Supra-local spatial planning in Germany, Raumordnung (spatial Ordering), is understood as comprehensive planning aimed at coordinating the spatial impacts of various policy sectors. The Bund (federal level) has limited competences for planning and spatial policy is therefore set out in non-binding 'guidelines' that are devised jointly by the federal government and the Länder (federal states)."

4.5.2.2.1 Federal Transport Plan (Bundesverkehrswegeplan)

The latest federal transport plan was approved in July 2003. The plan is an investment framework and planning guideline. Moreover, in July 2004, national law ("Europarechtsanpassungsgesetz Bau – EAG Bau") confirmed the German Federal Building Code to EU Directives on the Assessment of the Effects of Plans and programmes on the environment (Landeshauptstadt Stuttgart, 2007),

The federal level establishes the general guidelines for planning and mobility concepts for the country. The plan states the priorities for the projects according to the cost-benefit ratio and to the network concept considering the period covered by the available investment framework. It designs scenarios for 2015. The federal transport infrastructure plan is also the basis for the first act to amend the "Federal Railway Act" (2004) and for the fifth act amending the "Highway Expansion Law" (2004) (Germany. Transport Ministry, 2008).

The transport infrastructure is considered priority and strategic for the national planning policy. The objective of the plan is to develop an optimal network where all modes of transport are well linked. An integrated system all over the country is planned using information and communication technologies for networking among modes of transport (Germany. Transport Ministry, 2008).

4.5.2.2.2 State Transport Master Plan: "Baden-Württemberg General Transport Plan – BWGTP" (Generalverkehrsplan)

At the state level the Interior Ministry (Innenministerium) is responsible for developing and presenting the transport master plan. The update of the "Baden-Württemberg General Transport Plan" (BWGTP) and the foundations and objectives of its transport policy have 2025 as their target year.

The BWGTP has been valid since 2010 and is "a long-term general concept" that aims to face the results of "the continuing growth of traffic" and "minimise environmental impact" (BW, 2010). According to the Baden-Württemberg transport ministry (2010), the plan is developed considering social, economic, environmental and land-use planning policies. It presents the concepts and specific measures for different transport modes to face the requirements of the community and industry.

The plan presents technical and organisational measures for different means of transport: road transport, rail passengers, regional public transport, air transport, inland waterway, pedestrians, cyclists and freight transport. In addition it states the guidelines for transport planning in metropolitan areas (BW, 2005).

An updated transport plan is being prepared. It includes the basic principles and objectives of the federal transport policy until 2025. The aim of the update is to put forward solutions for all areas of transport and prioritise where the conditions in transport have changed and new developments are expected (BW Interior Ministry, 2008).

4.5.2.2.3 Regional Plan and Regional Transport Plan (Regionalverkehrsplan)

The Stuttgart Region (Verband Region Stuttgart – VRS) is responsible for the regional plan. The "political organization with its own directly elected representatives of the population: the regional assembly" (Stuttgart Region, 2010) is the legitimate decision-maker for the regional plan.

The regional plan covers the 179 municipalities of the region: the six "Kreise", including Stuttgart. "The plan outlines the regional structure of land uses and governs the spatial order to coordinate the development of settlement and recreational uses with transport and infrastructure networks and public facilities" (Landeshauptstadt Stuttgart, 2007). The plan covers the following areas, looking to present a uniform picture of the region: planning policies – regional infrastructure, landscape and transport; business promotion; local public transport; waste management; trade fairs and exhibitions, and tourist marketing.

According to the Verband Region Stuttgart (2006), the key stipulations of the current plan are the following:

- Priority for maintaining and extending existing residential and commercial/industrial space as opposed to new buildings on green field sites;
- Further development of the region's characteristics as a polycentric city;
- Concentrating growth of housing and commercial/industrial plants along the development axes in order to counter uncontrolled urban sprawl in the region and efficiently use the existing road and rail connections (see Figure 95);
- Integrated transport concept: establishment of policies for the whole region considering all modes of transport in an integrated network, plus housing and landscape planning.
- Continual improvements in the regional transport network to support the constant economic growth and as a consequence the growth of the demand for transport.

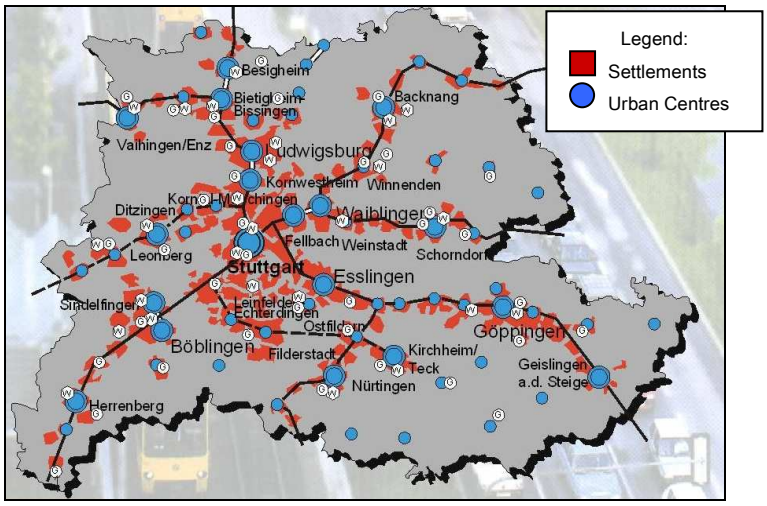


Figure 95: Stuttgart Region. Development axes. Source: Landeshauptstadt Stuttgart (2008).

The regional transport plan (Regionalverkehrsplan) was edited in 2010. The plan states the guidelines and the main transport measures for the region of Stuttgart. The Regional Plan has

strong commitment to the development of the logistic system and the transport of goods to support economic development for the region, thet is a production basis export oriented. “In Baden-Württemberg und in der Region Stuttgart ist die Exportabhängigkeit besonders hoch. Dem Güterverkehr muss deshalb ein hoher Stellenwerk eingeräumt warden”[86] (Verband Region Stuttgart, 2012, p.102). According to the Stuttgart region (2010) mobility is the main challenge for the region and it is the sector which requires the largest amount of investments. The plan considers investment in transport to be the main strategy to balance the region’s development, proposing strategies and plans for the development of a regional transport network.

> “Da hinaus kommt die im März 2011 erschienene Begleituntersuchung zur Fortschreibung des Regionalverkehrsplans der Region Stuttgart zu dem Ergebnis, dass der Freizeitverkehr für die Bevölkerung in der Region die groesst Bedeutung hat. So entfallen 37% aller zurückgelegten Wege auf die Freizeitverkehre. Erst an dritte Stelle stehen die Wege zur Arbeit (17%), noch nach dem Wegezweck Einkaufen mit 18%. Diese Zahlen zeigen, dass neben den Wirtschaftsverkehren die Freizeitverkehre von zunehmender Bedeutung sind“[87] (Verband Region Stuttgart, 2012, p.102).

In recent years, one of the most important projects for Stuttgart, approved by the regional parliament, is “Stuttgart 21”. The objective of this project is the reorganisation of Stuttgart’s main rail station. The construction of an underground station would create the possibility to connect the region to the main European high-speed railway corridors. Additionally, it would create new metro connections for the region (VRS, 2010). Figure 96 below gives an impression of the project “Stuttgart 21”.

Legend: A, B and C are the areas liberated for new uses after the implementation of the project.

Figure 96: Stuttgart 21 Project[88]. Source: Stuttgarter Zeitung Nr. 47 Monday, 25th February 2008, page 21.

[86] In English: In Baden-Württemberg and in the Stuttgart region's export dependency is particularly high. Therefore a high priority to freight transport must be given.

[87] In English: Published in March 2011, this study is to update the regional transportation plan for the Stuttgart Region. The paper shows that the trip purpose for leisure for the population in the region has the greatest importance among the journeys made. The figures shows that 37% of all trips for this purpose. The purpose to working (17%) coms only at third place, even after the purpose shopping with 18%. These figures show that in addition to business trips, leisure has increased its importance.

[88] Legend: A, B, C represents the area liberated for new uses after the implementation of the project.

4.5.2.2.4 Local Plans and guidelines

In Germany the municipalities are in charge of planning their territories, following the guidelines of the higher levels. In Stuttgart the mayor of the city is responsible for planning in general and the city parliament is responsible for decision-making. Urban planning is under the responsibility of the office for “Urban Design and Environment”. This office has general planning responsibility for all areas in the city. However specific themes can be planned by the authority of each area or by specific offices.

At the local level various plans are designed to provide legal support for the application of the laws proposed by the higher government levels (federal, state and regional plans) and for developing the diverse areas of the city. Landeshauptstadt Stuttgart (2007) enumerates the following plans at the local level as the basis for city planning in Stuttgart:

- Preparatory land use plan (Flächennutzungsplan);
- Urban development strategy (Stadtentwicklungsplan);
- Landscape plan (Landschaftsplan);
- Urban framework plan (Stadtebaulicher Rahmenplan);
- Local building plan (Bebauungsplan);
- Local green structure plan (Grünordnungsplan);
- Local design plan (Gestaltungsplan);
- City Bye-Laws – Historic urban cores (sonstige Satzungen).

Figure 97 below shows a general overview of the stages in the production of the local development plans, according to the requirements of the “Federal Building Code”.

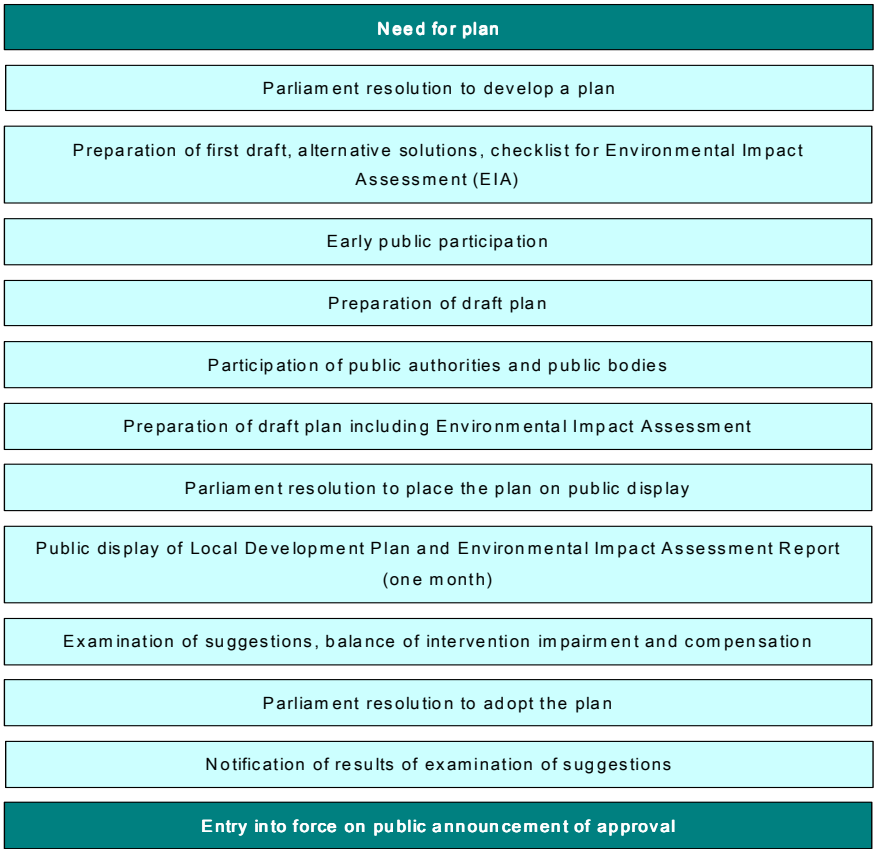


Figure 97: General overview of the stages in the production of the local development plans, according to the requirements of the "Federal Building Code" of 2004. Source: Landeshauptstadt Stuttgart (2007).

a) Preparatory Land Use Plan (Flächennutzungsplan)

The preparatory land use plan is developed by the city of Stuttgart, following the guidelines of the "Federal Building Code" (BauGB). It has to fulfil the requirements of the BauGB for the different uses of the municipal territory. According to the §5° of the federal code "The preparatory land use plan shall represent in basic form the type of land uses arising for the entire municipal territory in accordance with the intended urban development which is proposed to correspond to the anticipated needs of the municipality." The final version of the plan must be approved by the state parliament and its adoption is supervised by the Interior State Ministry.

As described in Stuttgart (2007), the preparatory land use plan "has to be aligned with the aims of the state spatial planning and regional development planning. It outlines the existing or envisaged structure of land use of the municipal territory, especially residential, commercial and transport uses, green spaces, agricultural and forestry land. It is drawn up in order to secure planned urban development." Therefore, the preparatory land use plan represents the connection between federal, state, regional and local planning policies and guidelines.

Besides the preparatory land use plan, there is the "Local Development Plan". It was developed according to the "Federal Building Code" (§§ 1 and 9). "It is adopted as a statute" with the objective to regulate the constructions and the land use (Landeshauptstadt Stuttgart, 2007).

b) City Development Plan – CDP (Stadtentwicklungsplan)

According to Stuttgart (2007) the "city development plan" (Stadtentwicklungsplan) is not a law "neither a binding administrative territory". It is defined as a "long-term strategy for analysis, information, coordination and governance of municipal planning concerns."

The "city development concept" (Stadtentwicklungskonzept – STEK) was written on the basis of the CDP and the first version was presented in 2004 with the objective of providing a framework for the CDP, giving guidelines for the development of projects for the different areas of city planning. According to Landeshauptstadt Stuttgart (2007) the STEK coordinates "sectoral planning with urban planning". The city development plan and the city development concepts for each area are not laws, but they are approved as valid by the city parliament.

The city development concept of 2004 confirms a decentralised city, as shown in Figure 98, and sets the city growth along the existing development axes (Figure 95), following the guidelines of the regional plan.

Figure 98: Stuttgart: an overview of a radius of 25 km. Decentralised/polycentric city concept. Left side: settlements. Right side: preservation areas. Source: Stuttgart city development concept – STEK (Landeshauptstadt Stuttgart, 2004).

The urban development concept generally follows tendencies towards densification, recycling and the recreation of old areas, instead of allowing constructions on new ground (URB-AL, 2004).[89] This concept involves the use of existing infrastructure more efficiently along the development axes and the maintenance of environment quality, preserving the green areas (Figure 98). [90]

The city development concept contains a specific chapter on transport and mobility, giving an overall view on the sector. In addition, it presents mobility scenarios and guidelines for transport development with emphasis on specific projects, for instance Stuttgart 21.

The most important aims indicated by the general STEK 2004 for transport development are the following (Landeshauptstadt Stuttgart, 2004):

[89] Bosch Areal is an example of a recreation area: the old area of the first Bosch company plant was transformed into a commercial and leisure area. Also Stuttgart 21 will liberate a large area in the core of the city for the construction of housing, commerce and services.

[90] According to STEK, around 29% of the entire area of Stuttgart is green area: forest and leisure areas (parks, squares, etc.) (Landeshauptstadt Stuttgart, 2004).

- Integration of transport and urban development;
- Development of attractive public transport;
- Improvement of mobility management and public relations;
- Motorised individual transport development integrated with urban design;
- Designation of public spaces and transport infrastructure;
- Reduction of noise pollution coming from transport;
- Intensification of cycling development;
- Improvement in pedestrian areas;
- Integration of freight transport in the city.

A specific STEK for urban transport was also developed by the Department of Urban Renewal and Development section of Transport Planning and presented in 2010 and 2013.

c) Urban Transport Development Concept (Verkehrsentwicklungskonzept – VEK 2030)

According to Landeshauptstadt Stuttgart (2013), the VEK 2030 presents a framework for action and strategies for transport and traffic planning for the city of Stuttgart for the next twenty years - the target horizon is the year 2030. The VEK proposes to be an integrated and inclusive approach, which should be a guideline of urban transport planning, also allowing the prioritisation of required investing, operational and regulatory policy measures. The term “integrated” in this case also means that the traffic is considered in relation to the environment, urban design and urban compatibility. The ideal of integration is also founded on the consideration of the conditions of topics such as demographic change, settlement development, and environmental and climate protection. Furthermore, the VEK seeks to promote further developments in transport planning including new forms of mobility such as electric vehicles and car sharing, in response to the demand for sustainability.

Aiming towards these goals, the VEK proposes a framework for action in order for Stuttgart to continue its position as an attractive business location and place of residence with a high quality of life. A system of goal-oriented and multi-layered transport and mobility planning is also required for the future. In order to meet this vision the following principles have been set:

- Guaranteeing performance in the major road network and offers of public transport;
- Careful handling of the public space;
- Promoting and complementing the local transport service as well as non-motorised, new and sustainable forms of mobility;
- Promoting active awareness of the possibilities and implications of mobility behaviour, and providing tools that allow greater use of modes of collective environmental network; and
- Transparency for citizens in all measures of transport and mobility planning.

4.5.2.3 The urban transport network

According to the Verband Region Stuttgart (VRS, 2012, p.103), the figures for the modal split confirm that the region has a high dependence on private motorised transport. This means that more than 50% of the region's population uses cars for daily journeys.

> „Die Verteilung der Verkehrsleistung auf die verschiedenen Verkehrsmittel, der sogenannte „Modal Split", unterscheidet sich in der Region Stuttgart teilweise deutlich von der gesamtdeutschen Verteilung [Mobilitaet in Deutschland 2008, Hrsg.: BM Verkehr, erstellt von infas.]. In beiden Fällen ist der Pkw das dominierende Verkehrsmittel mit 49,2% in der Region bzw. 54,8% in Deutschland. An zweiter Stelle mit 25,0% folgen in der Region die oeffentlischen Verkehrsmittel, die in Deutschland mit 15,5% erst an dritte Stelle kommen. An zweiter Stelle stehen stattdessen die Pkw-Mitfahrer (inklusive Taxi) mit einem Anteil von 24%. Dieses Verkehsmittel kommt in der Region Stuttgart nur auf 19,0% und damit an dritter Stelle. An vierter und fuenfter Stelle folgen die zu Fuss bzw. mit dem Fahrrad zurueckgelegten Wege, die in der Region auf 4,6 bzw. 2,1% kommen. In Deutschland haben beide Verkehrsmittel einen Anteil von knapp unter 3% (2,9 und 2,8%)."[91]

4.5.2.3.1 Public transport

"Stuttgarter Strassenbahnen AG" (SSB) is a public transport operator in Stuttgart. SSB is a public company set up with 100% public capital. The city of Stuttgart is the single owner of SSB. The company organises, plans and operates public transport by bus and tram for the whole city. It is also responsible for the infrastructure: tracks, rolling stock, tramway, bus stops and tram stations. In Stuttgart around 24% of journeys are made by public transport.

The public transport network in Stuttgart is planned as an integrated network for the whole Stuttgart region. The timetable, together with the integrated fare, provides the connections between the metro, tram and buses.

The fare administration is done through an association with VVS. The tickets from VVS are valid for the entire network of Stuttgart and the region. The prices are established according to a zoning system which radiates out from the centre of Stuttgart (fare level 1, with a cheaper price) to fare level 6, the most distant ring covered by the network in the region. The territory of

[91] In English: The distribution of transport performance in the Stuttgart region among the various modes of transport, the so-called "modal split", differs in important ways from the average modal split for German cities [Mobility in Germany 2008, Eds: BM traffic, created by infas.]. In both cases the car is the dominant means of transport with 49.2% in the region and 54.8% in Germany. In second place in the Stuttgart region, with 25.0%, comes public transport, whereas across Germany public transport is in third place with 15.5%. In second place nationally is shared private transport (including taxis) with a share of 24%. This means of transport follows closely in the Stuttgart region, with 19.0% and in third place. In fourth and fifth place are walking and cycling, which make up 4.6 and 2.1% for the region. Across Germany these two modes make up a share of just under 3% (2.9 and 2.8%).

Stuttgart itself is covered by the fare levels 1 and 2. There is also a selection of tickets available for specific users such as students and commuters. [92]

VVS is responsible for the administration of the web platform to inform users about the timetable and the itineraries of public transport for Stuttgart and the metropolitan region. In addition VVS organises the dialogue among the transport authorities in order to coordinate the services and generates an integrated and consistent public transport service (considering the integrated fare and physical infrastructure). The picture shows a typical bus stop (street level) near an underground tram station (U-Bahn).

Source: from the author.

a) Tram (Stadtbahn: U-Bahn)

In Stuttgart there are 16 tram lines in operation, with 209 kilometres of track length covering the whole city territory. The tram system transports around 400 thousand passengers per day.

The yellow “Stadt Bahn”, as it is called, is a symbol of Stuttgart. It is considered environmentally friendly. Operating on segregated tracks and having preference at cross-sections, it can reach high speeds without interference from people or cars. Its average speed is around 30 km/h. The electric propulsion has low impacts on the environment. The service receives a good evalution by its users for performance, availability, comfort and reliability. The picture shows the integration of public transport and cycling.[93]


Source: from the author.

b) Bus

The bus routes are planned and operated by the public company SSB and cover the entire territory of the city. There are 54 routes, 822 stops and stations and the itineraries cover a route length of 672 kilometres. 170 thousand passengers are transported by bus daily in Stuttgart.

[92] According to VVS (2008), “the VVS tariffs apply equally to all commuter trains, trams, buses, and regional trains within the Stuttgart region. This provides many benefits for our customers, who need only one single ticket for all these types of public transportation. With its comprehensive variety of tickets offered, from short-distance tickets, single tickets, multiple ride tickets, and daily, weekly, monthly and yearly passes, to company passes, "School" passes for school children; StudiTickets for university students, and senior tickets, VVS has a matching ticket available for each of its varied groups of customers.”

[93] On this line, a rack railway called the ‘Zahnradbahn’, the trams have racks available to transport bicycles. This offers a special integration of the modes, considering that the line goes up steep hills. The cyclists coming from the hills reach the tram station by bicycle, go down by tram, and again have the bicycle available to circulate in the city centre.

c) Metro (S-Bahn)

The metro system is planned and operated by the Stuttgart metropolitan region (VRS). The first line was opened in 1978. Since 1993, there have been six lines crossing the metropolitan region from north to south and from east to west. The daily demand in the entire region is around 280 thousand passengers. The network has 267 km for the Stuttgart Region and 77 stations. The section in Stuttgart transports on average 166 thousand passengers per day (working days).

Source: Verband Region Stuttgart

d) Taxi

The taxis system is managed by the municipality, who gives permission to private individual operators to serve the population. The services are regularly monitored by the transport authority. They have fixed stops at regulated parking spaces. The fare is calculated by the municipality and monitored electronically. Taxis services are an importat alternative transport mean on covering areas where mass public transport is not available or with scarce time table.

4.5.2.3.2 Alternative transport modes

a) Public Car sharing "*Stadtmobil*"

In Stuttgart the service of car-sharing is operated by the German Railway (DB Stadtmobil). There are several stations in the city where users, after registration, can collect a car or return it after their trip. The service is used by different customers, with an important attraction for liberal professionals and public officers. What also makes the service attractive is its availability at points near train stations, facilitating the integration with the railway services.

Source: from the author.

b) Private car sharing "*Car to go*"

This is an alternative transport service available for the population. The service consists of the availability of a car, rented according to length of time used and distance travelled. What has raised the attention of users to this service is its flexibility, availability in areas of more intensive commercial and service uses, and reasonability of costs for people who cannot or do not want to buy a car, but who sometimes needs one.

The advantage of this service when compared to a taxi is that the passenger is also the driver and the price is lower than the taxi service. What is different about the public car-sharing, which is seen as an advantage by its users, is the fact that the *Car-to-go* does not have a fixed point for collection or departure.

Source: from the author

4.5.2.3.3 Private transport

a) Motorised individual transport

Stuttgart has a fleet of around 320 thousand cars, which represents 1.9 inhabitants per unit. Car journeys make up about 45% of the modal split.

Parking is one of the greatest problems in the centre of Stuttgart and its closest neighbourhoods. Most of the buildings do not have parking areas on private ground, and the public spaces are not enough to cover the demand. In the city centre there are subterranean parking garages and building garages with several floors.

Moreover, at peak hours in various parts of Stuttgart, there are queues of up to fifteen minutes. The city has constraints of topography (it lies in a valley surrounded by hills) that reduce possibilities of the enlargement of the road network. The city centre is bound by a ring that channels the traffic and distributes it onto the intersections with the high capacity roads. Two federal motorways and four national roads cross the city. According to the planning office the motorways section has one of the greatest traffic densities in Germany. Considering the traffic volume crossing the area, plus the traffic generated by the high number of cars in the city, the road network is not able to offer a high level of service without new investments in construction of tunnels, bridges and new road sections. Additionally, investment in traffic management is required.

The road infrastructure is classified according to Table 29 below. In Stuttgart the local streets have a single classification (Gemeidestrasse). In addition, the federal, state and district roads are considered in the local network classification for planning and operation.

Table 29: Stuttgart road classification.

Road Infrastructure Classification		
Type	**Location**	**Function**
Federal motorways	Continental	Level 1: Connecting metropolis region.
Federal highways	National	Level 2: Connecting metropolis region to big cities or connecting big cities.
State roads	State	Level 3: Connecting big cities to medium-sized cities.
District roads	Districts	Level 4: Connecting districts or connecting cities.
Local streets	City	Level 5: Local connections (local road infrastructure).

Source: adapted from “Richtlinien für integrierte Netzgestaltung – RIN” (Guidelines for creating the integrated network) (FGSV, 2007).

The implementation and operation of traffic signalling are done by a private company through a contract with the city of Stuttgart.

The office for security and order is responsible for the traffic statistics and the integrated traffic management centre (IVLZ). The IVLZ integrates the traffic surveillance made by the police, ambulances, fire brigade and traffic monitoring. The office of IVLZ gathers together staff from these professions in one building. The objective in working together is to guarantee safety, security and less congestion. In the middle of the building there is a room prepared for crisis administration. The staff receives training to work together and manage crisis events, from minor accidents affecting one cross-section to catastrophes that involve the whole city.

b) Cycling

Cycling is planned and organised by the Department of Urban Renewal and Development section of transport planning, subordinate to the office for urban planning and environment. Today cycling represents 5% of the modal split (1996). The city has 140 kilometres of bicycle lanes. In the forest and agricultural areas there are more than 700 kilometres. The city has around 6,000 parking spaces for bicycles. Additionally, there are more than thirty parking garages (Figure 99), where users can store bicycles with security, paying a tariff for the service. Additionally, there are two bicycle-service stations with 100 bikes each (Cycling Ofice, 2009, interview).

In agreement with VVS and SSB, various facilities are offered to cyclists: journey planning on the Internet, infrastructure at the tram stations and space on board trains for the storage and transportation of bicycles. Additionally, maps and other kinds of information are available for the public on the Internet or in the information offices.

Since 2007 a new service to rent bicycles called “Call-a-bike” was opened in Stuttgart (Figure 99). The service is operated by the German Railway (DB Rent), ordered and supported by the City of Stuttgart. To use the service the customers must register online and activate by mobile phone. The first half hour is free of charge. Today there are 65 stations and 400 bicycles. After a year in operation, in 2008, more than 60,000 trips were registered.

Figure 99: Stuttgart. Bicycle garage and “Call-a-bike” station. Souce: from the author.

c) Walking

Pedestrians make up 26% of the modal split in Stuttgart. In the city centre the circulation area is mainly pedestrian zones. The area of its influence is approximately eight thousand m². It is the most important commercial and service area in the city. This area is limited by the city ring. It is not possible to cross the pedestrian zones by car, but only to circulate on the city ring and access the parking spaces and garages located underground. It is also possible for some delivery vans and lorries to enter commercial areas. Information for pedestrians is available on the Internet and on maps displayed at several points around the city and in folders at the information offices. Considering the polycentric urban area, the pedestrian pathways in the centre of or surrounding the parks, squares and leisure routes, are displayed on maps.

Source: from the author.

4.5.2.4 Urban transport planning process in Stuttgart[94]

a) Actor-network

In Stuttgart there are government offices and institutions at the local level, from the Stuttgart region and from the state level involved in the urban transport planning process (Figure 100). The state determines the general guidelines and gives financial support for some strategic projects. The Stuttgart region participates directly in the planning process, considering the transport network covers the entire region. Additionally, fare administration and planning are performed by VVS.

At the local level the government offices and the public transport company SSB are responsible for the planning process in all phases, excluding the decision phase. In general the plans are developed by the staff responsible for each specific area. Before the phase of decision at the local level, the projects involving construction of infrastructure are sent to the "Regierungspräsidium" to be approved. The "Regierungspräsidium" is responsible for assessing the projects and executing the laws related to planning[95].

[94] The information used to describe this section was gathered during interviews, direct observation and internal documents in the different city departments, SSB, VVS. IVLZ and Stuttgart Region, from 2008 to 2011.

[95] The State of Baden-Württemberg is divided into four planning regions. One of them is the Stuttgart planning region. The "Regierungspräsidium" is a state institution responsible for the execution of the laws related to infrastructure planning for the state planning regions. It uses technical staff from different areas of planning to assess and approve the projects.

At the decision phase the projects are sent to the city parliament. In Stuttgart, the local parliament has sixty deputies plus the mayor, who is its president. In the parliament there are technical and financial commissions. Six commissions discuss the plans and agree on a decision. There are three other commissions who are only open in order to discuss the plans and make recommendations. The decision-making commissions are composed of the deputies and of technicians from the government. In the other commissions there are representatives of the community who are stakeholders.

The mayor is the coordinator of the decision process. However, he only has one vote among the total of the sixty-one votes of the deputies. This is the typical decision-making process of the parliamentary government. The executive is responsible for developing and implementing the measures, whereas the parliament and the executive together make decisions about the projects.

In Stuttgart all strategic projects are sent to the parliament. At the tactical/operational level the most important projects, those that have the most financial or environment impacts, are also sent to the parliament for discussion and for final decision. The sixty deputies and the mayor organise the various discussions of the project through commissions and make the decisions about the plans.

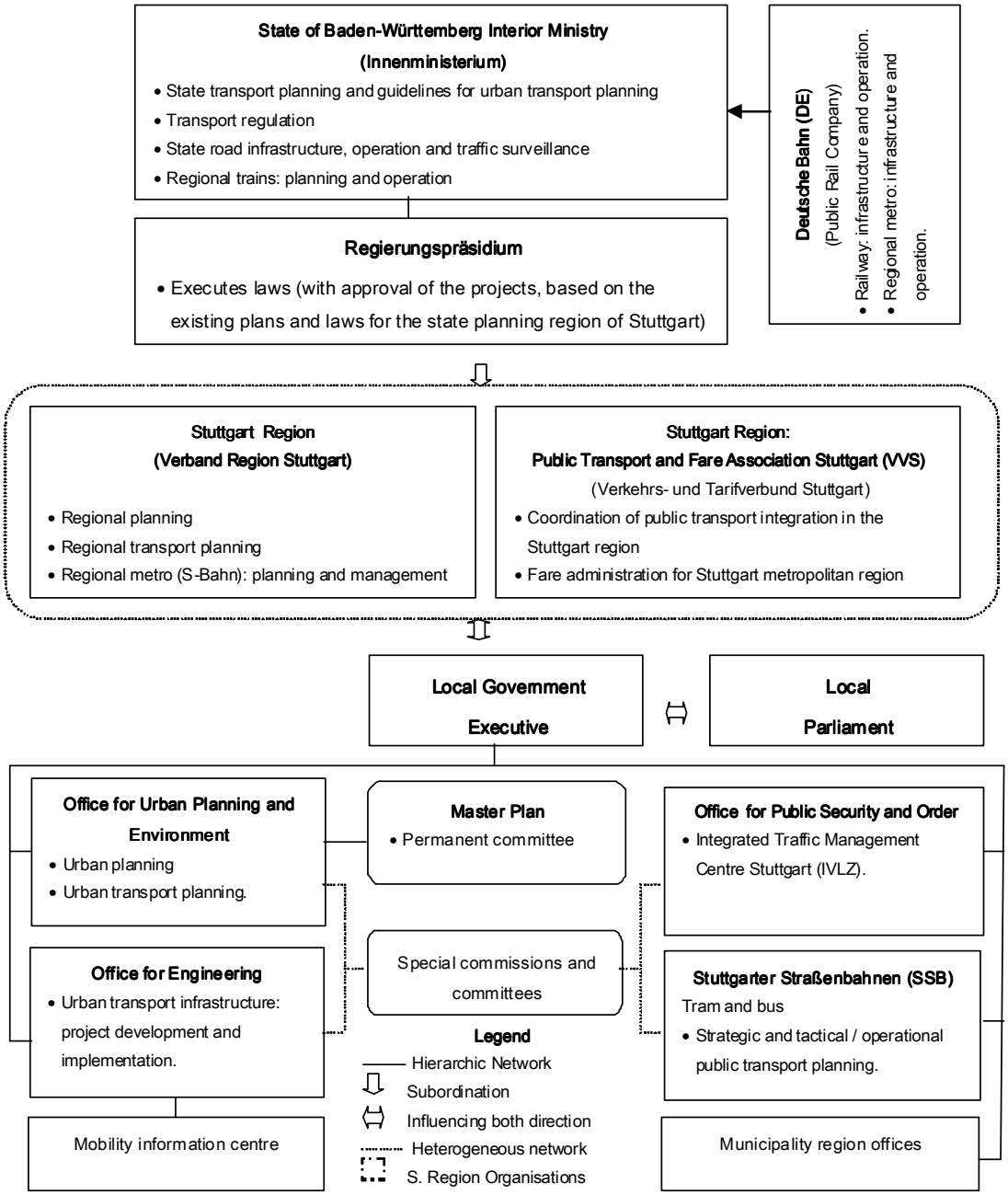


Figure 100: Urban transport planning process in Stuttgart: Actors. Source: from the author.

According to Figure 97 public participation in the process of planning is regulated. However the way that the public participates in the process can vary according to the kind of project and who is responsible for organising each specific plan. In Figure 97 it is possible to observe two moments when the norm is applied: the “early participation” stage and the “display of the plan for a month” for public evaluation and discussion.

The document “Levels of spatial planning in Stuttgart” (2007), presents different plans and shows how public participation was engaged in the process during the “problem analysis” and “examination of measures” phases. The most common methods chosen for participation are coached discussions, forums, workshops and discussions with affected parties and advisory boards. Later, public displays of the projects are made, with analysis of suggestions from the public by the office responsible for the plan, which decides whether or not to include

suggestions. Moreover, some plans are developed with the participation of the public bodies from the areas affected by the specific plan.

For projects involving the construction of infrastructure, public participation is guaranteed before the approval of the projects by the “Regierungspräsidium”. The projects are presented in public audience for discussion and in order to receive suggestions. Additionally, the citizens can individually send their opinions and suggestions to the staff responsible for the project’s assessment.

In some areas, cycling for instance, a permanent committee exists. This committee involves the participation of stakeholder representatives from the community, university, public bodies and city parliament. The main committee in Stuttgart is the “master plan” committee, composed by technicians from public bodies and coordinated by the head of the office for urban design and environment. This committee occasionally convenes when there needs to be an improvement of the master plan.

Public participation at the decision phase is representative. The city parliament and representatives of the public in general, decide on and choose the plans and investment for each project and means of transport.

b) Information

In Stuttgart the information used for planning comes from various sources. The basic information comes from the applicable laws and plans: federal, state, regional and city plans, from the concepts (STEK and VEK 2030) and from the guidelines and internal data basis organised by the city planning office. Additionally, the manuals produced by the researcher institute “Forschungsgesellchaft für Strassen und Verkehrsplanung” (FGSV) and the traffic manual “Handbuch für die Bemessung von Strassenverkehrsanlagen” (HBS) are largely used for the development of the projects.

For public transport, SSB posseses the internal guidelines and data basis with statistics and historical information. This information is used by SSB for developing the plans. The information is used as a source for softwares and programmes that develop computational simulations in order to support the development of measures.

4.5.2.4.1 Strategic level

In Stuttgart the process of plan development is decentralised. The process of decision at the strategic level can involve the city parliament, the Stuttgart region, the “Regierungspräsidium” or the state of Baden-Württemberg. The organisation of each planning process depends on the type of plan, as described before. The actors involved in the process at this level are the same as those shown in Figure 100 above.

The mayor, the institutions involved and the parliament can propose the initiation of an urban transport plan based on the master plan or on the needs presented by the citizens or identified by the public authorities and the planners.

For public transport the plan is developed and implemented by SSB. The company has technical staff responsible for the planning tasks. At the strategic level the company can propose to initiate a plan, but the proposal is first presented to the mayor. Then the mayor presents and discusses it in the local parliament. At this forum the decisions are made. In the phases of problem analysis and development of measures, the technicians can discuss specific tasks with other local government offices. Permanent commissions or committees do not exist.

In the case of the plan involving construction of infrastructure, it is presented to the "Regierungspräsidium" for assessment before being presented to parliament. Additionally, after the approval, it is left to the parliament to take the final decision about the investment and the implementation. Plans that do not involve construction are presented by the mayor to the parliament for decision.

Private transport is planned by the office for urban design and environment. The engineering office is in charge of the implementation. The process of decision follows the same pattern as with public transport.

At the strategic level there are two committees working under the guidance of the office of urban planning and environment: the master plan committee and the cycling committee. The members of the master plan committee are technicians from the different departments of the local government offices. The cycling committee is explained below.

a) Cycling committee:

The cycling committee is organised by the Department of Urban Renewal and Development section of transport planning, subordinate to the head of the office for urban planning and environment. The head is the main authority over the committee, is responsible for cycling matters, and coordinates the various groups and the planning process.

The members are stakeholder representatives from the community, university, public bodies (planners, police, and affected areas) and representatives from the city parliament.

The committee has three working groups:

- Cycling safety and security
- Public affairs;
- New master plan development.

The groups working on the plan meet every six weeks, and general meetings with these groups are organised every three months in order to discuss the projects and forward the results.

4.5.2.4.2 Tactical/operational level

At the tactical/operational level SSB is in charge of public transport planning in all phases of the planning process, except decision-making. At this level the mayor is the decision-maker. However, in this case, the mayor acts not as the political authority of the city, but as the

representative of the owner of the public company SSB, the city of Stuttgart. SSB interacts with VVS for implementation or change of the timetable, fare, or any other aspect of the network. Additionally, it works together with VVS and the mobility information centre to give information to the citizens and passengers.

Private transport planning falls under the responsibility of the urban design office for the phases of problem analysis and development of measures. The engineering office is responsible for the implementation of the projects. A contracted private company is in charge of the operation and implementation of traffic signalling.

Permanent commissions and committees do not exist at the tactical/operational level. The plans are developed by the technicians, following the related regulations and guidelines. During the process of planning, the planners can invite technicians from public bodies or representatives from organised societies to discuss specific subjects and tasks. At this level the mayor is the main decision-maker, together with the head of each area of planning. Figure 101 shows the actors involved in the process of planning.

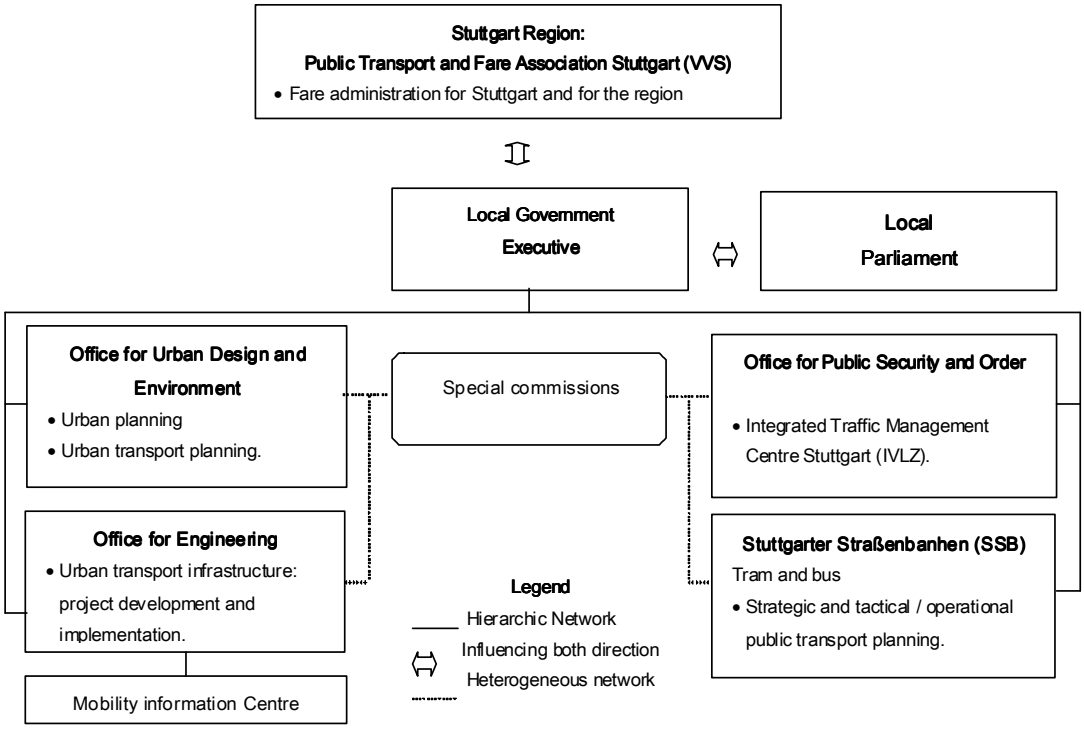


Figure 101: Urban transport planning process in Stuttgart: actors – tactical/operational level. Source: from the author.

5 COMPARATIVE ANALYSIS OF THE CASE STUDY AREAS

5.1 TERRITORY GOVERNANCE: THE PLACE OF THE CITY IN THE NATIONAL/FEDERAL, POLITICAL AND ADMINISTRATIVE ORGANISATION OF BRAZIL, COLOMBIA, GERMANY AND SPAIN

In the two Latin American countries, Brazil and Colombia, the political contexts have similar organisation concerning the levels of government: federal, state and municipality. These three levels of government are valid for the whole territories and follow the federal constitutions. Additionally, the government systems are presidential, with formal divisions of power into the legislative, executive and judiciary. These countries also have strong executives when they are compared to other democratic systems like the parliamentary system. Ardila-Gómez (2004), analysing the same cases, points out: “A strong executive, be it the president at the national level or a mayor at the local, has more formal power than its counterparts in other political systems”.

Taking the two European cases, Germany and Spain, even though they are both democratic states and members of the European Union, they have different kinds of political organisation. Germany is a parliamentary republic with high levels of decentralisation for the states (Länder). The states take over the responsibility of the political-administrative organisation of the territory and the municipalities. The decentralisation is also evident in the judiciary, which is located in Baden-Württemberg (BW) State and not in the federal capital Berlin. In Germany each state has the autonomy for administrative organisation. Therefore, there are different levels of government in different Länder throughout the federal territory. In BW, besides the federal level, there are two levels of government (the State and the city) with political and administrative power, and additionally there is the regional parliament of the Stuttgart Region and ‘Kreis’ (Municipalities Association, wich deals with some tasks, like bus companies contracts surveillance and roads authority and maintenance).

Spain is a parliamentary monarchy. It also has a decentralised territory divided into states (Comunidads Autonomas) with administrative autonomy. Also in Spain the *Comunidads Autonomas* have the freedom to organise their territory into different levels of government. Catalonia has four levels of government, below the federal level. Even though the government of Spain is decentralised, the national level still concentrates more political power than the federal level of German government. In Spain the *Comunidads Autonomas* have a status of political and administrative autonomy concerning the organisation of the territory and a number of tasks. However, the central power in Madrid determines the rules for many other tasks with direct impacts on the states’ territories. For instance, the structure of the transport sector is organised by the transport ministry, in a planned hierarchy for supplying services and infrastructure for the country.

Although this work does not propose to deeply analyse the political systems of each country or their interrelations with the political organisation of their cities, it is worth mentioning some aspects of these countries' influences on planning, and the participation of their populations in public decision-making. In both regions, the last twenty years were marked by deep social, economic and governmental transformations, which had major impacts on urban areas. In Europe the power of the federal states was relatively reduced by the supranational power represented by the European Union. In Latin America, for historical reasons concerning the period of military rule across the continent until the end of the eighties, representative and democratic power are still in the process of being developed. The movements against the military regime had as their main objectives the effective participation of the whole population in political decision-making and the right to vote in general elections.

Today, elections in most Latin American countries are direct and general for the legislative and executive at all levels of government. This means that the whole population aged sixteen years and over can vote. In Europe, political representation is used for electing representatives of the high levels of government and also for diverse public councils. The time-scale of the development of democratic systems and the maturation of institutions is different on the two continents. The condition of new democracy has a direct impact on the organisation of public participation in planning processes in the cities. Public institutions in Latin America have still not won very high levels of confidence from their citizens. Therefore, when analysing planning processes, it is important to view the city decision-maker system in a political context in order to evaluate their ability to make and act on decisions independently of the higher powers and their position in the local political environment.

The pro-municipalisation movement in Brazil had strong power in the eighties. It was founded on the argument that the "states" were the basis of the military revolutions of the thirties and sixties. Indeed the conflict between the powerful Brazilian states and the argument in favour of the decentralisation of the political and economic power of the federal republic to the cities, supported the transference of power to the cities. The Brazilian Federal Constitution of 1988 is called the "constitution of the cities" as it establishes the cities as autonomous administrative and political levels of government, each with a kind of "city constitution". In Brazil the CF/88 transfers the same administrative and political tasks directly to all cities over the whole territory.

Compared to Germany, where the decentralisation movement gave empowerment to the states (Länder), in Brazil it was the cities that took over direct responsibility for administering and planning their territories, and providing services for the population. In Germany the states have different political and administrative structures for administering their territories, and federal regulations are more flexible and decentralised concerning the tasks and responsibilities of each one. In Brazil and Colombia, which are presidential republics, the federal constitution has the highest authority concerning the organisation of the territory and the regulation of the responsibilities transferred to the states and municipalities. In Spain the city, following the rules of the National State and the *Comunidads Autonomas*, has the authority to plan its territory and exercise political and administrative power over its own affairs, and the mayor is the decision-maker.

Furthermore, the position of the city in the federal political organisation in the Occidental world has grown in importance up to the nineties, considering major urbanisation as a consequence of the current economic pattern. As written by Rothfuß (2007, p.1) “à medida que o controle do poder dos Estados Nacionais estreita-se, no âmbito da globalização, sobre o seu próprio território, as cidades entram em franca concorrência local, adquirindo importante papel como formadoras das condições locais específicas de desenvolvimento”.[96] Among the five CSAs we can see different degrees of administrative and political power. This position has impacts on planning and, consequently, on the development of the territories, considering the authority to make decisions and the financial and administrative capacity.

The transformation and expansion of the urban systems that has accompanied increasing regionalism, has a great impact on planning the territory and on performing the political and administrative tasks. The CSAs present important differences between the European and Latin-American cases concerning these aspects.

For the five cities the region does not represent a level of government. However, the Stuttgart region differs from the other four cities studied. It has a political and administrative structure and a parliament that takes responsibility over all areas that cover the regional interests. The tasks concerned with planning and supplying of some services to the region are regulated and have organised institutions in charge of them. Additionally, the regional parliament is the decision-maker for the regional issues. The metropolitan region of Barcelona also has organised institutions in charge of specific tasks concerning planning and the power to make decisions for the region, which overrule the local powers of decision-making. However, the metropolitan region of Barcelona establishes cooperation agreements or consortia for specific tasks among the municipalities and the other government levels. For instance, the public consortium ATM is in charge of regional integrated public transport.

In the Latin American cities, the regional organisation presents conflicts at the political level and in the administration and planning of the regional territory. The presidential political system with its strong executives left open the possibility of competition between the cities of a region, and between the cities and the state (unit of the federation). In BOGOTÁ it is clear that there is a polarisation between the power of the city executive and the power of the national executive. There are documents and guidelines that preview a regional organisation but the regional planning is not effective at all. Additionally, due to the special condition of BOGOTÁ as a national capital, the state of Cundinamarca does not have an effective political power for organising the region.

In Brazil the FC/88 determines the organisation of metropolitan regions and establishes the rules for their creation and the tasks that have to be included in their organisation[97]. It is similar

[96] “As the control of the national states’ power decreased in the face of globalisation, the cities came into competition on the local level, enhancing their positions and capacities to create specific solutions for local development.”

[97] Today there is a special commission at the Federal Parliament studying the matter related to the organisation of the metropolitan regions and their administrative and political tasks. The members of the

to the Stuttgart region in its relation to the administrative and planning level, but unlike Stuttgart, in Brazil there is no regional parliament with power to make decisions on behalf of regions. Political power is in the hands of the States and the cities individually. The institutions in charge of supplying the determined services and planning for the region are administered by the states. This condition creates conflicts of competence and in some cases competition between the levels of government. The second possibility for cooperation between government levels, stated in the FC/88, are agreements and public consortia for specific tasks (Martins G. & Couto, 2007).

In Porto Alegre the metropolitan region is a collection of 31 municipalities. There are institutions in charge of the tasks established by law, like the METROPLAN, which is in charge of planning the region and supplying regional public transport by bus. However, in reality, it does not have a regional plan and therefore the cities of the region are largely free to plan their affairs for themselves. In this case it is clear that there is competition between the levels of government in supplying services to the population and a lack of coordination in the planning of the territory. Curitiba has also institutionalised its metropolitan region, congregating 26 municipalities. However, the region is mostly effective with regards to political, rather than administrative, legislative or strategic affairs. For the supplying of services there are cooperation agreements for specific tasks between the municipalities involved. For public transport for instance, the municipalities signed a cooperation agreement transferring the planning and operation of the services to Curitiba, through the municipal company URBS, instead of setting up a new institution. The main justifications were to avoid a conflict of competence between the cities and the state, to reduce administrative costs, and to take advantage of the traditions in planning and operating public transport and of the knowledge of the already well-trained technical staff from Curitiba's institutions.

Table 30 below shows a summary of the position of the city in the federal organisations of the CSAs.

Table 30: The position of the city in the federal or national political organisation of Brazil, Colombia, Germany and Spain.

CSA	The Position of the City in the Federal or National Organisation of Brazil, Colombia, Germany and Spain
Brazil	• "Municipal Autonomy": this means political and administrative autonomy. • The municipality exercises within its territory legitimate political and administrative power, like the states (each unit of the federation) and the republic, following the determinations of the FC/88. • The main tasks for the municipalities are written in the Federal Constitution, and the city constitution regulates them, fills gaps in regulation and performs specific local tasks. • Formally the public services provided directly for the citizens are shared among the three levels of government; the main tasks performed by each government level are written in the Federal Constitution. • The municipalities are in charge of supplying daily services for the population, such as urban transport infrastructure, public transport, water supply, education for children up to 14 years, and basic health care for

parliament aim with this study to propose a reform in the Federal Constitution, trying to settle the incongruities that make the regional organisation difficult in practice (incongruities such as various unclear articles which can lead to missunderstanding about what the phrase 'metropolitan region' really means, and about the tasks they need to perform.)

	instance. • The municipalities have an independent financial system and have responsibilities over investments. • The mayor is the main decision-maker, but the investments, when above a certain amount, need the approval of the local parliament. Furthermore, the annual budget is approved by the parliament and it is also in charge of its surveillance. The municipal annual accountability and financial declaration also need the approval of the State Court Auditors.
Colombia	• The city has political and administrative self governance, but it is subordinated to the higher government levels. • The mayor is the main decision-maker. He decides on the municipal tasks, but is under the surveillance of the higher government levels. • The local parliament does not vote on laws. It only writes recommendations and agreements (*Acuerdos*). The mayor can accept or refuse them. • The tasks can be determined by the Constitution, the State or National Government plans, and local plans. • The local government can produce initiatives and act on them, as long as they are not in disagreement with the higher government levels. • The investments are made by the municipality, but they are also complemented by the State and National Governments. • There are big differences in the way public affairs are organised throughout the territory; this depends on the size of the cities and the level of political control that exists. The capital BOGOTÁ receives massive investments from the National Government; the medium-sized cities also have support from National and State government; the small-sized cities are normally dependent on the organisation and finances from the State or local political control.
Germany	• "Municipal Self-Administration": Administrative autonomy. • The tasks can be regulated by federal or state law. • The states (Lander) determine obligatory and voluntary tasks. • The city can have initiatives on tasks unregulated by higher laws or government levels, and can perform voluntary tasks. • There is a national financial system that distributes the resources for investment in infrastructure for all government levels. • The responsibilities over public and private transport are shared with the government levels, the Region and Municipalities Associations. There are differences throughout the territory concerning the organisation of government levels. It depends on the way the States (Lander) organise their own territory. For instance, Stuttgart Region has a Parliament where decisions are taken for the Region, and these decisions affect the cities. • The main decision-maker is the parliament; the mayor is just one among the voters. Therefore, he needs his counterparts' collective support for his projects. The mayor together with his staff decide only on tasks that do not demand high amounts of investment or do not have strong impacts on society. • The projetcts with high impacts also need approval from the the "Regierungspraesidium" (a court of auditors who execute the laws).
Spain	• "Municipal Autonomy": The city has political and administrative autonomy. • The responsibilities over public and private transport are shared with the government levels, the Region (via consortia contracts) and Municipalities, according to the distribution of tasks determined by the laws. • The decisions are taken in different forums: mayor, parliament, organised Councils (which depends on the organisation of the *Comunidads Autonomas* and local government organisation and laws). The executives are the main decision-makers, but additionally the parliament and councils decide on specific tasks. • The cities have their own financing system, but the higher levels invest in the systems that they administrate and the major projects that they cooperate in.

Source: from the author.

The democratic governance of the cities' territories are formally ruled by its representatives at the executive power and the local parliament levels. Considering we have four countries ruled by democratic institutions, with constitutions and consolidated laws as the basis for governing the people and the territory, those representatives must make decisions about public affairs. Each democratic state carries out the decision-making process within a range of personal power forces and under the influence of other, internal and external, forces. Table 31 shows the

main decision-making powers enacted by the mayor, the Parliament and the community in the CSAs:

Table 31: Main decision-making powers in planning, enacted by the mayor, the Parliament and the community in the CSAs.

Power to make decision in the CSAs enacted by the mayor, the Parliament and the community					
CSA ⇒	**Barcelona**	**BOGOTÁ**	**Curitiba**	**Porto Alegre**	**Stuttgart**
Mayor	Main decision-maker Influenced by politicians, technicians and community.	Main decision-maker Influenced by National government, politicians and representatives of society.	Main decision-maker Influenced by technicians, politicians, representatives of society and community.	Main decision-maker Influenced by politicians, representatives of society, technicians and community.	Decides on smaller investments and projects Influenced by higher government levels, politicians, technicians and representatives of society.
Parliament	Votes on laws Political influence Votes on master plans and higher investments	Votes on *acuerdos*, not laws Political influence	Votes on laws Political influence Votes on master plans and higher investments	Votes on laws Political influence Votes on master plans and higher investments	Main decision-maker Votes on laws Political influence Votes on master plans
Community	Influence through communitarian associations (*Associacion de los vecinos*)	Influence through representatives of society.	Influence through communitarian associations (*associaçao de moradores*), representatives of society.	Decides on small annual budget through O. P. Influence through communitarian associations and representatives of society.	Influence through the parliament, general society and its representatives.

Source: from the author

Ardila-Gómez (2004) concluded in his study that technicians have strong influence on decision-making in Curitiba. The present study also confirms that in fact both institutions IPUCC and URBS exert strong influence over the parliament and the executive power. This occurs on one hand through technical argumentation and control over the projects, and also because of the mediation of the communities' representatives in front of the politicians, considering that they, in general, receive a high level of the population's confidence.

BOGOTÁ and Porto Alegre present similarities related to the concentration of power held by the executives and their tasks in working to build up consensus among the different streams of politicians and society for the decision-making. In both cities the mayor and his relation to the higher levels' executives (federal/national and the state governor for the case of Porto Alegre) is very important for the equilibrium of political forces and for the construction of political consensus for the decision-making. It was observed during the interviews that interviewed people mentioned that the good political relations of their mayor could bring investments for the cities, or bring approval of suggested changes in the law, or they could solve society's conflicts and settle socioeconomic differences among various economic groups and sections of society, as well as help to build infrastructure.

Porto Alegre has a solid Transport Authority (EPTC) working with qualified technical staff who are able to internally develop their own projects and plans. The technicians use regulations and

their institutional power to influence commissions, committees and society representatives in the decision-making. Concerning the decision-making for planning in urban transport, as was mentioned in interviews and observed in practice by the many initiatives rejected over time, the political influence is higher and they have limited influence on decision. The community in practise decide only to a small degree, and only short-term plans and projects through O.P.

Barcelona has a decentralised political and administrative organisation. The executive is also the main decision-maker in planning tasks, although the mayor receives influence from political counterparts, institutions and technicians, organised society and communitarian organisation (for instance, *las associaciones de los vecinos* – neighbours' associations). Furthermore, Barcelona's local government has various agreements with the other government levels to carry out specific tasks from the different areas of public administration (for instance the consortia for transport area). At these forums the discussions and decisions are made by voting on the basis of councils or committees.

In Stuttgart, in general, the interviews showed that technicians and politicians are highly concerned that decision-making must accomplish the orientation of laws and guidelines for planning. Then the mayor leads the discussion in the Parliament in a political forum. The general public is informed and has the material displayed for a certain time. They can write suggestions and concerns about the projects but do not make decision on them. The parliament can take on board the general public's suggestions and bring them into the political forum for discussion. Decisions regarding the concerns would depend on the agreements made between the politicians and the constellation of political powers.

5.2 URBAN DEVELOPMENT IN THE CASE STUDY AREAS: THE "REAL CITY" TODAY

> "I shall be writing about how cities work in real life, because this is the only way to learn what principles of planning and what practices in rebuilding can promote social and economic vitality in cities, and what promote social and economic vitality in cities, and what practices and principles will deaden attributes"
> (Jacobs, 2011, p. 5)

Figure 102 below shows a schema of the interdependence of different variables and the urban development. This schema is a rough representation of the variables that influence urban development directly:

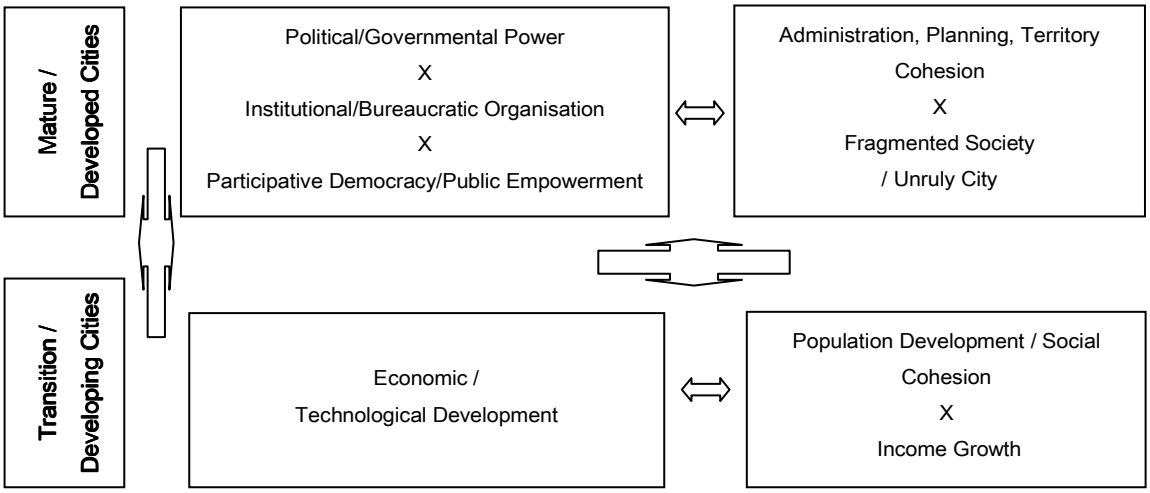


Figure 102: Interdependence of different variables and the urban development in transition/developing cities and mature/developed cities. Source: from the author.

Materialisation and personification of power over the territory:

- Political/governmental: representative power, where the holders of power are raised to this condition through elections.
- Institutions and bureaucracy: bureaucratic public affairs, permanent technical staff, institutionalised rights and scope of laws.
- General public: possibility for participation in governance and planning; empowerment of society through the enhancement of channels by which people can intervene in and decide on public affairs.

These aspects have direct correlations to the way the territory is governed and planned. Territory cohesion affects and is affected by the political and administrative actions and conditions of the territory. In fragmented political and social organisations the same pattern is seen in the way the territory is occupied. The cities of BOGOTÁ and Porto Alegre confirm those patterns. The vast outskirts and "unruled" areas (considering the lack of formalisation of the settlements, and the absence of public services and institutional support for citizens in these areas) show a clear fragmentation of social and political participation in urban development and economic growth. It is also visible in these communities' deprivation of public services, including public transport.

Socio-economic development:

- Population development: culture and socio-historic development; level of education for the general society;
- Technological development: depends on public and private investments for its development, and public policies to enhance education. The enhancement of education for all levels of society is a precondition for successful technological development (as is confirmed by several studies conducted in countries like Germany, Japan, South Korea, etc). If education was only enhanced for a selected and privileged group, this would put limitations on the expansion of innovative initiatives and growth.

- Income growth: standard of living; this depends on economic growth, which is closely related to social and technological development (World Bank, 2010; United Nations UNCTAD, 2010)

Furthermore, these variables are correlated to government structures and the governance of territories. Glaeser (2009), writing about cities' development, discussed the relationship between political institutions and their development concepts. For instance, the results of public policies on income distribution and the uncontrolled growth shaping the unruly city development, contribute to the building up of fragmented societies. The conditions of urban development are closely related to social cohesion and to the ways in which people participate in production and consumption. Following the words and thoughts of Jacobs (2011), the principles of planning and its practices can promote cities' social and economic vitality, or bring about their death when they demotivate or even destroy public initiatives and attributes. Furthermore, increased standards of living and of education among all sections of society can raise economic and income growth, and improve the society's technological pattern. These results were seen on the "Brazilian Human Development 2013 Report" ("*Atlas do Desenvolvimento Humano no Brasil* 2013"), where a comparison of the population and social aspects of official data was made using data from the National Census for the years 1991, 2000 and 2010 (BRASIL; PNUD, 2013). The investments were made in order to include the entire school-age population in education. The improvements in education conditions, income and standards of living are visible in the 2010 Census Report in comparison with earlier reports.

For this study the cities from Brazil and Colombia are considered as transition/developing cities. They are located in developing countries which have experienced economic growth and social development in various aspects over recent years. In both countries the economic crisis of the eighties, when their governments lost the capacity of being the main investor and planner of economic development, together with the growth of urbanisation, opened the opportunity for the private sector to raise its position as a source of investment. It is important to highlight the role of the powerful real estate companies in the incorporation and urbanisation of rural land and their influence on land use and city planning. Caldeira and Holston (2005, p.143), discussing the planning approach in use in Brazil, defend the idea that:

> "In the last half century, the Brazilian state consolidated and then liquidated a modernist model for the production of urban space. According to this model, best crystallized in the construction of Brasilia, the state produces urban space according to centralized master plans that are conceived as instruments of social change and economic development. The role of government is both to articulate these plans and to create the means for their realization. During the two decades, however, a constellation of forces – including main elements of the state, business and industry, popular social movements, political parties, and non-governmental organizations (NGOs) – rejected this centralized conception of state intervention. In this place, they substituted a notion of planning in which government does not produce space directly, but rather acts as a manager of localized and often private interests in the cityscape."

As was shown in Chapter 2 for Colombia and Brazil, their cities have undergone an enormous transformation concerning social and population structure and growth, economic and

urbanisation aspects, and also concerning institutional organisation, transference of power (related to Governments, third sector and general public) and the planning and administration of their territories. Therefore, these cities are experiencing a period of transition and a great transformation throughout their territories. And the way these cities will look in the future depends on current planning and decisions, and also on how the constellation of power and governance will be conformed over the territory. Following the positive stream of thinking about the future, transition/developing cities have a great opportunity to enhance their process of planning and development by using the advantages of economic and technological growth and social development during a time of transformations. Therefore, analysing the mature/developed cities of Europe and learning from their experiences can be an opportunity for the enhancement of planning practice.

On the other hand, European cities are taken as developed/mature cities, considering this ongoing pattern of development. These cities have achieved great development in socioeconomic aspects like education, health care, urban infrastructure, technology and income, which have raised living standards at a level never seen before for these countries. However, the Age of Communication is changing the patterns of social development in a world where political geography, markets and people are globalised. The very notion of territory and space is being discussed. Furthermore, population structures, land use and the structural basis of economic development are unstable variables for the mature economies.

Siedentop & Fina (2008) affirm that population decline and deindustrialisation in Europe are creating a new pattern of urban sprawl, a kind of "shrinkage sprawl" where industrial and residential areas, as well as public infrastructure, are underutilised in cities. The authors listed four major factors that confirm this trend in Germany (Siedentop & Fina, 2008, p.3-4):

- "The ongoing demographic trend towards smaller households, counterbalancing the negative effect of population decline on housing demand,
- The fiscal competition between communities to attract new inhabitants and companies, fulled by tax regulations and public subsidies for the provision of newly urbanized land for housing as well as for industrial and commercial land uses,
- "planning routines" of local land use planners that favour Greenfield development over brownfield projects, where brownfield development is perceived as more complicated and riskful, and
- A strong preference for low density housing especially in suburban and rural regions with low land prices."

For Siedentop & Fina (2008, p.4) this pattern for urbanisation and land use in Germany mainly follows a sequence of three stages of development:

> "In stage one, called "growth sprawl", annual growth rates of population and urbanised areas are positive with urban growth outpacing population growth. Stage 2, termed "excessive sprawl", is carachterized by a growing imbalance of urban and population growth. While the annual population growth drops, the growth of urbanised areas remains high. Stage 3, called

> "shirinkage sprawl", shows negative population development accompanied by a fall in urban growth rates."

Cities under these development conditions create a new kind of demand from the population for infrastructures and services. For cities like Barcelona and Stuttgart with large public transport infrastructures, where the main lines depend on the rail systems, the dropping of population growth can raise the costs for passenger units to be transported. Schiller and Siedentop (2009, p.139) defend that:

> "When evaluating the efficiency of infrastructure systems under conditions of shrinkage, the capacity of the infrastructure stock is of central importance. According to this, a cost-saving urban development aims at a minimum degree of utilisation of plants and facilities. Underutilisations of systems have to be considered as they might lead to sudden cost increases similar to situations when capacities are exceeded."

Therefore, planning urban transport for these shrinkage areas must be oriented towards the reduction of costs for the operation, and must also be strategic and long-term. It must not simply concentrate on the optimisation of construction and implementation of transport facilities. A possibility for improving accessibility for the population can be based on the investigation and encouragement of alternative means of transport, mobility and accessibility channels, aiming towards cost reductions for the state and for transport users in the cities.

5.2.1 Spatial Planning and Urban Development Approaches in the CSAs

Table 34 below shows the main characteristics of the spatial planning and urban development approaches in the CSAs.

Table 32: Urban development in the case study areas and its main characteristics.

CSA	Urban development	Main Characteristics of the Urban Development
Barcelona	Compact city-Regional city	• Three visible stages of urban development: compact historic centre marked by the limitation of the wall (today the "*Ramblas*"); the extension (*ensanche*) marked by the straight lines of the manzanas, the wide streets and the metropolitan conurbation; • High population density in the historic centre and in the extension of the centre; • Negative growth of the population; • Connection of the historic centre to the city extension by high capacity public transport: metro and bus corridor, large pedestrian zones and cycle lanes; • Historic centre and the extension: zones of mixed use, concentrating commerce, services and housing; • Areas of high density in the extension of the centre (*manzanas*) crossed by high capacity roads for private and public transport (buses, metro, tramway, regional train), connecting to the metropolitan region. • State capital and centre of the Metropolitan Region.
BOGOTÁ	Sprawling city-Unruly city	• Urban growth marked by a high diversity of settlements; large area as "unruly city"; • Urban form: elongated sprawling city; leapfrog land developments • Great separation of the standard of living between the richest residential zones and the poorest zones; poor people living in large peripheral zones; • Great separation between the residential areas for workers and their workplaces, generating long commuting times and high energy consumption • Positive population growth, attracting of migrants • Presence of significant amounts of investment in transport connections in order to orient spatial planning and development after 2000; renewal and rehabilitation of the City Centre with urban design, focussing on public transport and non-motorised transport • National capital.
Curitiba	Linear Transit Oriented Development (TOD) - Regional city	• Oriented to urban growth transport based on the urban master plan of 1965 and its update in the seventies and 2004; • Positive population growth; attracting migrants • High density along the high capacity transport axes; • Decrease of the population density moving away from the structural axes; • Large pedestrian area in the city centre concentrating commerce and services; • Centre of the metropolitan region, accumulating administrative functions and supplying services for cities in the region through agreements. • State capital and centre of the Metropolitan Region.
Porto Alegre	Sprawling city – Unruly city – Regional city	• Urban growth marked by a high diversity of settlements; • Still positive, but low population growth; higher percentage of elderly people in Brazil • Urban form: starting in a harbour and sprawling inland; 'leap frogs' and empty spaces between the settlements. • High concentration of activities and workplaces in the city centre; • Great separation of the standard of living between the richest residential zones and the poorest zones; Poor people living in large peripheral zones; large areas such as "unruly cities"; • Great separation between the residential areas for workers and their workplaces, generating long commuting times. • State capital and centre of the Metropolitan Region.
Stuttgart	Decentralised/ polycentric city – Regional city	• Decentralised urban growth; • Polycentric city connected by transport axes: Regional trains, metro, tramway and road infrastructure; • Low urban density; • Population preference for housing, especially in suburban areas where prices are low; • Negative growth of the population and growth of one-person households; • Large pedestrian area in the city centre, concentrating commerce and services; • Offering of alternative transport means in the inner city: public bicycle service; car sharing • State capital and centre of the metropolitan region.

Source: from the author.

5.3 URBAN TRANSPORT PLANNING IN THE CSAs

> "The urban fabric is shaped by the actions of a diverse range of organizations and groups, largely outside the control of planners. Equally important, planners have recognized for decades that their actions are inherently and inevitably political in the most fundamental sense of helping to determine who gets what, when, where, and how."
> (Klosterman, 2008)

Taking the thoughts of Klosterman (2008) for the analysis of the CSAs we see that there are important differences in the question of who gets ***what, when, where and how*** when comparing the European against the Latin-American cases. The process of planning and the development of measures follow different rules depending on the urban fabric and form, the level of socioeconomic development for the area, the distribution of the socioeconomic groups over the territory, the land use and urban design, the democracy standards and governance paradigms, and the conditions for public involvement and participation in planning (see Figure 48 and Figure 49).

5.3.1 Regulation: Urban Master Plan and Urban Transport Plan

Table 33 shows the planning regulation in the case study areas. The five CSAs have various scopes of laws and guidelines stated by their national or federal governments towards regional and urban planning. The two European cases also have a State Transport Plan and a Regional Plan (Barcelona Region and Verband Region Stuttgart) giving direction for strategic planning and regulating the operation and management for the tasks under the State competence. The Latin American cities are not integrated into a State or Regional Plan. The five cities possess an urban master plan, under legislation enforcement. However, only Barcelona, BOGOTÁ and Curitiba have an Urban Transport Plan, enforced by law; Stuttgart has an Urban Transport Concept comprising strategic guidelines and concepts for the entire urban transport network.

Porto Alegre does not have an urban transport master plan for the whole urban transport network, enforced by legislation. The city has a Cycling Master Plan, which is enforced by law and a so-called Accessibility Plan, a law stating guidelines for promoting accessibility to people with impairments and reduced mobility. A plan proposal was presented in the nineties and various project proposals were presented by different government administrations in the subsequent periods to date. Moreover, most of the projects proposed were not in accordance with the original transport plan proposal. The analysis of the chosen scenario and the guidelines of the urban transport plan showed that the impacts of various modes of the network like the metro, regional buses, bus microbus ("*lotaçao*"), cycling and car were not considered. It is one of the limitations of the implementation of this plan. One of the difficulties presented in developing an integrated network covering the entire area of the region's influence is the political limitations in overcoming the different interests of various jurisdictions in the development of a regional transport plan. The different levels of government and their institutions, together with the legal metropolitan region institutions, all have historical and political struggles and interests which are suppressed by unilateral decision-making. Also the

lack of decisions on historical needs for solutions related to required measures for the region stops the process of planning (interviews, 2007, 2008; various documents; participant and direct observation). However, since 2010, due to the scope of the FIFA World Cup that will take place in Brazil, the city of Porto Alegre has presented a vast proposal for improvements on mobility. Some projects are already being implemented by the city, the State and the Federal Government. Among them are an elevated tram system, the 'areromovel', which connects the metro to the airport, and a centralised traffic control management.

Table 33: Planning regulation and guidelines in the case study areas.

Existing Planning Regulation in the Case Study Areas							
CSA	**Federal/Nat Regulation /Guidelines**	**Federal/Nat Transport Plan**	**State Transport Plan**	**Regional Plan**	**Urban Master Plan**	**Urban Transport Master Plan**	**Urban Transport Concept**
Barcelona	X	X	X	X	X	X	
BOGOTÁ	X				X	X	
Curitiba	X				X	X	
Porto Alegre*	X				X		
Stuttgart	X		X	X	X		X

Source: from the author

BOGOTÁ is characterised by the significant power of its mayor in administrating the territory. The mayor has the formal authority to change the master plans and approve a new one by his Act. The main concern of the mayor is his political ability to persuade and attract partners to support his decision. However, the POT obliges municipalities with more than 20 thousand inhabitants to present a master plan for urban transport. The biggest cities must develop their own plans and implement them. Moreover, they are in charge of transport operation and management. In the case of BOGOTÁ, considering that it is the National District Capital, the city also receives guidance and a budget for transport planning.

As discussed by Caldeira and Holston, (2005, p. 143) the planning approach in use in Brazil since the late seventies and early eighties has lost the significant participation of the central government in producing the urban space enforced by law and by the large amount of investment, as was foreseen by the strict guidelines of the modernist model which was practiced between the fifties and the early eighties:

> "In this place, they substituted a notion of planning in which government does not produce space directly, but rather acts as a manager of localized and often private interests in the cityscape. Moreover, whereas the modernist model entails a concept of total design, by which planners impose solutions, like demigods, the new model considers that plans should both be based on and foster the exercise of democratic citizenship."

In this case the urban transport planning is individually organised and implemented by different institutions in a city. It does not present systemic co-ordination among the levels of planning or among the different transport systems. After the dismantling of the national planning structure there was a lack of planning for almost 15 years during the transition of the federal organisation (from military regime to democratic state with rule of law). Only in the years since 2000 could the federal parliament approve the Cities' Statute (Brasil, 2001) and later in 2012 the federal

guidelines for policy development and planning for urban mobility (BRASIL, 2012). On the basis of the new federal legislation and guidelines, the municipalities are obliged to develop an urban transport plan.

Table 34 shows the main characteristics of the existing urban transport master plans in the CSAs.

Table 34: Existing urban transport master plans and guidelines in the case study areas and their main characteristics.

CSA	Existing urban transport plan	Main Characteristics of the Urban Transport Plans
Barcelona	• Urban transport plan	• It is a law voted in by the municipal parliament; • It presents the strategic guidelines, containing the goals and the objectives for the development of urban mobility and an action plan aiming to accomplish those goals. • It aims for the development of an integrated urban transport nework, setting strategies to meet an equilibrium in the modal split, through the implementations of policies and measures to enhance the use of non-motorised transport. • It was developed in accordance to the federal and state transport plans, with an integrated vision for the regional transport network.
BOGOTÁ	• Urban transport plan	• Approved by the mayor and comes into force by a mayor's act • It presents the concepts for the development of the urban transport network covering public, private and non-motorised transports. • The plan designs a concept for reaching sustainability for the territory through the equilibrium of the logistic of mobility and the logistic of the territory.
Curitiba	• Urban transport plan	• It is a law voted in by the municipal parliament • It presents the guidelines and action plan for urban mobility integrated to the urban master plan and the Federal Cities' Statute and the Brazilian Traffic Code. • It proposes strategies for the development of an integrated transport network seeking socio-environmental sustainability.
Porto Alegre	• Urban transport plan	• Developed and presented by the transport authority; it was not submitted to the Parliament for voting; most of the measures have not been implemented to date • It mainly presents measures for public transport • In recent years various projects and measures were presented for public and private transport but it is not an integrated urban transport plan covering all transport modes or designing an integrated mobility and accessibility concept for the whole city.
	• Cycling Master Plan	• Developed and presented by the transport authority • It sets guidelines for the development of an integrated cycling network for the urban area
	• Accessibility Master Plan	• It is a municipal law • Its objective is described in the *caput* of the law: general guidelines and basic criteria to promote accessibility to people with impairments and reduced mobility.
	• Pedestrian guidelines	• It is a law approved by the parliament aiming to set norms for the circulation of pedestrians, but it is not applied in practice.
Stuttgart	• Urban transport concept	• Developed and presented by the Office for planning, coordinated with different areas • It presents the concepts and main measures for urban transport for the city in general and specific studies and projects for city areas and districts. • It proposes concepts for logistics, for the city's supply and for freight transport covering the needs of the industry and export companies.

Source: from the author

5.3.2 Urban development and urban transport strategies: the mobility concept in the CSAs

Vasconcellos (2001) defines urban mobility in terms of the ability to overcome distances in the urban spaces. According to the VEK 2030 (Landeshauptstadt Stuttgart, 2010, p.4-1) "Mobilitat beschreibt die Moglichkeiten zur Fortbewegung mit unterschiedlichen Verkehrsmitteln und ist damit eine wesentliche Voraussetzung, um am gesellschaftlichen Leben teilzunehmen[98]" The Federal Mobility Law in Brazil defines urban mobility as the "condição em que se realizam os deslocamentos de pessoas e cargas no espaço urbano[99]" (BRAZIL, 2012, Art. 4º-II) and the mobility system as a set of organised and coordinated modes of transport services and infrastructure that ensure the displacements of people and goods in the territory of the Municipality (BRASIL, 2012, Art. 3º).

In the first definition, mobility is taken as essential for people playing a part in public life. This definition indicates that the urban mobility concept is centred on the requirement of the movement of people and goods in the space by using the available transport infrastructure and technology in order to access city life. Based on the concept it is possible to infer that there is a direct correlation between the variables of "movement" and "having access to city life". In the second definition the focus is on how people move using the available mobility system. Here, the focus is on the study of the conditions of the movement, giving, in theory, the possibility of working in two directions for planning: urban planning and land use (transport demand management) or transport planning in itself. This shows that the strong traditions (in modernist urbanism) of regulating land use and urban design are important elements in defining the mobility concept. Furthermore, the mobility law follows the statements of the CF/88 and the Cities' Statute for urban planning and development. This scope of law is strongly oriented towards the regulation of the urban territory and towards land use planning and design. Moreover, in both definitions the relationship between the variables of space and time are clear, combined with the need of infrastructure to overcome disconnections within the urban space.

The analysis of the correlation of urban development and urban transport strategies requires a broad understanding of various elements and different variables within the specific urban context, considering the complexity in which socio-political, technological and environmental elements develop in different landscapes and cultures. The analysis also requires the triangulation of different disciplines coming from both social and natural sciences and qualitative and quantitave research approaches to propose criteria for the evaluation and design of a mobility concept for an specific zone or urban area. The current study does not have the objective of exploring in-depth and raising conclusions on this matter in order to propose a methodology for the design of a mobility concept. Therefore, an analytical qualitative approach was used, based on the triangulation of information from the CSAs.

[98] In English: Mobility describes the possibilities of moving with different means of transport, and is therefore essential for taking part in public life.

[99] In English: the condition made by the displacements of people and goods in the urban space.

Rodrigue (2009, p.n.a.) proposed a methodology for the investigation of transport problems based on the triangulation method, defined as:

> "The intersection, or the triangulation, of three concepts defines a general field of investigation. [...] For a more general and complex concept, it is possible to expand the triangulation and include additional fields. Evaluating the environmental impacts of a transport project requires a triangulation of environmental studies, transportation systems and spatial statistics and models."

Figure 103 shows an example of how various disciplines and study areas can be triangulated to draw up analytical conclusions on mobility and urban development, having the focus on transport geography.

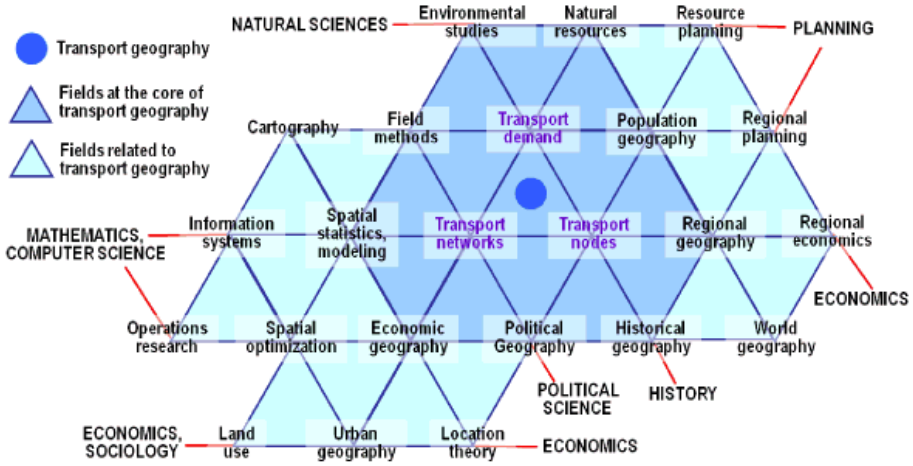


Figure 103: Triangulation analysis in transport Geography: an example. Source: adapted from Haggett (2001) by Rodrigue (2009).

The vision for an integrated mobility concept must also integrate the urban territory into the macro- and micro-spaces.

5.3.2.1 Territorial cohesion: integration in the macro-space

The integration into the macro-space must present strategies for the interconnections among the different public and private spaces, and actors in the urban territory. This means the choice of giving or not giving the actors the opportunity for accessibility in the urban space through mobility. The accessibility in the macro-space through mobility is made via the urban transport network and transport facilities that connect the different areas of an urban space. Therefore, the design of the transport network must integrate the physical infrastructure (road, rail, cable, boats, cycle, pedestrian and other transport infrastructures, terminals, connections and access points to transport), fare collection and information, in order to meet the population's need for and interest in mobility. However, the population's interests and needs for access can change over time and satisfying them is indeed difficult because there will constantly be new demands requiring infinitely new measures. Therefore, the design of the mobility concept for an area requires flexible strategies in order to integrate the territory and achieve cohesion in the macro-space.

Furthermore, the integration and cohesion of a territory faces various types of barriers or impedances, which sometimes limit or at least complicate full interconnections. Some of them are cited below:

a) Physical barriers:

    a. Geographical accidents (rivers, mountains, protected areas, etc)

    b. Condemned, degradated or polluted areas

    c. Constructed barriers: motorways, railways, monuments, brownfield, segregated dwellings (gated communities),

b) Political barriers

c) Legal barriers

d) Cultural barriers

e) Ideological barriers

f) Socioeconomic barriers

g) Ethnic barriers

h) Technological barriers

i) Lack of space available to build up connections

j) Etc.....

The spatial analysis and the encoding and de-coding of information on a large data basis are essential in order to understand and overcome physical barriers, and moreover to propose optimised designs for the transport network in the macro-space. In recent decades spatial and transport planning have highly benefited from the tools developed by information technology such as the Geographical Information System (GIS). As argued by Klosterman (2008, p.85):

> "Continued dramatic improvements in computer hardware and software have made the tools available on planners' desks faster, more powerful, and cheaper than could be imagined a decade ago. A wealth of spatially related data are becoming available, increasingly via the Web. Freely available Web-based mapping tools such as Google Earth and Microsoft® Virtual Earth™ are dramatically enhancing the public's appreciation for spatially referenced information. Perhaps most importantly, an increased concern with issues such as global warming, urban sprawl, and environmental degradation are creating an increased demand for computer-based analysis and forecasting tools. Together, these factors have stimulated a new generation of planners to develop a diverse and growing collection of computer-based

tools for planning (e.g., Brail and Klosterman 2001; Geertman and Stillwell 2003b; Koomen et al. 2007)."

For Rodrigue (2009, p.n.a) "information in a GIS is often stored and represented as layers, which are a set of geographical features linked with their attributes." Figure 104 shows a rough representation of the use of the Geographical Information System (GIS) for the planning and design of the transport network and its interconnection to spatial planning. The visualisation is facilitated by the representation of the space in layers related to land use, flows (spatial interactions) and the network, linked to their related features and data.

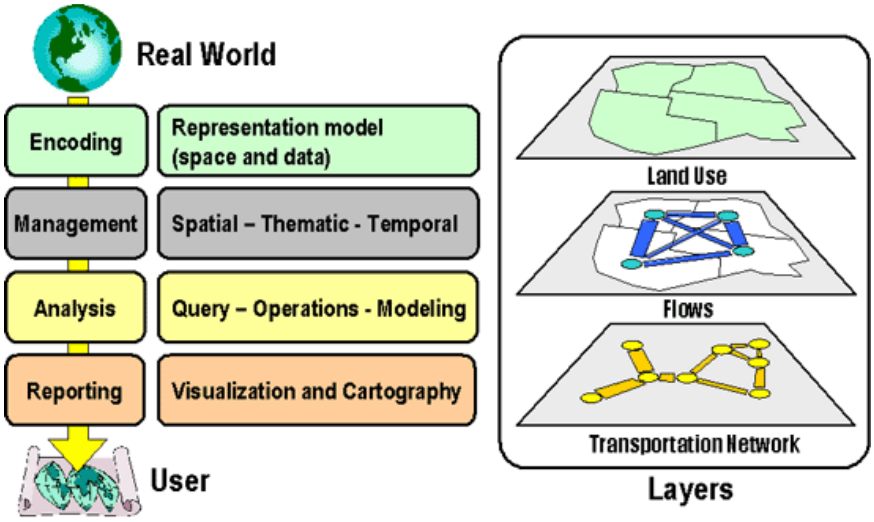


Figure 104: Rough representation of the use of the Geographical Information System (GIS) for the planning and design of the transport network and its interconnection to spatial planning and the users. Source: Rodrigue, Comtois, & Slack (2009)

The use of geographical information facilitates the design of an integrated mobility concept to support the development of an integrated transport network including all transport modes and socioeconomic and demographic data, through working with high amounts of information on a common basis. Nowadays this technology is totally dominated by the city and transport planners of developed countries and its use is a reality in the daily planning work for most of these cities. Therefore, discussing the topic here could be seen as redundant. However, for the cities of developing countries, the experience shows a different reality. Most of these cities cannot even afford the softwares and equipments. They also have difficulties in maintaining specialised technicians to work on the gathering of data and on management to deliver the required data and information for feeding the programs. In some cases the cities use consulting companies to write the plans and develop the projects. But the lack of continuity in planning and the lack of an integral vision for the design of a mobility concept produce as a result many inefficient and costly transport services, because of the disconnections on the transport network.

The Latin American cases analysed in this study have been working hard over time to internalise and also develop local technology for transport planning based on an integrated approach. But in some cases the cities still need improvements in the design of an integrated mobility concept (based on the model proposed in Figure 48 and Figure 49).

The German guidelines for road design and transport engineering edited by Forschungsgesellschaft fur das Strassen- und Verkehrswesen (Transport Engineering Association - FGSV, 2003) proposed a model for the design of an integrated transport network. The idea is to develop the network based on the parameters of all transport modes (public and private transport), seeking the equilibrium and efficiency of the entire network and the quality of the services delivered for the users (see the criteria and the model steps in Figure 105). Therefore, in the development of a plan to change services for a specific project or a transport system, the model considers the evaluation of the impacts on the whole network.

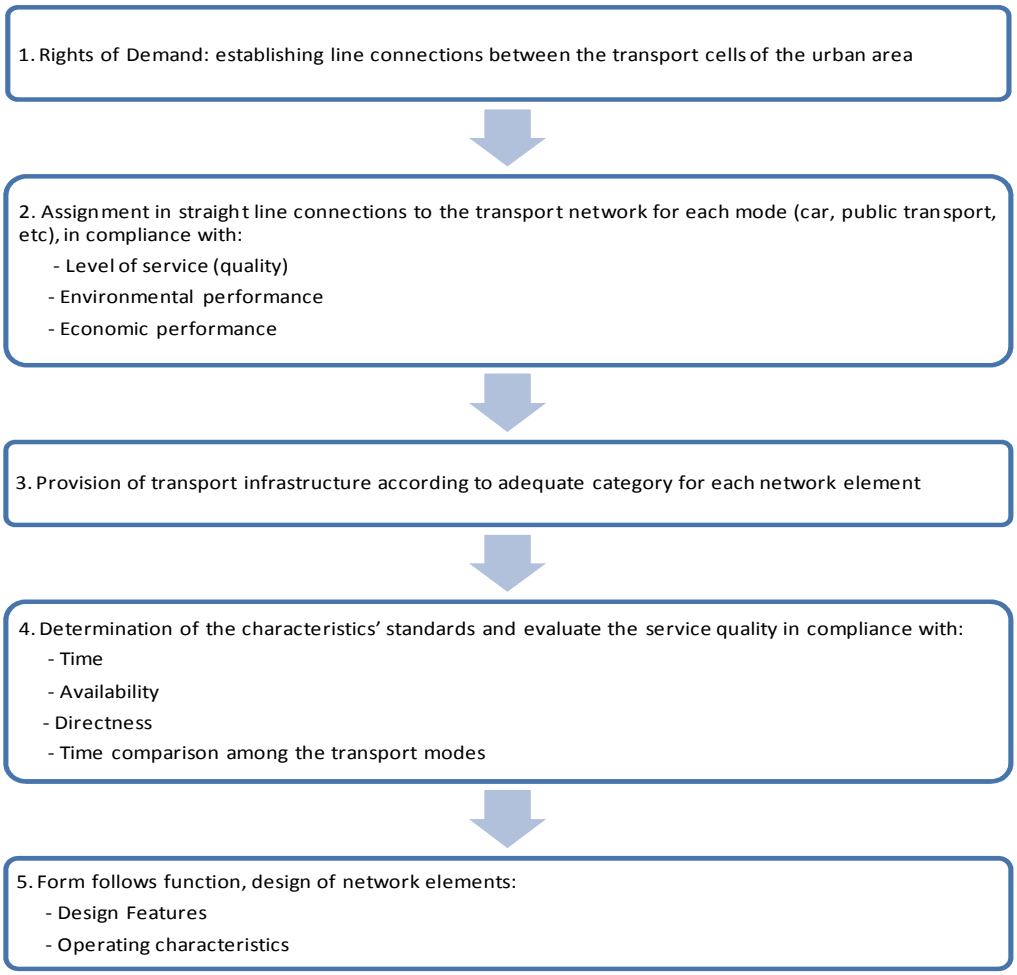


Figure 105: Structure of an integrated network design. Source: adapted from Forschungsgesellschaft fur das Strassen- und Verkehrswesen (FGSV, 2003).

The spatial analysis combined with the demographic and socioeconomic data must be evaluated for the whole urban space. It is also necessary to look at the specificities of each city district or special places. The city of Stuttgart developed the STEK (urban development concept) as the basis for planning the city in all development areas. The STEK contains the in-depth analysis of the different districts and special places and areas of the city (Landeshaupstadt Stuttgart, 2004). Later the VEK was also developed (urban transport development concept) taking the guidelines of the STEK (Landeshaupstadt Stuttgart, 2010). Therefore, theoretically, the urban transport planning must follow those guidelines and concepts to propose projects and measures that give mobility support for the development inside the

specific area and build up the interconnection to the whole transport network. Figure 106 shows a schema of the integrated analysis and the composition of the urban transport network by the superimposing and combination of the physically integrated network of each transport mode covering the entire urban area. Furthermore, the urban transport planning must follow the guidelines of the Regional Transport Plan, connecting the city through the railway system and the road infrastructure (Verband Region Stuttgart, 2012). For the high impact projects the local planning has to consider the guidelines of the State Transport Plan (Baden-Wurtemberg, 2010), the federal guidelines and the European Union supranational guidelines.[100]

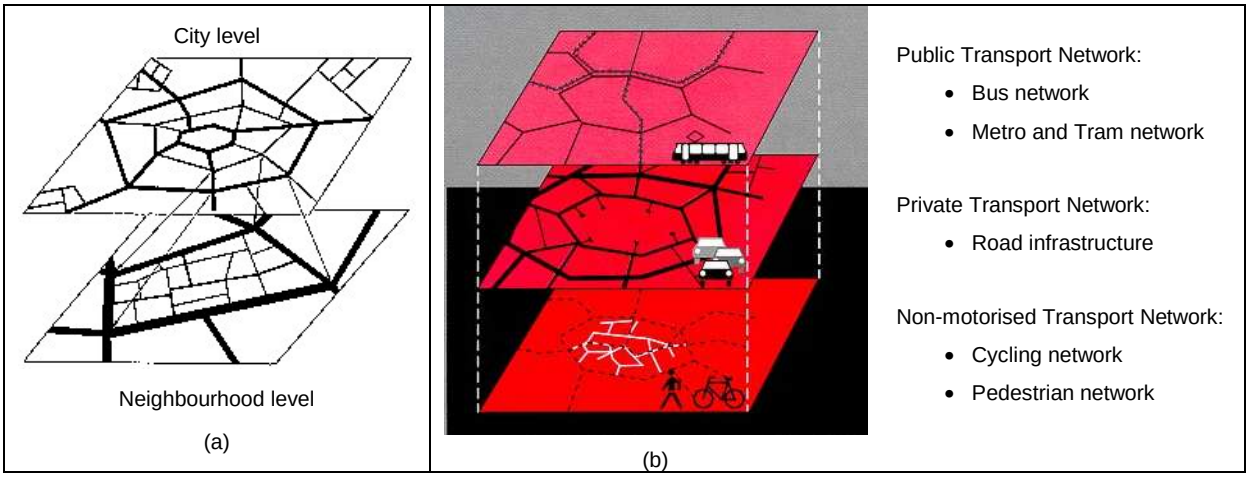


Figure 106: (a) Network design level; (b) Superimposition of the specific types of transport networks. Sources: (a) Kotter (2005); (b) Forschungsgesellschaft fur das Strassen- und Verkehrswesen (FGSV, 1995).

Barcelona is integrated with a large and diversified transport network. The city has also become recognised over time for its tradition in urbanism and its co-ordination of urban development and urban mobility. The broken walls of the old city make for a visible and strong impact and the transformation of them into open roads and paths to the new settlements has helped to build the transport infrastructure. The “Ramblas” today is still a symbol and the main point of reference for the transition of the old closed city into the modern city, as well as a natural connection between the two of them. The “Ramblas” is a symbol of the reinvented city and the “Enxample” (the extension of the city, with its manzanas and large avenues) the symbol of the innovation of the urban tissue and the interconnections to the mobility system (Guidoni, 2005). These spatial and urban development transformations set the basis of the mobility concept for the city of Barcelona in an integrated vision. The old city development as a compact city with mixed land use (housing, commerce and services, public services and institutions, leisure and education) laid down the spatial and socioeconomic conditions for the development of non-motorised transport, attracting a great movement of people into the historic district. The movement and mix of local people and regional citizens in their daily access to work, shopping, services, education and leisure, additionally attracts visitors to the large touristic area with its historic

[100] An example of this type of high impact project is the “Stuttgart 21”. It is an intervention in the Main Railway Station in Stuttgart, but follows the guidance of higher authorities, including the EU, since it is a strategic European project aiming at the integration of the European railway system.

sites, museums, restaurants, markets and diverse shops and leisure areas. The vibrant environment and the availability of interconnections using all different modes of transport for local area, inter-district, regional and long distances has raised mobility and accessibility.

After the seventies, the concept of “city region” again met new challenges of reinventing and innovation in Barcelona. For this new concept transport plays the most important role, considering the high investment in infrastructure to integrate the historic city and its expansion, its connection to the region by public transport (metro, train, tram and buses) and private transport (the rings and the high capacity roads), as well as the institutional organisation (ATM) operating at the regional level (Guidoni, Geografias Colectivas, 2005).

The mobility concept of the city of Curitiba was developed on the basis of the urbanism concepts, enforced by the urban master plan. The interventions were extensive over the urban territory and their implementation began in the core of the city, reconverting the logic of urban development from radial-concentric development to a transit-oriented development with an elongated mixed land use area for housing, commercial and service areas, leisure, education and public institutions, with the public transport and pedestrian zones as the main structuring modes of the urban transport network. The symbol of the urban renewal and re-design was the construction of the large pedestrian zone in the core of the city, the so-called *Rua das Flores* (Flowers Street), through the coversion of road lanes destinated to motorised private transport and parking places into pedestrian paths and areas for leisure in open spaces (Lerner, 2003). The mobility concept based on the so-called BRT is seen as a relatively quick and cheap solution for the development of an integrated urban transport network. Furthermore, the concept was effective in the integration of the mobility concept and the spatial development concept.

BOGOTÁ also has made significant interventions in urban development since the beginning of the twenty-first century. And like Curitiba the core of the transformations was the public transport-based development. The city also implemented BRT corridors, and it was from this concept that urban reform grew in the main districs. The most significant transformations were seen in the central district, where areas that had been greatly degraded in the past were then transformed into pleasant and bustling public spaces. The reconversion of these areas was based on the construction of infrastructure for the BRT, combined with large pedestrian areas and cycle paths. Urban design was also very elaborate, creating attractive, popular, vibrant spaces. Additionally, the city works into these areas using mobility managent to reinforce the uses of non-motorised and public transport. The area is primarily of mixed land use, concentrating commerce and services, education, leisure and tourism into the historic sites, museums, libraries, restaurants, etc. The reforms are enforced by the urban and transport master plans. However, the interventions, even though very effective on providing accessibility to the population, are still localised in the main areas and do not yet cover the city in an integrated mobility concept, even concerning spatial reach.

In spite of the interventions made over time in BOGOTÁ and Porto Alegre, they are still not sufficient for integrating the city territory. In both cities in practice, the modernist approach for urban development is predominant. The land use for most of the city territory separates the urban functions, for example what is particularly visible is the separation of workers’ housing

from their workplaces. New incorporation of land for the construction of residential areas is found in segregated settlements disconnected from the built urban tissue, promoting sprawling development. Many solutions for mobility are concentrated on increasing infrastructure and the expansion of road transport capacity. Furthermore, in BOGOTÁ and Porto Alegre a great percentage of the population live in 'unruly' districts. These parts of the city represent fragmented areas and a fragmented society in the city. The housing in these settlements in general has a lower standard of aesthetics. The services have different standards of supply. Connection to the formal/planned city is made through the transport network, mainly for commuting, involving long journey times and distances. This very complex urban development pattern complicates the design of an integrated mobility concept that looks towards territorial and social cohesion.

The analysis of urban development its discrepancies offers important elements for the design of the mobility concept, for instance those relating to demographic studies and the implications for transport infrastructure, urban models and the coordination of transport and land use. While in Brazil urbanisation has reached its peak during the age of information and globalisation, European cities are experiencing the shrinkage process of the post-industrialisation age. Demographic data shows that more than 80% of Brazil's and Germany's populations live in urban areas, while about 75% of Colombia's and Spain's inhabitants live in cities. Moreover, according to the statistics from Stuttgart and Barcelona, these cities have presented negative population growth in recent years. The data from the South American continent is still positive but also contains a decreasing trend for the future. Schiller and Siedentop (2009) draw attention to the effects of the sprawling development pattern and its consequences for European cities. The authors proposed that there are stages of development which could help planners to re-think the measures and reconvert the interventions and planning. But some questions must still be raised regarding these matters: do the cities follow "stages of development"? Or do they have different patterns? Is this dependent on different conditions of development? Would the Latin American cities follow the same patterns?

Therefore, for cities in developing countries, the practice of increasing infrastructure investments without a clear vision of urban development implications for the mobility concept, along with decreasing trends of population growth, can increase the costs for the population in the future. Moreover, economic growth and consequently, the increasing incomes of the population, increase mobility (Vasconcellos, 2001). However, inefficient and costly public transport encourages people to defect to private transport in their attempts to be more mobile. Again the aim of planning has been to expand the infrastructure in order to increase the mobility of the city populations reinforcing road private transport.

For the European cities it is necessary to consider for the design of the mobility concept the trends of shrinkage cities and the balance of these trends with the existing infrastructure, evaluating what the impacts are and to what extent they affect the design and operation of the urban transport network and the possibilities for mobility among various means of transport, as this is an essential prerequisite for taking part in public life. Häußermann (2009) analyses the impacts of the shrinkage in the reorganisation of the territory, the institutions, social and

economic aspects, and planning for the future. Siedentop & Fina (2008) draw attention to the impacts of costs and infrastructure supply in the shrinking cities of Europe. Therefore, the parameters regarding urban density need reevaluation, and European city authorities should think about reinventing and reconverting degraded areas, as well as about redesigning planning in order to renovate city life (Glaeser, 2011; Jacob, 2011).

5.3.2.2 Territorial cohesion: integration in the micro-space

Integration in the micro-space means the accessibility from house door to public space, the conditions surrounding the entering, circulating and leaving of private and public buildings and the interconnections made from and to the urban transport network. The accessibility in the micro-space is made via building entrances, pathways, lifts, pavements, parking facilities, bus stops, terminals and the various means of transport available in the public space and the integration into the macro-space.

Accessibility to urban transport, to bus stops, stations, terminals and the network in general, has proved to be a challenge to urban and transport planners as the providers of services, and also to citizens and users of the urban spaces. For any citizen, leaving home to reach a point of interest, means overcoming various barriers. The barriers begin inside the private buildings, and then come the gates, the stairs, the pavements, the kerbs, the traffic, the lack of signals to enable street crossings, and the obstacles in the pedestrian zones. When it becomes possible to reach public transport, then come the physical and information barriers to using the services and making transfers to final destinations. After the final stop the person needs to face another barrier and cover the distance to the building. A lot of these buildings were constructed according to standard measures with restricted awareness of various groups (Gonçalves, 2012).

The lack of facilities and lack of integration in the micro-space can discourage people from using the public transport system. People with disabilities and reduced mobility, for whom even private transport is problematic, can be deprived altogether of access to city life. The design of an integrated mobility concept must take into consideration the conditions of access, egress and interconnections to and from the main transport network system to private and public buildings, in order to have flows in space without barriers. However, the development of urban spaces without barriers in cities is not only a question of having good project techniques or financial support. It is also necessary to understand the complexity of the urban landscape, the built and unbuilt environment, and the multiple uses of the ruled and unruly city to cope with the mental and physical barriers and to promote equity in access to urban spaces. As witten by Vasconcellos (2001, p. 7):

> “Decisions of supply, operation and appropriation are constrained by political, economic, social and cultural factors, which vary remarkably in time and space. This propositions also assumes that the central issues for transport and traffic policies are: how access is distributed in space; how different social classes and groups use the city; and what the related conditions of equity, safety, comfort, efficiency, environment and cost are.”

A future without barriers depends on changing the culture of how we construct our cities, for both public and private spaces. The CSAs present some measures towards improvements for accessibility in the micro-spaces; some efforts were taken over the years to renovate the public spaces, but they still need improvements to promote social and environmental cohesion.

5.3.2.3 Integration in Urban Transport Planning in the CSAs

For Friedrich (2010) an integrated urban transport planning (IUTP) is characterised by the:

- Consideration of impacts on economy, society and individuals;
- Coordination of land use planning, urban planning and transport planning (regional plan, land use plan, urban transport plan);
- Coordination between various planning levels;
- Connection to adjacent areas and transport network;
- Consideration of all transport systems.

May et.al. (2005, p.238) argue that the meaning of integration in transport focuses not only on the operation of the services. The term also has to be discussed in its strategic form. This means that the integration of policy instruments seeks to achieve better performance from the overall urban planning and the urban transport planning strategies, considering:

- Integration between policy instruments involving different modes;
- Integration between policy instruments involving infrastructure provision, management, information, and pricing;
- Integration between transport measures and land use planning measures;
- Integration with other policy areas such as health and education;
- Integration between authorities within a conurbation.

Table 35 summurises points of co-ordination and integration of city spatial planning and urban transport planning in the CSAs.

Table 35: Interdependence of city spatial planning and urban transport planning in the CSAs

CSA	Points of Co-ordination of the Spatial Planning and Urban Transport Planning
Barcelona	• General guidelines for urban transport in accordance with the national and state guidelines and laws; • Urban transport master plan co-ordinated with the urban master plan, creating three main zones for urban development: old city (compact city – non motorised means of transport), Enxample (modernist city: manzanas, straight grade roads, public transport), Regional city (transport axes connections: private and public transports).
BOGOTÁ	• General guidelines for urban transport following the national guidelines and laws and the city development plan; • Urban transport master plan co-ordinated with the development plan and POT; • Central district: urban renewal, land use (commerce, services, tourism, combined with non-motorised transport, public transport and mobility management).
Curitiba	• General guidelines for urban transport in accordance with the national guidelines and laws, and the local planning concepts; • Urban transport master plan co-ordinated with the urban master plan and federal guidelines; • The city development concept as transit-oriented development (elongated centres on main axes) proposes mixed primary uses on the transport axes (BRT, private transport, pedestrian zones).
Porto Alegre	• General guidelines for urban transport in accordance with the national guidelines and laws; • The city development concept as “Eixos de Centralidade” (elongated centres on main axes) proposes the concentration of commercial and service areas on the transport axes; • Determination in the urban master plan that non-motorised transport is a priority for investments as a policy to reduce pollution and to recover open spaces for recreation and preservation; • Cycling master plan regulates the availability of bicycle parking facilities for the construction of buildings and shops.
Stuttgart	• Guidelines for urban transport following the national, state and regional guidelines and laws; • Planning concepts for urban transport (Verkehrentwicklungskonzept – VEK 2030) follows the guidelines for urban development considering the different zones of the city (Stadtentwicklungskonzept - STEK).

Source: from the author

Table 36 presents a summary and a comparison of the analysis of data collected by the direct observation, the interviews and document analysis. The objective was to compare what was seen in practice and what was stated on documents about integrated planning using selected criteria concerning administrative organisation, regulation, planning organisation, development of measures, and network design and operation. In the end the analysis scored the criteria for each CSA city in order to make a rough evaluation and a comparison of the level of integration in the studied cities.

Table 36: Integration in urban transport planning in the case study areas: a rough evaluation

Criteria / CSA	BCN	BGT	CTB	POA	STG
Administrative Organisation					
▪ Joint institutional organisation of UTP	2	0	2	2	1
▪ Coordination between all transport institutions	2	1	2	2	2
▪ Integrated teamwork of UTP and UP	2	1	2	1	1
▪ Permanent commissions	0	0	1	2	2
Regulation / Guidelines					
▪ Federal transport plan / Federal guidelines	2	2	2	2	2
▪ State transport plan	2	2	2	2	2
▪ Regional transport plan	2	0	0	0	2
▪ Urban plan	2	0	1	0	2
▪ Urban transport plan involving all different modes	2	2	2	2	2
Planning Organisation					
▪ Coordination between various planning levels	2	1	2	0	2
▪ Coordination of the decision process	2	1	2	1	2
▪ Integrated teamwork of UTP	2	0	2	1	1
▪ Integrated teamwork of UTP and UP	1	1	2	1	1
▪ Commissions	1	0	0	2	0
▪ Committees	0	0	0	2	1
▪ Task meetings and exchanging of documents	2	2	2	2	2
▪ Planning code towards integrated working (stated laws, rules and protocols for planning)	1	0	2	1	2
Development of measures					
▪ Development of urban transport measures considering all different modes	2	1	2	0	2
▪ Integration of transport measures and land use planning measures	2	1	2	1	2
▪ Inclusion of adjacent areas (e. g. cities which are connected within the region)	1	0	2	0	2
▪ Coordination with regional transport network	2	0	2	1	2
▪ Integration with other policy areas (e.g. education, health)	1	1	1	1	1
▪ Consideration of impacts on economy, society, environment, demography trends	2	1	1	1	2
Operational Integration for public transport					
▪ Physical integration of all different urban transport systems	2	1	2	1	2
▪ Fare integration for urban public transport	2	1	2	1	2
▪ Physical integration of all different regional transport systems	2	0	1	1	2
▪ Fare integration for regional public transport	2	0	1	1	2
TOTAL SCORE	**47**	**21**	**44**	**32**	**48**

Legend:
BCN (Barcelona); BGT (BOGOTÁ); CTB (Curitiba); POA (Porto Alegre); STG (Stuttgart)
Performance measurement (score from 0 to 56 points):
None = 0
Partial = 1
Total = 2

Source: from the author.

5.4 URBAN DEVELOPMENT, MOBILITY CONCEPT AND CITY ACCESSIBILITY

For this analysis, accessibility is defined as: “The degree of ease with which people get to desired destinations. It is the most direct measure of the positive effects of a transport system. In this simple form, accessibility can be represented by the number (quantitative) and the nature (qualitative) of the destinations that can be reached per person.” [Additionally, accessibility can

be measured by] “the density of infrastructure and transport supply that impacts on travel conditions. Among them are cited pavement for pedestrians, public transport lines for captive users, and roads for people with access to private motorised vehicles” (Vasconcellos, 2001, p. 19, 20). The Brazilian federal guidelines for urban mobility policies define accessibility as the “facilidade disponibilizada às pessoas que possibilite a todos autonomia nos deslocamentos desejados, respeitando-se a legislação em vigor”[101] (BRAZIL, 2012, Art. 4-III).

Moreover, time and money are needed for the evaluation of accessibility, as these variables can mean a constraint for people’s accessibility. One way in which time has been analysed related to transport access, is by transforming the time spent for the journey into monetary value and then relating it to the travelling cost, in order to determine the so-called ‘generalised cost’ (Gonçalves; Novaes, 1996). The generalised costs can influence people’s decisions when they plan to travel or when they think about the choice of transport mode and which route to take. Another way of analysing time is to look at people’s perception of the relative effects of time on the organisation of daily life. Moreover, the way time influences the reaching of destinations can also be analysed by making a comparison among the different transport modes and the city landscape where the displacement is made. The evaluation and percepetion of what makes a comfortable amount of time for the journey includes a geographical analysis of the general environment and the city landscape. Therefore, for this study accessibility is seen as the possibility to gain access by using the personal conditions, material mechanisms and transport means and infrastructures that are available, while access itself depends on people’s own motivations and decisions to use these possibilities, based on their own evaluations and perceptions of the giving accessibility conditions.

Therefore, the development of a mobility concept, together with efficient transport services to promote universal accessibility to the urban space for all the population cannot guarantee that people will, indeed, choose to have access to city life, considering that access depends on the individual’s decision on personally taking part in any activity (see Figure 107). However, an accessible city will be attractive to people and promote individual and collective development, when people decide to take part in this development according to their own evaluations and perceptions of accessibility. Based on this premise, the implementation of accessible transport infrastructure alone, or the mobility of people alone, cannot guarantee urban development. It is necessary to integrate public policies covering different areas and have good communication among the actors in order to attract people to the idea of accessing city life and developing themselves. A way to promote development is to create communication channels where information can flow and social learning can find spaces to be shared and developed in order to enhance knowledge. Accessibility can contribute to it when people understand how the mobility system works and perceive that the system is actually accessible.

[101] In English: the availability of facilities to people that will enable everyone to make the desired displacements with autonomy, respecting the laws in force.

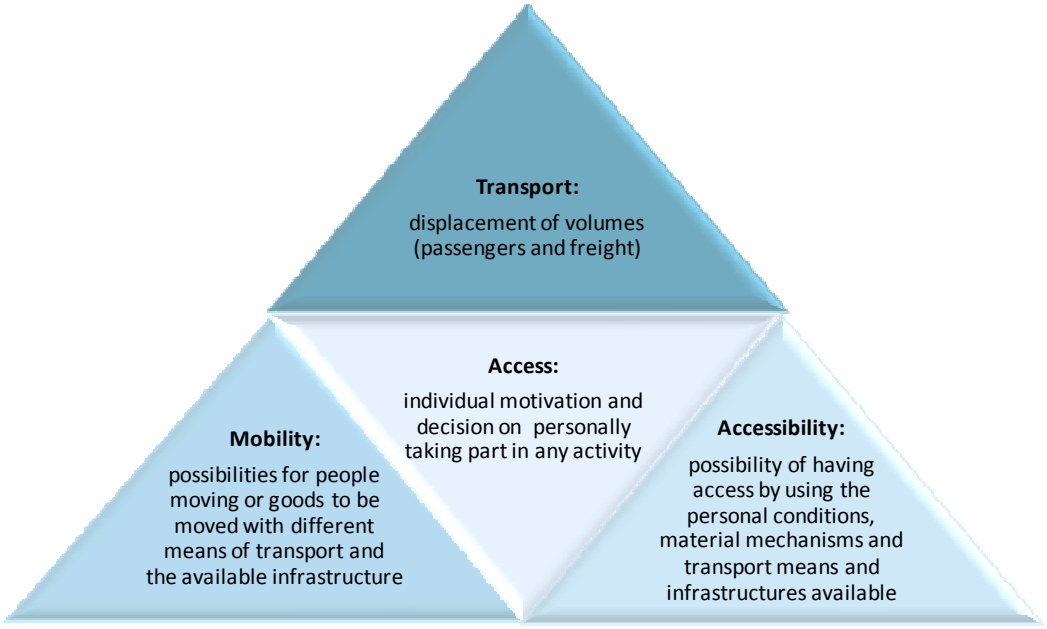


Figure 107: Transport, mobility, accessibility and access: definitions. Source: from the author.

5.4.1 Accessibility: main principles

a) Barrier free city:

- Directness
- Smoothness
- Free of horizontal or vertical obstacles – clearance
- Brightness
- Availability of information covering the whole network and facilities for diverse people – written, schemas, maps, international codes, technology-based instruments and tools, etc.
- Safety
- Security
- Clearness on entering, at intersection crossings and accesses to stations and parking places, and at the intersections with any other means of transport (for instance, pavement and road crossing interface)
- Clearness at micro-access to buildings and public and private spaces
- Comprehensive transport network design

b) Accessible transport network concept and systems design

c) Accessible transport infrastructure and technology: walking, cycling, alternative means, public transport, private transport, parking facilities, terminals, connection points, etc.

5.4.2 Accessibility and space-time relationships

Rodrigue (2009, p.n.a.) argues that "space/time convergence is far from being an uniform process as differences in transport infrastructures and basic landscape constraints have a discriminatory effect on accessibility." Therefore, when making transfers from any specific 'point' to another 'point' in space there is a variable 'distance' which appers under the environment conditions and the infrastructure and facilities available.

> "Distance, a core attribute of transportation can be represented in a variety of ways, ranging from a simple Euclidean distance - a straight line between two locations - to what can be called logistical distance; a complete set of tasks required to be done so that distance can be overcome. Any movement must thus consider its geographical setting which in turn is linked to spatial flows and their patterns." (Rodrigue, 2009).

Figure 108 shows different representations of distance in space and the consideration of a movement by using different transport infrastructure and its space/time relation.

Different Representations of Distance **The Spatial Consideration of a Movement**

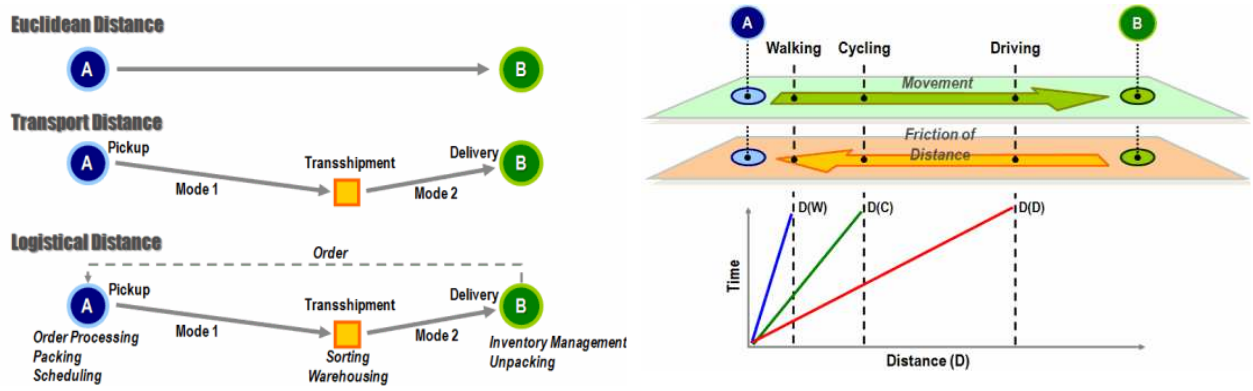


Figure 108: Distance representation and the spatial consideration of a movement. Source: Rodrigue, Comtois, & Slack (2009).

Taking mobility as the ability to overcome distances given the existing infrastructure and transport facilities, in order to improve accessibility it is required to consider the possibility of spatial reach for each means of transport, considering that each system has specific operational characteristics and performance to overcome space in a given time and with given geographical characteristics and built infrastructure of a space (Figure 108). "A better understanding of spatial relations is essential to assist private and public actors involved in transportation mitigate transport problems, such as capacity, transfer, reliability and integration of transport systems" (Rodrigue, 2009, p.n.a). Furthermore, understanding accessibility as a relative attribute, depending on personal conditions and material mechanisms, a second level for evaluation is established in order to measure whether or not a given urban space is accessible: the relational considerations of age, gender, physical characteristics, socioeconomic and cultural aspects, for instance.

The analysis of travel time and travel distance, and the average speed for motorised and non-motorised transport must be evaluated in terms of the attributes of the transport modes, the related infrastructure and also of the different groups of users, for the assessment of the accessibility level of an urban space. Time spent on journeys (walking time, waiting time, transfer time, running time) needs specific and relative measurements.

5.4.3 Urban form: mobility concept and city accessibility

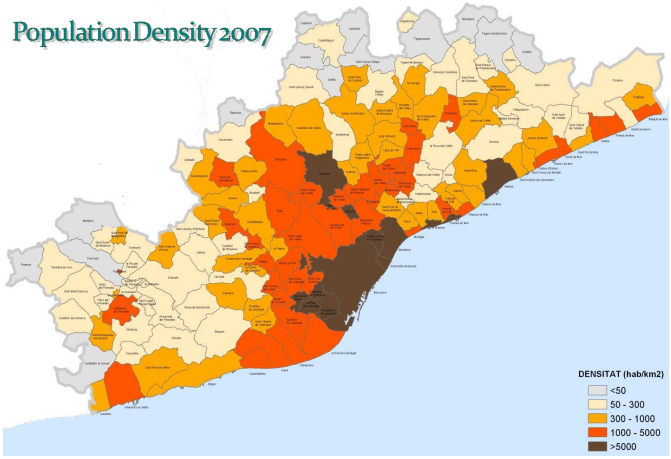
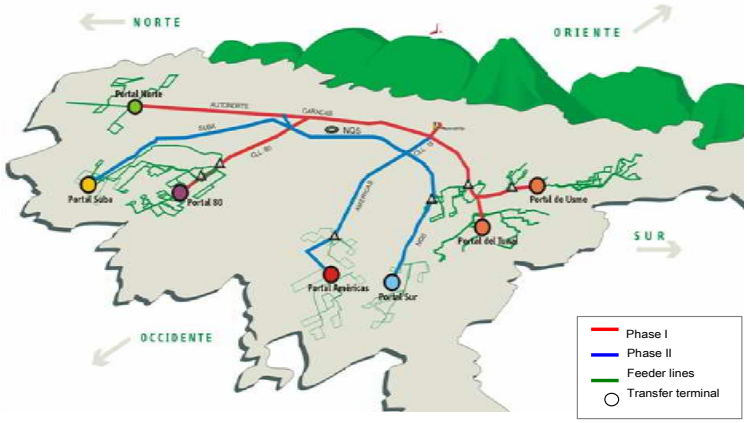
Nordic countries have tradition on developing conpact cities, in spite of having large amount of available space and land, for instance the case of Sweden cities. Newman and Kenworthy (1989, p.82) posed some reasons why cities are built in a very compact manner: “The basic reason for this is the long tradition in Sweden to plan urban services in an equitable and efficient manner”. They identify the following as elements of what a good city requires in Sweden:

- A railway station for rapid urban accessibility should be within 500 to 900 meters (i.e. a short walking or cycling distance) of most housing,
- A train service should not require a timetable, i.e. trains should be provided at least every 12 minutes, and
- People should not be more than 30 minutes from the city centre.

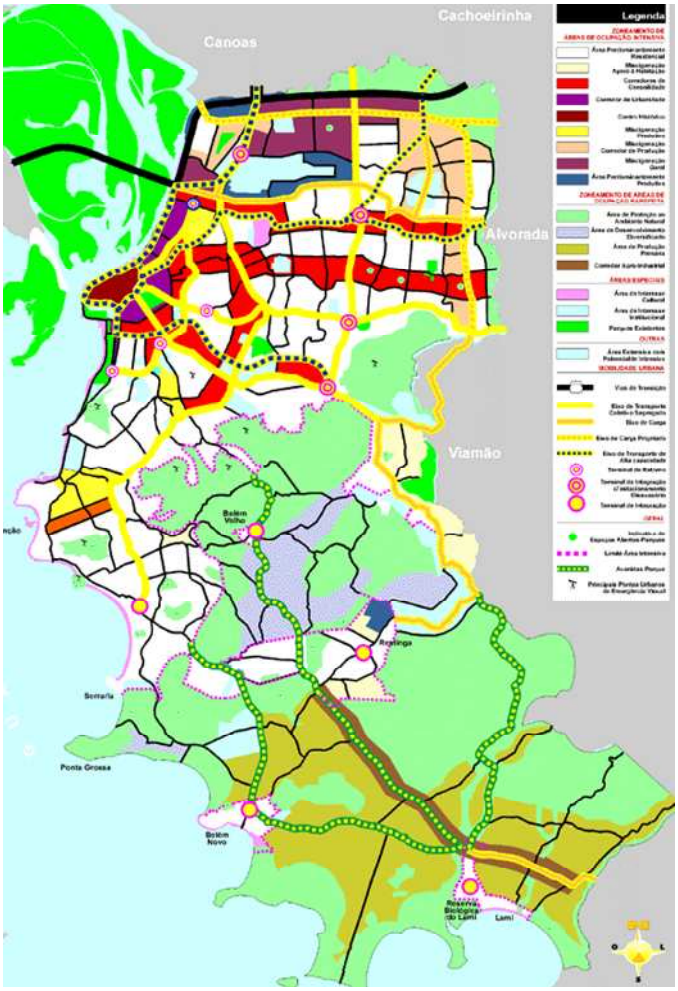
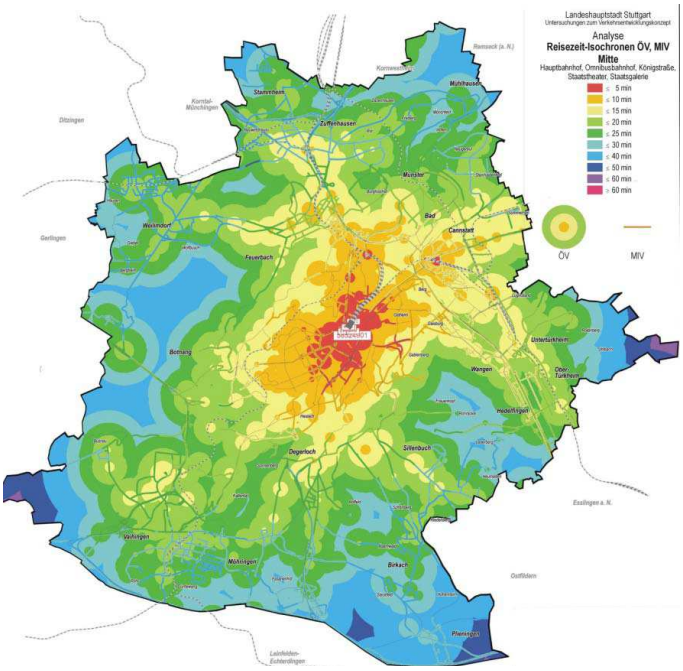
There are other cases described by various authors in a vast literature, for instance the Finger Plan of Copenhagen that promoted the integration of land use, urban transport and environment, seeking the control of urban development and the containment of urban form. Even though the CSAs Barcelona and Curitiba have different approaches for urban development (the old city of Barcelona is a compact city and Curitiba a transit-oriented development) they are also recognised for managing urban growth and sprawling in order to balance the urban transport network and urban form towards city accessibility.

Table 37 shows the main characteristics of urban development and urban form in the CSAs, and their relation to city accessibility.

Table 37: Relations of urban form and accessibility in the CSAs

CSA	Urban development	
Barcelona	**Compact city (CC) - Regional city (RC)** Principles of CC/accessibility: • Walking and cycling distances • Mixed primary uses • Diversity of land uses • Multimodal-integrated transport network • Integration of PuT to non-motorised transport Principles of RC/accessibility • Multimodal-integration PuT network • Integration of non-motorised transport to multimodal Put network	
BOGOTÁ	**Sprawling city (SC) - Unruly city (UC)** Principles of SC/accessibility: • Walking and cycling limited by long distances • Separated urban functions raise time for communting • Disconnections between settlements and leapfrogs • Physical and fare integration within the BRT corridors and feeder lines • Integration of BRT with cycling and walking Principles of UC/accessibility • Large separation from the reach settlements (most of the poor living in the periphery) • Low level of micro-accessibility • Poor transport services and facilities	
Curitiba	**Linear Transit Oriented Development (TOD) – Regional city (RC)** Principles of TOD/accessibility: • Walking and cycling distances in the main BRT axes and specific zones • Mixed primary uses in the BRT axes • Physical and fare integration for PuT network • Integration of PuT with non-motorised transport Principles of RC/accessibility • Physical and fare integration for PuT network – BRT • Integration of non-motorised transport into Put network	

Continuation..... Table 38: Relations of urban form to accessibility in the CSAs

CSA	Urban development	
Porto Alegre	**Sprawling city (SC) - Unruly city (UC) – Regional city (RC)** Atributes of SC/accessibility: • Walking and cycling limited by long distances and lack of infrastructure • Separated urban functions raise time for communting • Disconnections between settlements and leapfrogs (most of the low-income class settled in the outskirts) • Partial fare integration within the bus corridors, some feeder lines and metro Principles of UC/accessibility • Large separation from the reach settlements (most of the poor living in the periphery) • Low level of micro-accessibility • Poor transport infrastructure and facilities Principles of RC/accessibility • Partial fare integration for Put and metro	
Stuttgart	**Decentralised/ polycentric city (DPC) - Regional city (RC)** Principles of DPC/accessibility: • Walking and cycling distances within pedestrian zones, mainly in city centres and specific districts • Commerce and services at walking distances within the radium surrounding the metro stations along the Put axes • Multimodal-integrated transport network • Integrated transport facilities – ticketing purchase • Integration to PuT Principles of RC/accessibility • Integrated-multimodal network	

Sources: From the author; charts from Ajuntament Barcelona (2006); BOGOTÁ (2007); URBS Curitiba (2008); Porto Alegre (1999); Landeshauptstadt Stuttgart. Amt für Stadtplanung und Stadterneuerung (2013).

Some examples of instruments to manage urban growth on behalf of accessibility:

a) Urban design, land use laws and enforcement:

Research points out that “the expansion of peri-urban areas in Europe is a manifestation of a complex web of social, economic and technological changes. It reflects the drive towards lower density and lower costs locations, as well as the search for better environmental quality” (Piorr, 2010, p.44).

How can urban growth be controlled? One point to take into account when answering this question is that “Instruments to manage growth and control decline must concentrate on developing compact sub-centres in peri-urban areas by establishing strict zoning regulations against urban sprawl, and by restructuring urban low-rent areas” (Piorr, 2010, p.50).

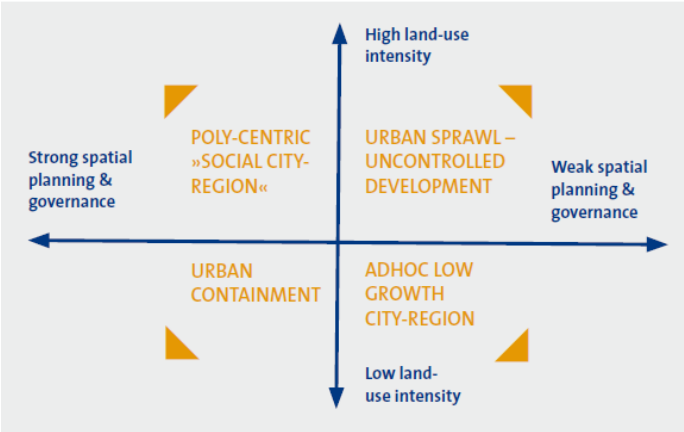


Figure 109: European Projects PLUREL. Peri-urban paradigms: quantity vs. quality. Source: (Piorr, Ravetz, & Tosics, 2011, p.34).

b) Promotion of the Urban-Rural Interface: understanding peri-urban land use relationships and designing strategies and sustainability assessment tools for urban-rural linkages (Piorr, Ravetz, & Tosics, 2011, p.30).

c) Integrated urban transport solutions within an integrated network giving preference for the more relatively sustainable modes and facilities.

d) Supporting alternative transport solutions: car sharing, taxis, skates, scooters, and others.

e) Studying the relationship between time and space covered, seeking to understand the impedances to accessibility (physical, psychological, safety, security, for instance), in order to reinforce the more efficient and comfortable modes.

5.5 ANALYSIS OF RESULTS OF IMPLEMENTED PLANS IN THE URBAN TRANSPORT NETWORK

The Urban Transport Network (UTN) comprises all of the different transport systems operating within the city territory. This analysis aims to compare some results of the urban transport

planning approach and the framework of planning (political and administrative organisation; regulation; public policies; urban development) that influence the urban transport network (UTN), based on mobility patterns like the modal split, average daily travel time per person and average distance covered per person per trip. Furthermore, it intends to compare transport indicators like the degree of motorisation (DM), public transport index of passengers per kilometre (IPK), cycling and walking facilities and transport infrastructures.

5.5.1 Mobility patterns

a) Modal split

Figure 110 shows a comparison of the modal splits of the five CSAs. For all five cases, motorised transport makes up about 70% of the total of all passengers' transport. From these figures, we see that public transport makes up half or more of the total for four of the five cases. The exception is Stuttgart, where individual motorised transport makes up 45% of the trips. BOGOTÁ has the highest participation of public transport: 58%. For the non-motorised transport, walking makes up the highest share of the trips for all cities, highlighting Barcelona as the city where the most walking takes place. Curitiba and Stuttgart have similar, and the highest, levels of cycling as shares of modes of transport.

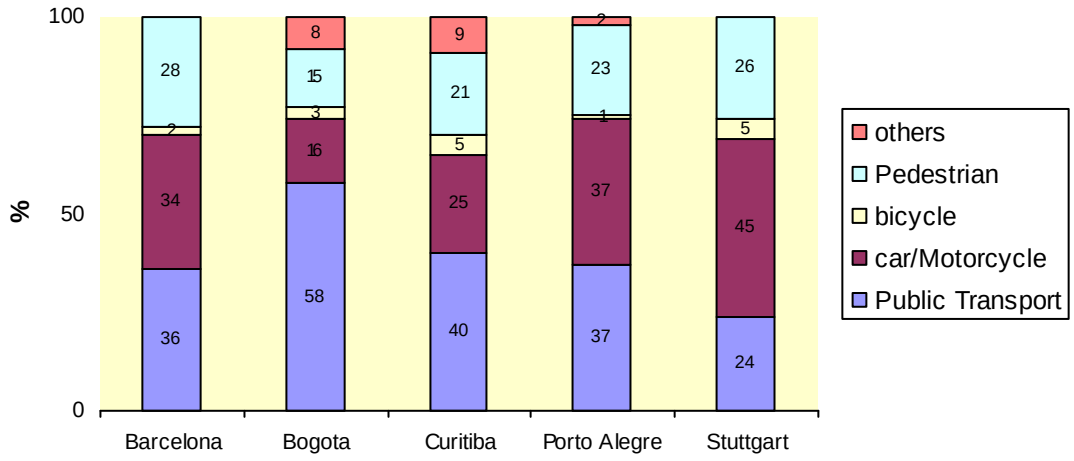


Figure 110: Modal split: A comparison of European and Latin-American cities. Various sources from the CSAs.

b) Travel time:

For this study, 'travel time' is understood as the total time taken by a person to cover a distance from door(origin)-to-door(final destination). It is the sum of: walking time (access plus egress time), waiting time, running time and transfer time. Walking time is the sum of the access time: time walking from door (origin) to the means of transport (car, bicycle, bus/tram/metro station, other), plus the egress time: time walking from the parking place (car, bicycle, other) or the public transport station to the door of the final destination.

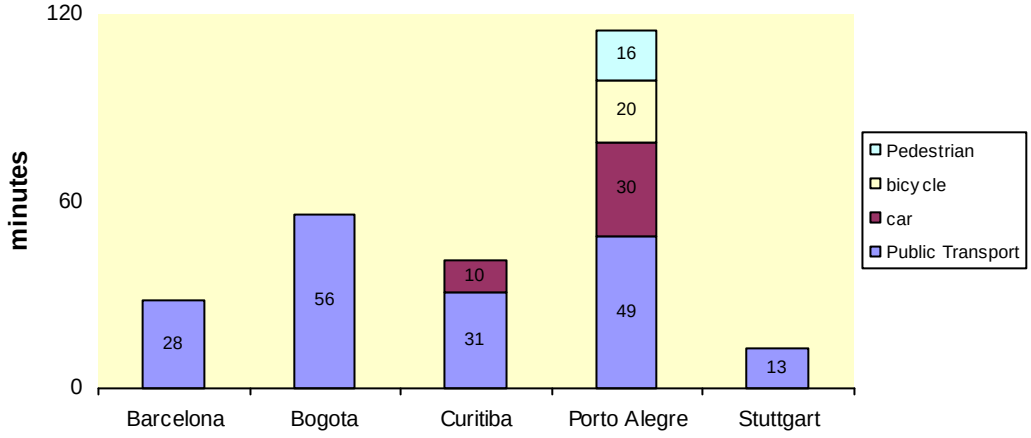


Figure 111: Average time spent travelling per person per trip/direction: A comparison of European and Latin-American cities. Various sources from the CSAs.

Analysing Figure 111, out of the five cases, only Porto Alegre possessed information on the average travel times for all four modes, walking, cycling, cars and public transport. The time spent travelling by public transport was available for all the case study areas. Therefore, when comparing all cases, a high discrepancy between the two extremes could be observed: Stuttgart with the average time of 13 minutes and BOGOTÁ with 56 minutes, followed by Porto Alegre with 49 minutes on average. Barcelona and Curitiba were both somewhere in the middle: 28 and 31 minutes respectively. Comparing the two sets of data available for private motorised transport, Porto Alegre also has the highest level of travel time: 30 minutes on average.

c) Average distance

Regarding the information for average distances covered while travelling, again only Porto Alegre possessed the figures for the four modes of walking, cycling, individual-motorised transport and public transport. Barcelona and BOGOTÁ had no data available at all, and Curitiba only for public transport and cars. Porto Alegre showed the highest distances in comparison with Curitiba and Stuttgart (see information in Figure 112).

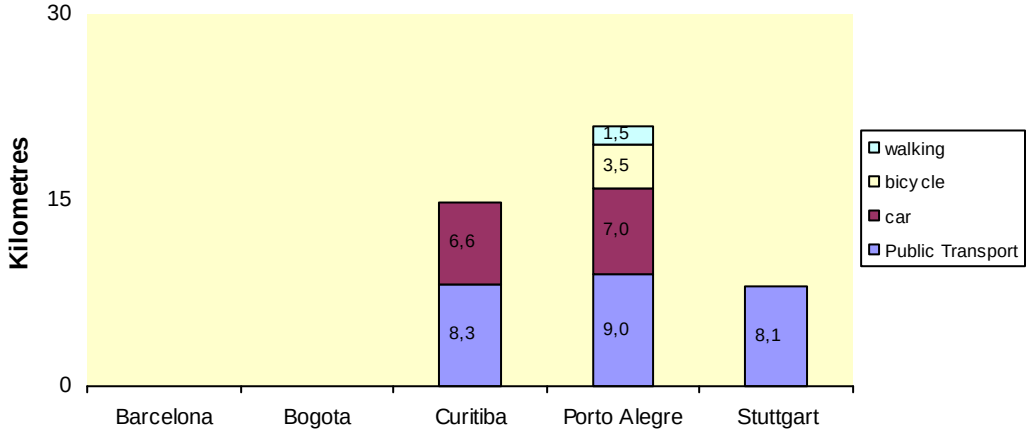


Figure 112: Average distances covered per person per trip: a comparison of European and Latin-American cities. Various sources from CSAs.

5.5.2 Public transport

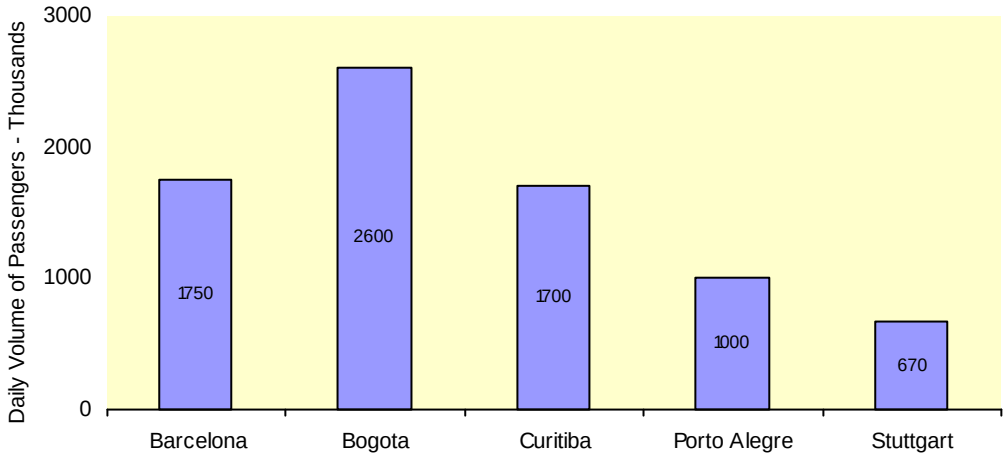


Figure 113: Daily volume of passengers: a comparison of European and Latin-American cities. Various sources from the CSAs

Figure 114 shows a comparison of the rate of passengers per kilometre (IPK) using public transport (daily average) in the CSAs. This indicator is largely used in several cities in Latin America (and other continents) to evaluate public transport performance and for the calculation of fares.

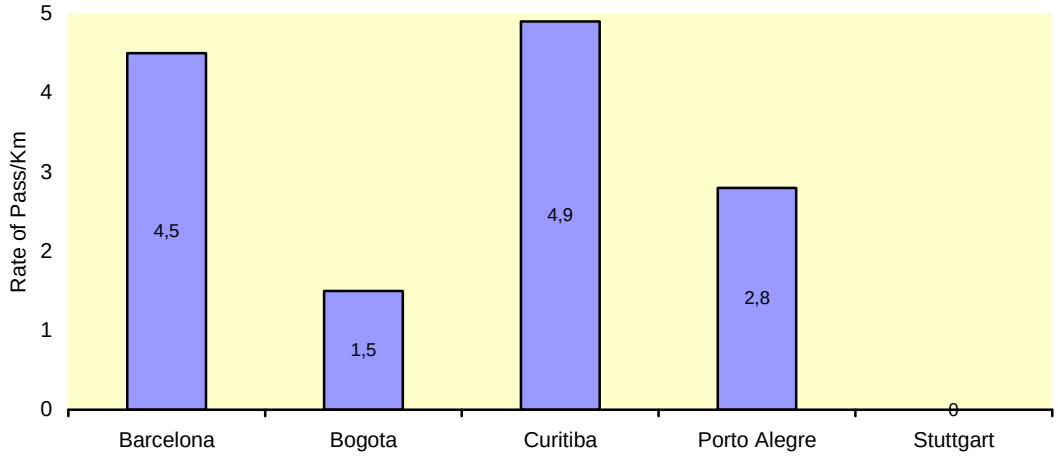


Figure 114: Rate of passengers per kilometre (IPK) in the public transport network – daily average: A comparison of European and Latin-American cities. Source: calculated on the basis of data from the CSAs' Transport Authorities. Various sources from the CSAs.

Figure 111 shows the average travel times in BOGOTÁ and Porto Alegre as 56 and 49 minutes respectively. Moreover, these cities have the lowest passengers/kilometre rate, which implies lower revenues for the operators regarding fare collection, as they are paid according to the number of passengers boarding, in spite of the highest participation of public transport in the modal split among the CSAs: 58%. The correlation of Figure 111 and Figure 114 shows that the passengers have high negative impacts for travelling by public transport regarding travel time, in

comparison to the other cities (Goncalves; Novaes, 1996 – an analysis of generalised costs for public transport users). Additionally, the high travel time and low passenger/km rate are results of the urban form in these sprawling cities where long distances are covered between housing and workplaces in low density areas, and also results of the separation of urban functions, which in turn results from the modernist urban design.

Furthermore, this is related to the design of the entire transport network. The two cities BOGOTÁ and Porto Alegre have implemented bus corridors, with acceptable levels of services, but the design of the whole network is not optimised, because it does not consider the entire public transport network during operational planning, and because the entire network is not fully covered by an integrated fare and interchange system. Therefore time, money and petrol can all be wasted as kilometres of the network are served without anyone actually using the service (with lines running in parallel and not complementing itineraries or offering the possibility of making transfers, which is not attractive for the users). This can raise costs and bring inefficiency to the services. Moreover, in Porto Alegre the operation is affected by traffic congestions and the lack of preference for public transport at the cross sections. The lack of traffic control and congestions imply a reduction of speed, in turn raising travel time, which makes the services less attractive for the population. These deficiencies are heightened in the city centre, where average speeds during the peak hour can decline to 10km/h.

Both cities have planned to increase investments in infrastructure for public transport. However, bearing in mind the decreasing rates of population growth, the planners should take into account the analyses of the urban development concept for the designing of new infrastructure for public transport. Also the entire transport network needs to be analysed, considering an integrated approach for planning.

Barcelona and Curitiba showed the highest figures for the IPK. These results are related both to the design of the urban transport network and to the urban spatial dvelopment. Both cities have mixed land use in various areas of the city territory. Mixed land use increases the movement of people into the area (Jacobs, 2011) and this creates impacts on the transport network, increasing the number of passengers travelling. Moreover, both cities have, historically, a co-ordination of urban and transport planning. Barcelona developed as a compact city, designing a diversified and integrated urban transport network infrastructure and services, combining different transport modes (walking, cycling, tram, metro, train, buses and private transport). On the other hand, Curitiba developed a transit-oriented development, with an integrated transport network (walking, cycling, buses and private transport). Within a compact city or a transit-oriented development, combining mixed land uses, the movement of people boarding and alighting is higher than in sprawling development, which has ‘leapfrogs’ or empty spaces between the settlements. Curitiba and Barcelona also relatively showed the lowest operational costs for public transport among the five cities (since discrepancies of currency are considered).

The BRT in Curitiba, where the stations are positioned on average 500 meters from each other, facilitates accessibility to public transport considering that this is the average distance that a person can walk in comfort (Newman & Kenworthy, 1989). Therefore one can walk around and make use of facilities, services, retail outlets etc, and arrive at the next station by taking a

simple, direct and short route, without having to return to the original station, which would create “lost time walking”, lengthening the trip by moving backwards. Therefore, in this system, users have maximised walking time.

5.5.3 Individual motorised transport

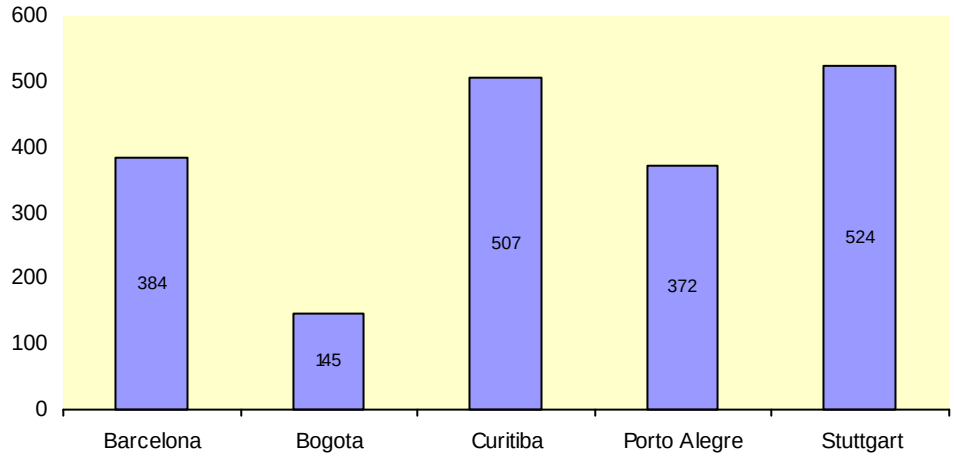


Figure 115: Degree of motorisation (DM) (vehicles/1000 Inhabitants): a comparison of European and Latin-American cities. Source: from the author on the basis of data from CAF (2013). Various sources from the CSAs.

It has been said that in urban sprawl cities, the degree of motorisation (DM) must be high in order to cope with long distances, due to the lack or inefficiency of public transport and high costs. Porto Alegre has the lowest DM considering the four cities shown in Figure 115. This figure reflects the special conditions of Latin American cities, where those of lowest income live on the peripheries of cities and are dependent on public transport in order simply to move around. In general they are not car owners. The trips they make beyond the areas where they live are mainly made for commuting and by bus. Therefore, several bus lines provide connections to the city centre. When services are not supplied by official and planned public transport, or when they become expensive because of the inefficiency of planning and the effects of the urban form, then the “alternatives”, non-regulated transport, appear, as has happened in BOGOTÁ. This situation generates great congestion and conflict between buses and cars in the core of the city, as has happened in Porto Alegre and BOGOTÁ.

The strategy of planning in Porto Alegre, the “corredores de centralidade”, or elongated city centre along the main radial streets, has not been able to solve the conflict of bus versus car during peak hours in the core of the city, or the effects of sprawling. The concept of the master plan has hitherto been unable to avoid the reproduction of the same pattern, the disconnected and fragmented city, in situations where its proposals are insufficient to fulfil the gaps between the ruled and unruly city, and between housing and workplaces. In these situations, the model of the modern city (in the way it could be applied in cities in developing countries) is seen as the model for urban development in practice. Solving this problem requires a redesigning of the transport network, considering a multimodal transport network, based on an integrated planning concept.

The highest DM are seen to Curitiba and Stuttgart. A general analysis points out that in both cities the percentage of middle and upper classes of the population is high when compared to the other cities within their specific regions. Furthermore, Stuttgart is the centre of one of the biggest automobile manufacturing in the planet. This condition would make Stuttgart a bit uncomparable because an important part of the workers receives facilities to own a car. The second point to be considered is about the urban form and development. Both cities concentrates the highest public transport infrastructure and facilities on the main axes. Although Curitiba perform high participation of public transport in the modal split, it is also true that the more distante from the BRT corridors, the population density decrease and also decreses public transport supply. Therefore, the use of private transport increases.

5.5.4 Non-motorised transport

The urban infrastructure, land use and the urban form have a direct implication on the decisions of the population for using non-motorised transport.

According to the literature, the sprawling cities can present constraints for cycling and walking. Taking two of the CSAs from Latin America, Bogotá and Porto Alegre, these cities are characterised by the concentration of most activities in the city centre or in special districts (e. g. industrial districts). There is a great separation of urban functions, with residential areas where most of the workers live (city outskirts) separated from the commercial and industrial areas where their workplaces are located. The population has to commute long distances every day to reach their jobs. These distances would be too great to cover using non-motorised transport.

a) Cycling

Table 39 shows a comparison of the availability of cycling infrastructure in the CSAs.

Table 39: Existing cycling facilities and infrastructure in the CSAs.

	Cycling Facilities and Infrastructure in the CSA						
CSA	**Display of Information and signalling**	**Information office and on website**	**Website services**	**Public services**	**Cycle routes km**	**Parking facilities**	**Integration with public transport**
Barcelona	X	X	X	Bicing	130	Rack and garage	
BOGOTÁ	X	X			350	Rack	X
Curitiba	X				140		
Porto Alegre					30		
Stuttgart	X	X	X	Call-bike	140	Rack and garage	X

Source: from the author.

Bogotá has by far the longest network of cycle routes, with a high percentage of the pathways integrated into the public transport network. Furthermore, public spaces and roads in areas of the central district have been recovered for cycle use. However, the modal split still shows only a modest participation in cycling. The modal split shows that in Bogotá, in spite of the 350km of

cycle routes and all the infrastructure available (parking places, information, facilities to make transfers to public transport etc), only around 3% of trips are made by bicycle. According to interviews done at the transport department of Bogotá, the long distances covered during these trips appears to be the main reason for the proposed expansion of the cycling network and for the encouragement of bicycle use.

Results like these, and those for Porto Alegre, confirm the limitation of cycling by the vast separation of the housing areas and the workplaces, as an impact of urban development. In Porto Alegre, together with the pattern of urban sprawling there is also a lack of adequate infrastructure for cycling. Therefore, the proportion of cycling in the modal split is less than 1%. Due to the concentration of trips to the city centre, the speed of motorised transport is lower than 12 km/h during peak hours. This factor was an important justification for the fast inclusion, in the plan, of cycling measures. With the new cycling plan Porto Alegre has directed efforts intending to improve infrastructure. Based on the example of Bogotá, the analysis shows that the availability of infrastructure alone is not sufficient to attract users to a means of transport. The spatial form of the city has a strong impact on the modal split (Figure 110). Therefore, the integration of the diverse areas of planning is essential in order to reach an optimisation of the transport network, which is not a reality in Porto Alegre and Bogotá today.

According to the officer responsible for cycling in the city of Stuttgart, the main reasons for the low use of cycling are related to the topography of the city, the discontinuation of the cycle routes network and the lack of proper connections between cycle lanes and cycle routes (safety problems). The data shows that there are differences in cycle use across the city territory. For instance, in neighbourhoods where the topography is flat, such as Vaihingen, the modal split reaches 18% for cycling, followed by Bad Cannstatt with a percentage of 12%. (Koehnlein, 2008, Interview). There are also social reasons, such as the high population of students in Vaihingen and the low-to-middle income bracket that predominates in Bad Cannstatt.

Indeed, for all cases we can see that the availability of infrastructure alone cannot raise the participation of cycling as a percentage of the modal split. The effective use of the infrastructure must combine an integrated concept for mobility together with other public policies and strategies, in order to encourage the use of cycling. Goals and objectives must be set out (for instance, as was done in Barcelona) and an action plan must be proposed in order to reach those goals. Furthermore, as is seen in Barcelona, urban form and development can enhance the use of cycling for local and intra-district uses. The compact city, with mixed land use, is very favourable to cycling with regards to local and short distances. Inter-district use can be encouraged when infrastructure and facilities are available. For instance the integration of the cycle routes and parking facilities in Barcelona, and the facilities available for carrying bicycles on public transport in both Barcelona and Stuttgart.

Barcelona and Stuttgart also have very sucessful rent-a-bike systems: the Bicing in Barcelona and the Call-a-Bike in Stuttgart. Both cities have raised the use of cycling in the areas where the services are available.

b) Walking

Levels of accessibility for pedestrians vary greatly across the CSAs. The conditions of the infrastructure and the facilities offered for users in the five areas were evaluated taking the central area as a reference (see Table 40).

Table 40: Existing pedestrian facilities and infrastructure in the CSAs.

CSA	Pedestrian Facilities and Infrastructure in the CSAs					
	Display of Information on the streets	Information office and website	Website services	Pedestrian zones	Universal signalling	Pavements infrastructure
Barcelona	X	X	X	X	X	X
BOGOTÁ				X	Partial	Partial; poor maintenance in the periphery
Curitiba		X		X	Partial	Partial; poor maintenance in the periphery
Porto Alegre		X		X	Partial	Partial; poor maintenance in the periphery
Stuttgart	X	X	X	X	Partial	X

Source: from the author.

Barcelona has the highest participation of walking in the mode share among the CSAs, 28%, followed by Stuttgart with 26%. This is a result of the walking facilities and large infrastructure (pedestrian zones, signalling, information, integration with other transport modes), mixed land use and the ease of reach within a compact city development. Stuttgart also offers acceptable accessibility conditions within the various pedestrian areas located in the city centre and other neighbourhoods. There is a pedestrian zones infrastructure and information available about the pathways and strategic points for the orientation of direction and reach.

BRT in Curitiba, where the stations are positioned on average 500 meters from each other, facilitates accessibility to public transport, considering that this is the average distance that a person can walk in comfort. Therefore one can walk around and make use of facilities, services, retail outlets etc, and arrive at the next station by taking a simple, direct and short route, without having to return to the original station, which would create “lost time walking”, lengthening the journey by moving backwards. Therefore, in this system, users have maximised walking time.

Bogotá has invested in pedestrian areas, seeking to make improvements for public spaces by recovering and urbanising degraded areas, developing integration to public transport and raising safety and security for pedestrians. The city has also permanently converted spaces that had been used for cars into pedestrian areas, by adapting road lanes and parking places. Additionally the city is using mobility management by closing streets in the city centre to cars after 6:00 pm. The results are already visible relating to the reduction of traffic accidents, statistics involving pedestrians and the now-liveable spaces in the city centre that attract citizens and tourists during the day and also at night, which had previously been almost entirely commercial and service areas which were dangerous at night-time.

5.5.5 Alternative transport services

It is worthwile to highlight the alternative transport services available in the city of Stuttgart. The services StadtMobil, offered by the public transport company Deutsche Bahn and the private service Car2Go are inportante initiatives for the expansion of the urban transport services available for the population and the urban transport network accessibility. Furtheremore, these services fill an important gap in urban mobility and also they can enhance the effience of the urban transport network because the intensification of use of the same number of cars, mainly in the inner city, can reduce the number of private vehicles entering the city centres, and consequently, could bring impacts on the reduction of traffic congestions. Moreover, these initiatives reduce negative environment impacts and contribute to more efficient uses of resources and work towards sustainability.

5.6 URBAN TRANSPORT PLANNING PROCESS IN THE CASE STUDY AREAS

The objective of developing and implementing a plan is to promote improvements on the current situation of a system. According to Friedrich (2007, p.n.a.) planning seeks to "change the current (or existing) state with deficiencies to an improved state." However, many organisations fail to achieve expected performance results when implementing system improvements. Warzynski (2006, p.1) says that "nearly two-thirds of change projects fail to achieve their goals." Additionally, it is common sense in the public institutions that many plans developed by the city planners or contracted consultants remain on the desks of the decision makers for years and a great part of them end up among the "dead archives"[102].

Innes & Gruber (2001, p.) argue that most of the constraints on achieving goals in planning exist because planning "can be a contentious process." The planning process, "most of the time involves many players and many interests all seeking different outcomes or protecting different turf." For the authors the main reason for contention within urban and transport planning is mainly due to differences in planning styles and less due to substantive disagreements or power struggles. Ward (2001) is of the opinion that the diversity of stakeholders participating in the planning influences the process organisation and the results of the plan.

Kristof (2005, p.) claims that "a possible reason for the failure to achieve performance results is that such organizations lack the knowledge, skill and appropriate planning practices for generating systemic and congruent approaches for implementing improvements and managing changing." Krizek & Levinson (2003) argue that the planning process is a multidisciplinary approach. Therefore it requires strategies and integrated approaches, combined methods, and synergy between specialisations. For Warzynski (2006, p.1) one reason why "many projects fail is because they lack a methodology that effectively engages the organization bridges levels of analysis, and integrates and aligns the new technology with the existing technology, social structure and culture of the organization."

[102] As an urban transport planner for years the author heard in many situations the argument that it is "normal" that some of the developed plans are not implemented or fail in public administration.

Gonçalves & Bernardo (1998) proposed a methodology to integrate public participation in the public transport planning process, seeking to build bridges between the actors involved in the process. The organisation of the process was based on a software platform and in an administrative organisation to support the flow of information between the population and the transport planners. Furthermore, the authors discussed how the institutional framework organisation must be structured in order to include public participation in the daily work of planning urban transport. This means breaking down the paradigm of including participation only in certain specific moments of planning, when it is considered politically or technically convenient, and instead making public participation part of the philosophy of planning.

Furthermore, for the organisation of the urban transport planning process it is essential to consider the socio-political and cultural manifestations in any specific urban area.

5.6.1 Urban transport planning as a part of municipal organisation: the share of responsibilities for the cities and the institutions for organising the planning process

The impulses to start the process of planning, to catalyse human and non-human actors, to consolidate the process in all phases of planning development, to disseminate the results for a planning area and to achieve sustainability and its reproduction over time, can all be considered as stages in the space and time of the planning process. The process can be organised as a methodological approach in stages to help its understanding, organisation, monitoring, adjustments and reproduction over time, as illustrated in Figure 116.

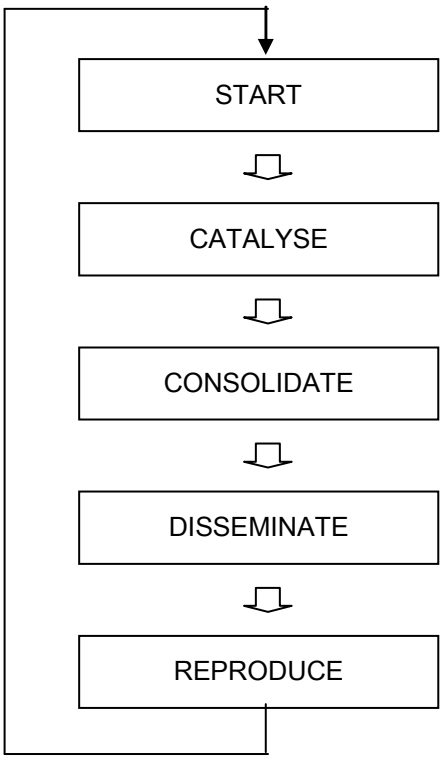


Figure 116: Planning process: stages in space and time. Source: from the author.

5.6.1.1 The organisation of the planning process

The position of the city in the government structures impacts on the urban transport planning process depending on the way the responsibilities are shared for each government level and institution. For the five CSAs the federal or state constitution determines that the mayor has the personal responsibility for planning the territory of the city represented by her or him. Therefore, the mayor has to organise the basis of the planning process. This is concerned with the transference of responsibility to staff and the giving of institutional legitimacy and administrative and financial support for the organisation of the planning process.

Healey (2006, p.207) claims that:

> "An institutionalist analysis enphasises the complex interactions between the activity of formal government bodies, economic activity and social life, interlinked through social networks and cultural assumptions and practices which cut across formal organizations. Thus ideas from a business or social arena are drawn into the development of policy ideas and help to frame assumptions about government practices, and vice versa."

Some assumptions are common for the five case studies about basic elements of the planning process based on international agreements or the share of principles relating to the matter. For instance, UN statements about democracy and the inclusion of people's accountability for public policies; the participation of the general public in planning, as well as government staff and the representatives of organised society; and the formalisation of planning towards sustainability, considering the significant concerns about environmental problems and the responsibilities of governments and their populations to work towards the efficient use of resources and the maintaining of equilibrium in reproduction for environmental reasons. A third point is related to the need for the planning process to have financial accountability, considering commitments regarding credits, contracts and the public budget.

It is also visible for all five case study areas that their populations are now much more aware of their own rights and are much more interested in participating in the process of planning, than they were in the past, as planning is seen as the common arena where they can intervene in the city's development, participating in the construction of the environment where they live and where their children will live in the future.

The five CSAs have formalised regulations and institutions in charge of the organisation of the urban and transport planning process. All of them have permanent technical staff, as well as the politicians and their staff who come and go with the government administration they work for. In four of the five cities, the Urban Master Plan is at least enforced by law and by guidelines for the organisation of the planning process. The exception is the city of Stuttgart, which has the Urban Development Concept (STEK) and the Urban Transport Concept (VEK 2030), which are not enforced by law. The five cities have traditions in the organisation of urban transport planning. All of them have had edited documents relating to formalised planning since at the latest the sixties.

Co-ordination of urban and transport planning in the planning process exists in the five CSAs but each city uses different instruments and strategies for processing this co-ordination. For instance, Stuttgart works on the basis of the two documents STEK and VEK, adhering to regulations and calls for meetings with other areas when required; the same institution is in charge of urban and transport planning for the strategic level. Curitiba works similarly to Stuttgart; the only difference is that Curitiba works on the basis of the urban and transport master plan enforced by law. In Barcelona and BOGOTÁ they have different institutions working to develop and organise urban and transport planning. Both cities work on the basis of the two documents of the urban and the transport master plans. The cities do not have permanent commissions or commitees working together on urban and transport planning; the technicians and politicians meet when required for specific projects. There are two separate institutions working in urban and in transport planning in Porto Alegre (EPTC and SMP). The institutions organise and implement the planning process on the basis of the urban master plan and they maintain permanent regulated commissions and committees for discussing and delivering technical statements, giving evaluations of and recommendations for planning and specific projects.

Both European cities share the responsibilities and the organisation of planning processes for urban transport with the regional institutions. In Barcelona the ATM administrate the integrated urban and regional public transport network and it is also in charge of organising and implementing the planning process for specific tasks and areas of public transport. Stuttgart shares the planning process with the Verband Region Stuttgart for strategic planning. Two Latin American cities do not have a unified institutionalised regional planning process (Bogotá and Porto Alegre). In Brazil it is determined by the Federal Constitution for all cities that urban transport is under municipal responsibility in all aspects concerned with planning organisation, implementation of infrastructure and operation.[103] The two Brazilian cases show quite different behaviour regarding regional transport administration, operation and planning. Curitiba has an agreement with the metropolitan region for organising the planning and operating sections of the integrated public transport networks of the metropolitan cities. In Curitiba the same municipal institutions (URBS and IPPUC) and technical staff that plan urban transport in Curitiba, work in the planning process for the regional level. The sustainability of Curitiba's implemented plans has the support of the institutions that have been able to reproduce it, through URBS and IPUCC.

At the regional level in Porto Alegre the three government levels have direct responsibilities for planning the services they operate in the region, with the same degrees of legal empowerment. Thereby, when the decision reached is not a consensus, the process is interrupted or the tendency is that each one implements the measures in accordance with their own view of planning and the affordable budget. Although in Stuttgart the federal level participates in the operation of regional transport through an operation contract, it does not have direct responsibility for planning. Therefore, it does not compete "on the table" of decision with the same level of empowerment as the transport planning authorities, as in the Porto Alegre

[103] FC/88, Art. 30, Item V.

metropolitan region. Instead it is delegated to the lower levels of government. In Stuttgart the mayor is in charge of the organisation of planning. However, he does not represent a single decision-maker. “A good plan is one easy to understand and has the focus on people not on the infrastructure. Also a good plan is one that presents a balance between public transport and private transport” (Forderer, 2008, interview).

Although Bogotá has a Mobility Secretary in charge of administering and planning urban mobility, there are various institutions in charge of specific tasks and shared responsibilities for transport planning. Transmilenio is in charge of the administration of the BRT public transport, its operational planning, the trust fund and the payment of the operators’ bus companies, and is also in charge of the organisation of the planning process for the areas of public transport they operate. IDU is in charge of planning, the development of projects and contracting the implementation of measures for private and non-motorised transport. Therefore, there are no strict or unified guidelines for the organisation of the urban transport planning process. Each institution conducts the process of planning within their administrative and planning organisation.

Considering a planning process framework in accordance with the schema of Figure 44, all five cities’ planning processes are organised by separating plans and specific projects following a logic of strategic and tactical/operational levels for planning, considering terms (“Zeitraum”), budget and the level of impact of the measures. From the five cities only Porto Alegre has unified strategic and operational planning for the whole urban transport planning process, conducted by a single institution and co-ordinated with the urban planning via permanent commissions. The other cities have different public companies or institutions in charge of strategic planning and sharing operational planning with one or more institutions. Even though in Porto Alegre EPTC is in charge of urban transport planning as a whole, the planning process is clearly organised into two levels: strategic and tactical/operational. One major difference between the two levels regards the participation of the public at large in decision-making: the O.P. participates more effectively at this phase for measures developed for short-term tactical/operational planning and decisions. The O.P. works better on the technical/operational level where the diversity of interests among actors is narrower.

Participation in the planning process can be analysed by different aspects as social or technical. However, in countries like Brazil and Colombia there has been a fundamental motivation concerning recent decades: to rescue democracy and the rights of citizens. This aspect separates them from the current situation of European countries like Germany and Spain, because they are living in a different stage of historical and political development. Democracy is much newer in Latin America, and therefore their focus is vastly different and much more motivated by politics. In Latin America, planning processes are motivated by gaining rights to enter public places, which is not an issue in Europe. They are also different in the way public participation is involved in the process of planning the cities. For example, the OP in Porto Alegre has been presented as a trophy by the creators and the organisation up to the present day, as it has brought into the public institution the voice of the poor people. They could show

publicly that they “exist” and have needs in the city that should be satisfied; that they want to live in a ruled city and belong to society.

Considering the theory developed by Innes & Gruber (2001), the way Curitiba organises the data base and all information used in the planning process indicates a technical/bureaucratic style of planning: “The information that technical planners use is mostly quantitative and is developed by them or their consultants”. This is visible in the publications from IPPUC and URBS. The analysis of the process showed that the technical institutions always have the plan in their hands and lead the process through the phases of planning. There is a unitary decision-maker and a low diversity of actors influencing the process. The decisions are made based on the concepts developed by the planners, who have significant influence on the final decision. According to Innes & Gruber (2001), the points set out above indicate some characteristics of the technical/bureaucratic style. “In this case, the technicians maintain in their hands the process and decisions, and lead the other parts to adhere to the original proposal.”

In Curitiba the plan is developed by technicians from IPPUC and URBS during the phases of problem analysis and examination of measures. These institutions are responsible for the coordination of the next phases: decision, implementation and evaluation of measures. The analysis shows that in Curitiba “there is a strict division of labor” (Innes&Grubber, 2001) among the actors in the planning process, and public participation has a limited role. According to the planning styles theory, the characteristics of the technical/bureaucratic style are visible. What is a good plan? In Curitiba it is “one that meets all the requirements of the legislation is consistent with the official goals, and has all the backup information required”. According to this theory, the characteristics of the planning process and the expected results for the city follow the pattern described as the “technical/bureaucratic style”.

Considering the theory discussed by Innes & Gruber (2001) concerning planning styles, the participation in the planning process at the strategic level in Porto Alegre can be understood as “political influence”. For the authors “In the political influence model, where public participation does exist, it ideally involves a blue ribbon committee of hand picked, trustworthy and well respected individuals from different sectors”. These characteristics can be seen among the committees and city councils. Moreover, strong interference was observed from political leaders from other municipal departments, like Local Governance (SMGL) and Municipal Strategic Government Administration Secretary (SMGAE). Additionally, the analysis of internal commissions, documents, regulations and interviews conducted with members of CAUGE, all show significant influences on the government from technicians, especially those from EPTC. They also show that members of CAUGE influence the process of planning, and therefore also the decisions made by the government. The analysis of the planning process in Porto Alegre shows that it is complex and contentious. As discussed by Innes&Gruber (2001), these characteristics can be a result of the involvement of “many players and many interest all seeking different outcomes”. Additionally, the contention can be due to differences in planning style among the participants of the process when it involves various institutions from local government and the three government levels: federal, state and municipality. The analysis of the existing committees confirms that on the strategic level the most important characteristic of

the planning process, which defines the implementation of the plan, is related to political influence, considering the theory of planning styles (Innes & Gruber, 2001). At the tactical/operational level, the strong influence of public participation on the process through O.P. (Participative budget) must be considered.

Today, many plans are being developed in parallel in Porto Alegre. A high complexity was observed in the planning process. At the strategic level a set of committees and commissions are working to present solutions for urban transport. It is not clear which measures will actually be implemented or in what time scale. Considering that the planning style at the strategic level in Porto Alegre is political influence, a good plan could be “one that has the support of all the powerful players” (Innes & Gruber, 2001), therefore the implementation of plans depends on the decisions of politicians. However, the current government does not have the support of the social movements represented by O.P. and cannot harmonise them with its own political interests or the interests of the state and federal government levels, concerning the budget and technical structure needed to make decisions and implement the required infrastructure (long-term) for urban transport. For the representatives of social movements, a good plan would be one that solves the problems of local communities, represented by the O.P. in the municipality regions. In addition, for EPTC, the main goals are to implement the measures at the tactical/operational level, according to the plans developed by the technicians from the company. These situations combined, make the decision-making process in Porto Alegre complicated and the implementation of measures or the construction of an integrated mobility concept very hard to reach, even though this concept would only be designed for the local level.

The experience gained from this research can give an idea about the difficulties planners must face in order to cope with the organisation of a good data and information basis for planning. As written in Chapter 3, even though the author has a good knowledge of the languages spoken in the five cities included in this study and good contacts with some of the people involved in urban transport planning in these cities, one of the biggest constraints for the accomplishment of this research was related to the gathering, organisation and compilation of all the data and information from the CSAs, and aggregating valid information for comparison. The difficulties related to gaining complete and broad information covering the different areas, for all five cities. Furthermore, information is the basis of making decisions. The public decision-maker needs a basis on which the decision can be supported. Otherwise the project runs the risk of not being implemented or not being accepted by the community, or of the decisions being made purely out of political interest due to the lack of good information. The personal characteristics of the decision-maker, whether they are a politician or a technician, make no difference. He will need an information basis in order to make a decision.

Barcelona, Curitiba and Stuttgart have a vast number of technical publications and internal manuals that give them the basis for planning, together with the regulations and some external technical manuals and norms. Bogotá and Porto Alegre use information from their internal data basis, surveys, statistics, external manuals and external official data from public institutions and from the higher government levels.

Most of the information the institutions use for planning is based on the following sources:

a) External data: demographic and economic data

b) Institutional information (structured data): master plan, technical manuals, operational data, internal procedures, statistics;

c) Broad information coming from general public participation (unstructured information) can be considered only for very limited projects. In general it is not used.

5.6.2 Actor-Network in the decision process

Assuming that the process of planning involves the participation of stakeholders who possess the power to influence or even make decisions, the diversity of stakeholders influences and determines what decisions are made, depending on the way the network is organised and on the degree of empowerment of each actor involved in the decision process. This confirms that planning is profoundly affected by the political environment.

5.6.2.1 Hierarchic network: “chain of command”

The hierarchic network is understood here as the formal administrative framework of the public organisations. For the analysis the following types of decision-making were considered:

- Unitary decision-making (e.g. mayors)
- Decisions made by the executive directory and administrative council (e.g. ATM)
- Internal commissions or committees (e.g. Porto Alegre: CAUGE)

5.6.2.2 Heterogeneous network: “dependent power relationships”

The heterogeneous decision network considers the participation of diverse stakeholder representatives of the general public in the decision phase of the planning process.

Ward (2001) developed a study to investigate the participation of diverse stakeholders in urban transport planning. He analysed three case study areas in Europe to test his hypotheses. He evaluated the inclusion of “a greater diversity of stakeholders in transport planning”, taking into account whether this inclusion “will be obstructed by existing concentrated power structures.” The results of his analysis in the three CSAs showed that a diversity of stakeholders in the urban transport planning process “may be difficult to achieve” because of the concentration of power structures. However, his conclusion is that the participation of diversity stakeholders is, on balance, beneficial to the process of planning.

In the analysis of Ward (2001) it is clear that there were driving forces in the case studies against public participation in the process, considering that “the influence of the forum was obstructed not by indecision but by power play” (Ward, 2001, p.125). Moreover, the degree of the stakeholders’ empowerment in the planning process generates decisiveness and has impacts on the results of the plan. This is in accordance with Innes & Gruber (2001)’s analysis

in the San Francisco Bay Area. They affirm that there exist struggles in the process of planning and sometimes it is contentious due to the diversity of interests and players. Nevertheless, both studies (from Ward and Innes & Gruber) do not explain or evaluate the degree of influence of the diverse stakeholders and the actor network on the decision process.

In the process of planning there is power to influence and power to make decisions. Therefore, not only the diversity of participation, but also the balance of power, must be considered. However, Ward (2001) does not discuss or explain how this balance of power works or how it is measured and evaluated in order to create improvements in the process. Innes & Booher (1999) wrote that the styles of planning result from the way the "players" advance their interests in the planning process. The four styles presented by Innes & Gruber (2001) are defined according to a combination of the degree of "diversity of interests" and the "interdependence of the interests" of the players involved in the process of planning.

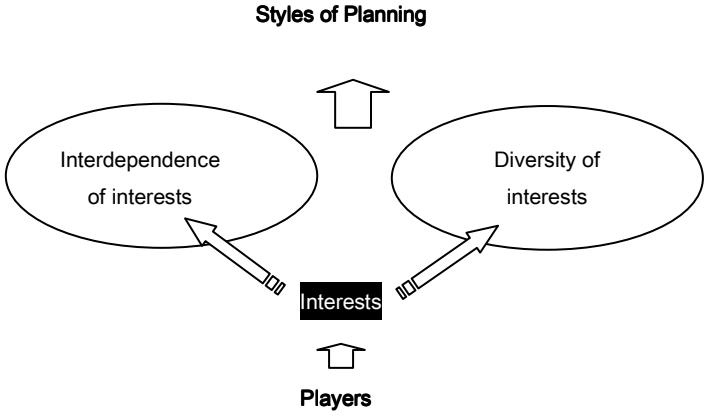


Figure 117: Planning styles concept deduction schema. Source: from the author, designed on the basis of Innes & Gruber (2001; see Figure 36, Chapter 2).

Ward (2001) agrees with the point that the diversity of stakeholders participating in the planning process generates different outcomes according to the influence and power they can bring into the process. But the question is: How do the diversity and the interdependence of the interests of the actors involved in the process of planning, generate, influence or determine decisions?

Actor-Network Theory ensures that the implementation of policies and, consequently, the changing of current states is influenced by "ordered networks of heterogeneous materials" (Law, 1992, p. 2), composed by human and non-human entities (institutions, technology, for instance). In other words the explanation of change lies not only in "structural, cultural, technological, physical or human variables but rather focuses on the interaction of all these variables within a broad heterogeneous network of human and non-human entities" (Warzynski, 2006).

The conditions needed to create and support change come from the decision-making process. The pre-condition of power is needed in order to make decisions. Law (1992) claims that "patterning generates institutional and organizational effects, including hierarchy and power" and that "the effects of power are generated in a relational and distributed manner". For Innes & Gruber (2001), players struggle for their own interests during the process of planning. This statement assumes a relational basis that ultimately generates a style of planning.

In the case of unitary decision-making during the planning process, the leader co-ordinates the process and makes the final decision. Nevertheless, during the process of decision, the actors can influence the process and have decision-making power. The decision-maker is not considered as an isolated individual decision-maker, but as a centre of decision within a network. Moreover, it does not make sense nowadays, in the democratic world, to rely on absolute power to make decisions. As written by Kelly & Becker (2000, p. 27), "the very notion of democracy is that the major decisions about the future ought to be collective ones." Moreover, throughout all processes of decision, the actors possess a measure of influence over the decision-maker. Therefore, participation generates an influencing network as well as a decision network.

The analysis based on the theories and the case study areas shows that the forces driving the process of changing current states and of reproducing them are more related to the way the **decision network (DN)** and **influencing/support network (IN)** are organised.

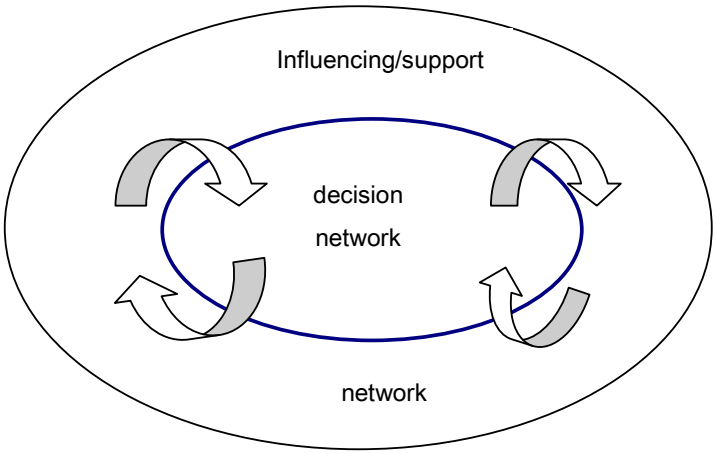


Figure 118: Planning process: Decision network (DN) and Influencing-support network (IN). Source: from the author.

The 'Decision Network' is understood as being formed by the actors that possess the formal conditions to be decision-makers. The variable object of analysis is considered as the "centre of decision" and not just one individual person.

The 'Influencing Network' is understood as the set of actors (human and non-human entities) influencing the process of decision, outside the decision-maker. The influencing power is defined by the sum of the degrees of empowerment of each of the actors in the planning process.

The connection between the influencing/support network and the decision network occurs through the "power centre". The "power centre" establishes the interactions and the connections between the entities (human and non-human) within the network. The "power centre" can be a key person or a non-human element. For instance it can be a law, a technology, a special condition of the society or culture, a key element in the old structure that is strong enough to hold and retain the connection, a political connection or something else specific to each system.

These connections work as bridges between the two “power centres” and permit the flow of information and influence between the involved sides. The degree of strength between the connections establishes the degree of influence in the decision process.

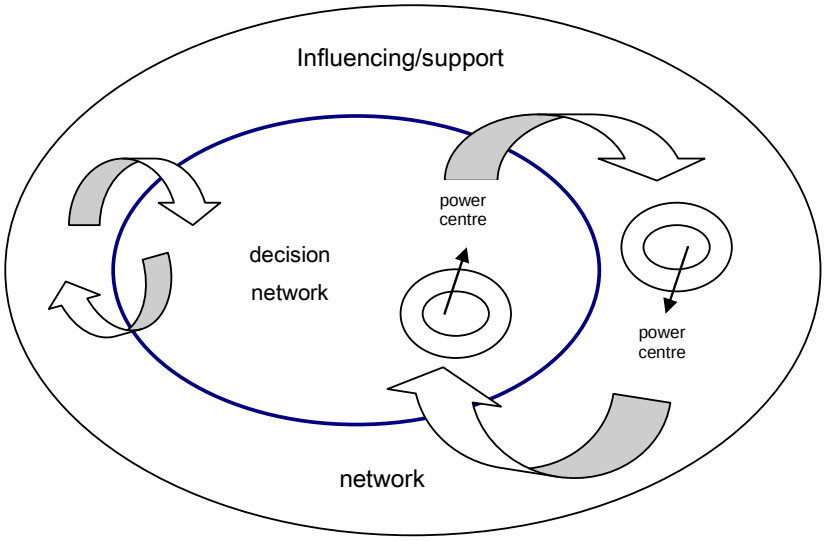


Figure 119: Planning process. Decision network (DN) and influencing-support network (IN): interactions and connections between the “power centres”. Source: from the author.

The “power centre” is explained as the driving forces in the making of decisions (decision network) or the influencing of decisions (influencing network) that give movement to the process of planning. It catalyses the interests of the community or social group and interact with the decision network.

Who is the decision maker? What defines the power needed to make decisions? How do we measure the level of actors’ empowerment and how do we evaluate the balance of their power in the process of decision? In the process of planning in democratic systems, there is the formal decision-maker who can be established by laws, acts or internal norms made by the planning institutions. But as mentioned before, the decision-maker is the end point of the process of decision. The decision in planning is a result of a process involving the actors and non-human entities (as considered in this study, regulation and information). The decision-maker is supported by the sum of the actors’ empowerment. The support coming from the entities, plus the personal empowerment, gives the decision-maker the power to make the required decision in a process of planning, which supports the decision process.

5.6.2.3 How is the decision making process organised in the case study areas?

The analysis of the CSAs shows that the process of decision in urban transport planning can be organised based on a “hierarchic network”, considering the formal administrative structure of the institutions, or in a “heterogeneous network”, involving the participation of stakeholder representatives of the population and organised society.

The process of decision varies among the CSAs considering whether the level of planning is strategic or tactical/operational. Table 41 shows the characteristics of the decision-maker in the planning process.

Table 41: CSAs: characteristics of the decision-maker in the planning process.

	Strategic level						Tactical/operational level			
	UDM	**PD**	**ED**	**CA**	**IC**	**CC**	**UDM**	**PD**	**ED**	**PA**
Barcelona	X			X			X		X	
BOGOTÁ	X						X		X	
Curitiba	X		X						X	
Porto Alegre	X		X		X		X		X	X
Stuttgart		X					X	X	X	

Source: from the author

Acronyms:

UDM: Unitary Decision Making
PD: Parliament Decision
ED: Executive Directory Decision
CA: Public Consortium Assembly Decision
IC: Internal Commission Decision
CC: Collaborative Committee Decision
PA: Public Assembly Decision

A limitation for the analysis of the power enacted by each actor within the decision process is to understand or measure how much each actor can influence the decision-making based on its degree of empowerment within the network. What Warzinski (2006, p.5) claims is that “the leader is only one aspect of the network”. When it comes to public institutions, the application of this affirmative cannot be generalised, because the leader can have a different weight depending on specific political organisation, which gives different degrees of empowerment to the formal leaders or decision-makers. Therefore, in order to have an idea of the influence of a set of selected criteria and alternatives in the decision process, this study uses the method of **Analytical Hierarchic Process (AHP)** aiming to triangulate and compare qualitative and quantitative information from the CSAs.

5.6.2.4 Comparative evaluation of the decision process in the CSAs based on the Analytical Hierarchic Process (AHP) method

Considering that the cities have different institutions (from different government levels), different regulations and different levels of participation involved in the process of planning, and use specific sets of information for planning, what is the hierarchy and the weight of the different criteria and alternatives considering information coming from hierarchic and heterogeneous networks, specific regulations and actor-networks? Considering that the different institutions can represent different government levels and different concepts of planning, how is the process of decision organised? Is AHP adequate for measuring the degree of empowerment of each actor participating in the process of decision in urban transport planning?

The urban transport planning process incorporates in its essence qualitative and quantitative aspects, and the evaluation of these combined aspects can be required in different phases of the process. The assessment of alternatives in the decision phase requires an instrument which makes it possible to combine different criteria and alternatives derived from the process of planning. In this sense AHP might be a valuable tool for assessing a set of alternatives which

support the decision-making process and the comparison of different systems. In the decision phase of the urban transport planning process, using AHP to assess alternatives is appropriate, considering that the set of information and data can come from a broad and unstructured source, the heterogeneous network, combined with the set of information and data coming from the institutions involved in the process, which represents a chain of command or hierarchic network.

According to Saaty (2007), “a single decision involving the selection of best alternative requires knowledge of objectives and criteria to evaluate the alternatives of that particular decision”. In this case the descriptive analyses of Innes & Gruber form a valuable backbone for the urban transport planning process. Furthermore, for Saaty (2007) “an objective of a decision is defined by values and their priorities.” The analysis of planning styles gives an explanation for some of the variables in the process of planning and combines them in four “styles”. When this happens, it is possible to draw basic values that involve the actors and the environment of the specific planning process. Additionally, these variables are useful in supporting the analysis and the prioritisation of the criteria for the evaluation of the planning process. Furthermore, ANT provides the basis for the understanding of the network of various human and non-human entities – for these cases: Regulation, Information and Actors involved in the process of planning.

The proposal of the present evaluation is using AHP as a support method to measure the degree of influence of the actors in the decision process described in the section above. The analysis evaluates the degree of empowerment of the actors involved in the process of planning and the weight of the decision-maker in the network. It additionally evaluates the relative weight of the influencing decision network.

The criteria selected for the evaluation were “actors: level of power”, “influence of regulation” and “influence of information” (see definitions in Table 19). For each criterion the set of alternatives (variables involved in the planning process) were selected according to the approaches of urban transport planning in the CSAs (see criteria and alternatives in Figure 50). The objective was to evaluate the weight of each selected criterion and the variables influencing the planning process organisation, and more specifically to measure the participation of each actor (person or material variable) involved in the urban transport planning process. The results hint at the level of influence of each one in the process of planning.

- Influence of regulation: level of representative democracy among organisations
- Influence of information: the institutional organisation’s level of participation in generating and sharing factual information.
- Actors and power

The results shows it is not only the style that determines the results of a plan, but also the way the network is organised, the actors, the decisions, and the flows of information, that determine the success or otherwise of a plan implementation.

Figure 120, Figure 121 and Figure 122 illustrate the results of the evaluation of the proposed criteria and the alternatives used in the AHP for the CSAs.

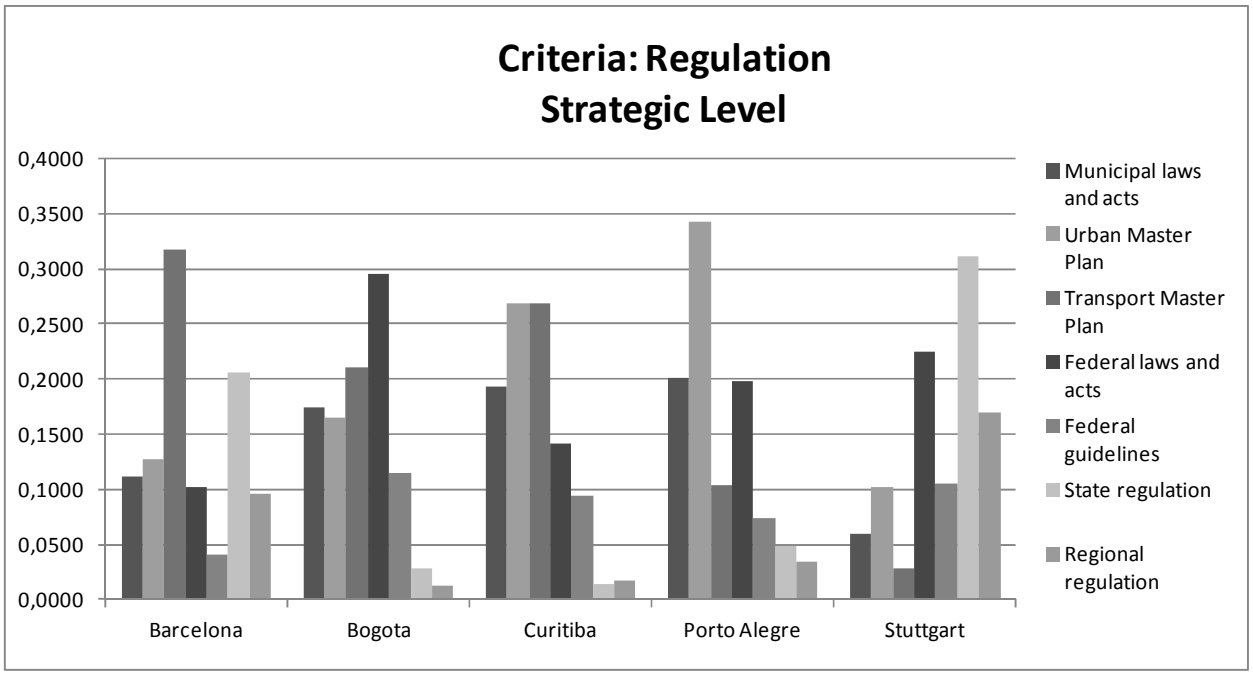


Figure 120: Planning process evaluation using AHP: results for the CSAs' criteria of regulation.
Source: from the author

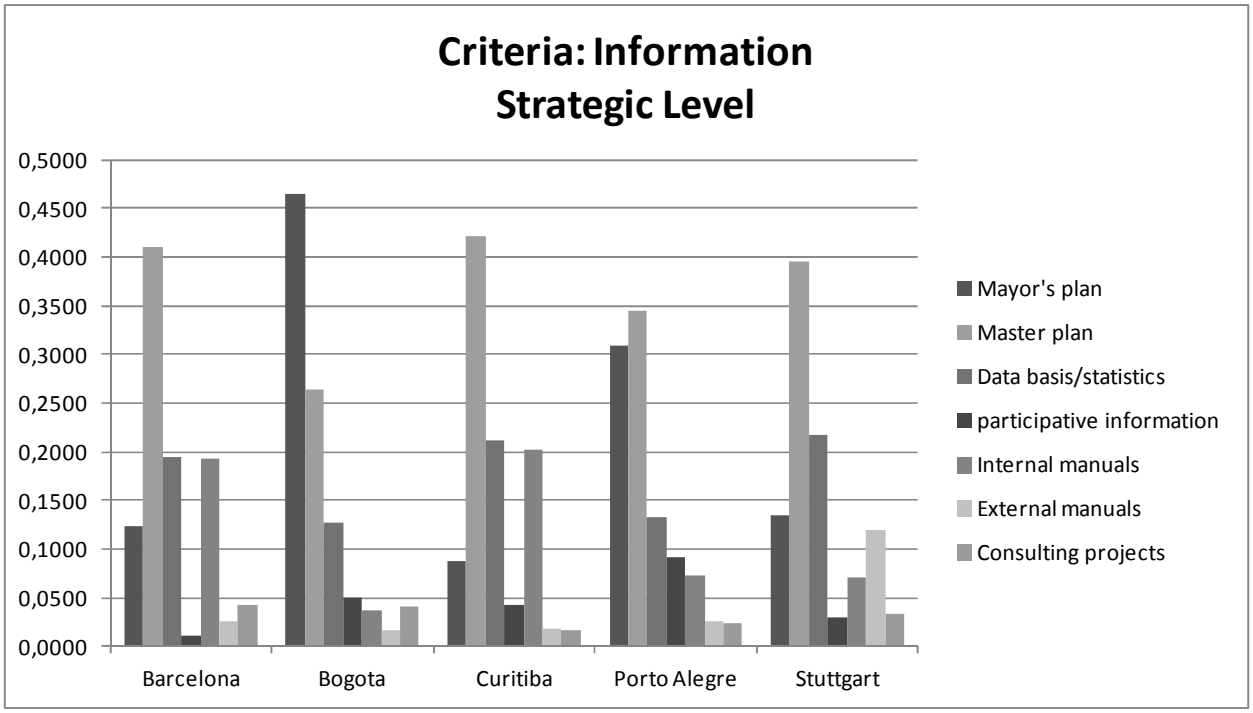


Figure 121: Planning process evaluation using AHP: results for the CSAs' criteria of information.
Source: from the author

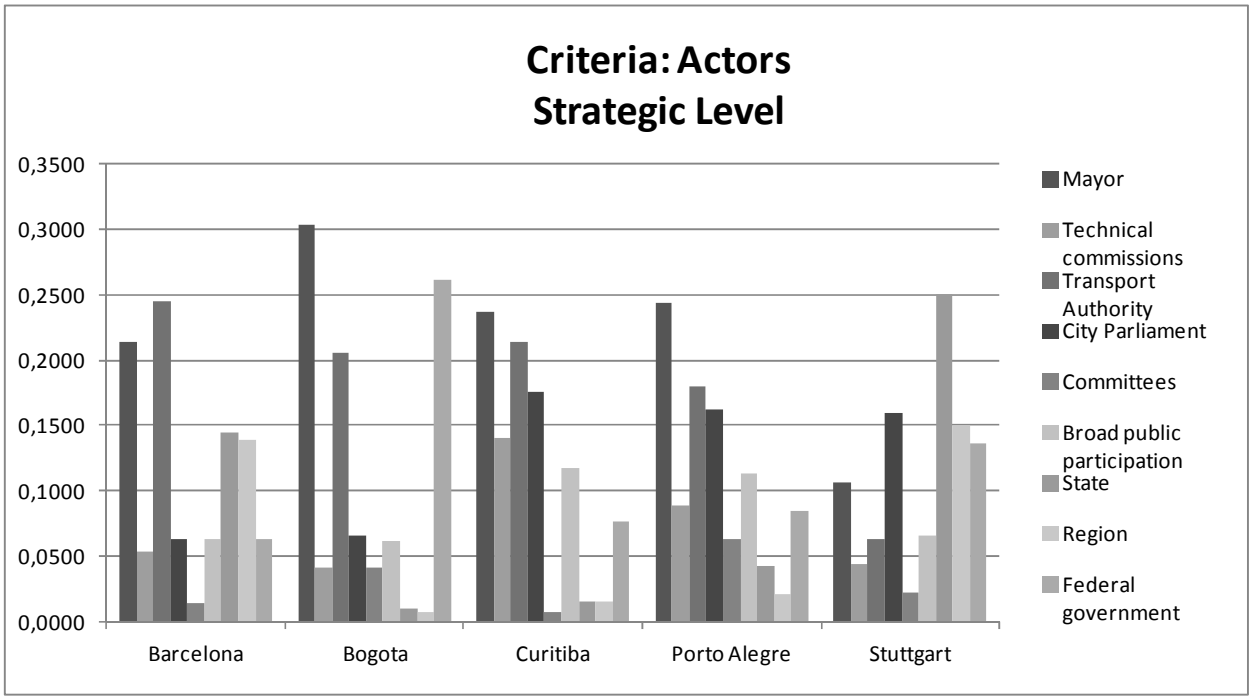


Figure 122: Planning process evaluation using AHP: results for the CSAs' criteria of actors.

Source: from the author

6 URBAN TRANSPORT PLANNING STRATEGIES IN EUROPEAN AND LATIN AMERICAN CITIES: LESSONS FROM THE CASE STUDY AREAS

What are the opportunities and perspectives for urban transport planning in European cities and in cities from developing countries such as those in Latin America? What are the lessons learned from the CSAs?

A practical reason for developing a comparative study in urban transport is to find similarities and differences among the analysed cases and from these conclusions to propose improvements for the services. Another reason is to identify concepts, know-how and technologies which can be used as a basis for the development of projects in cities with similar problems and development conditions.

This chapter devotes some sections to the enumeration of various concepts, know-how and technology of urban transport planning in the CSAs, which are considered as examples for other cities by the literature, and show the strategies identified in the fieldwork. Additionally, it shows some methods and instruments used to share knowledge among these cities.

- What can cities like Barcelona or Stuttgart, with consolidated systems of urban planning, teach cities from developing countries that are still growing?
- How can environments be built for social learning and the exchange of knowledge? Is this possible, in spite of differences in local culture, levels of development, legislation and political organisation?
- How can planning approaches be identified, namely planning strategies that can be shared in order to enhance urban transport planning for other urban areas? Using SWOT evaluation: strengths, weaknesses, opportunities and threats…. What are the opportunities?

6.1 PLANNING STRATEGIES IN URBAN TRANSPORT: SWOT ANALYSIS FOR THE IDENTIFICATION OF THE BEST PRACTICES

The analytical process of theory about urban transport planning and urban development in European and Latin American cities, and the approaches in practice in the case study areas shown, may teach lessons through their similarities, differences, strengths and weaknesses, and also give many opportunities for the enhancement of planning theory and practice.

A number of the attributes of the planning approaches and measures implemented in the CSAs were analysed using the SWOT analysis method, in order to identify the practices and their strengths, weaknesses, oportunities and threats and set them in a table as presented below with the objective of social learning in urban transport planning.

6.1.1 Identification of possibilities for social learning and transferability in the Case Study Areas

Cities in Latin America face the problem of the "dead city centre", or low use of services and commercial areas within the normal schedule of working days. A number of cities in Europe, including Barcelona and Stuttgart, can be used as reference points for the best practices in the development of measures for urban renewal. The example of the STEK in Stuttgart can be used to generate a development concept for specific areas of city centres. Barcelona's city centre is a good example of the mixing and intensity of uses and of integration with non-motorised transport and services. In Latin America BOGOTÁ and Curitiba also present good examples for the renovation and rehabilitation of degraded areas in city centres, and for proposals for urban design. Historically Barcelona is well-known for city planning. Additionally the city is a reference point because of the institutional organisation for managing and planning integrated public transport for the city and the metropolitan region – the ATM. Another example is the Bicing – the public bicycle system.

The mass bus transport system – Bus Rapid Transit (BRT) in Curitiba is an example shown in the literature and implemented today in diverse cities from different continents. Golub (2004) believes that the principles of the design and spatial planning in the Brazilian bus transport system, Bus Rapid Transit (BRT), can be transferred for application to the USA and indeed, many parts of the world. He points out that the Brazilian initiative from the end of the sixties to the twentieth century has initiated the development of a transport system that gives special attention to social and economic aspects of urban planning and environment sustainability. The author points out:

> "It is clear that North American bus operators have a great deal to learn from their South American counterparts. It is no surprise that Bus Rapid Transit has become a popular experimental mode in the US, jointly encouraged by FTA [Federal Transit Administration] and the Brazilian experience. So, the next time you save fifteen minutes on a bus trip along an exclusive corridor, don't forget to say, "Obrigado, Brazil!" (Golub, 2004).

Curitiba receives many visitors every year who analyse the concepts the city uses in the development of its urban transport system. The concepts developed in Curitiba were the basis for the design of the transport system in many cities in Brazil. According to literature and interviews, the BRT has also been a public transport solution for cities in other countries, especially in the developing world. A well-known case is Transmilenio in BOGOTÁ, implemented in 2001. A more recent case is in Beijing, China, where BRT was implemented in the years 2007 and 2008.

Since 2001, when the mass transport system Transmilenio was implemented in BOGOTÁ, the city became a worldwide reference point for public transport. The infrastructure used and the organisation of the services are seen as suitable public transport concepts particularly for the developing countries which need fast solutions for their growing cities at reasonable costs.

The city of Porto Alegre is a world reference point of public participation in city planning. The OP as a social movement has opened the space for the inclusion of a broad participation of unorganised society in the process of planning. The methodology used by the OP is a reference point for the organisation of participation and the process of decision in budgets for urban and transport planning. Also in Porto Alegre the public instution in charge of local urban transport planning can be seen as a reference point.

6.1.2 SWOT analysis for the identification of the best practices of urban and transport planning in the CSAs

Table 42: SWOT Analysis: Barcelona

	Strengths	Weaknesses
Barcelona	• Urban Planning tradition • Primary land uses in the city centre with high density and low energy comsumption • Urban transport plan – strategic plan • High share of non-motorised transport • Physical and fare multimodal integration into public transport network • Regional integration for urban transport planning • Integrated urban transport network with regional reach • Institutional Organisation • Urban Renewal • Bicing rent-a-bicycle • Public transport tickets that are affordable for users	• Traffic congestion • Limited participation of general public
	Opportunities	**Threats**
	• Expansion of walking and cycle facilities and infrastructure for the peripheral neighbourhoods • Expansion of the transport network and services: trams, BRT, etc.. • Reevaluation of the regional integration, network services and infrastructure • Promotion of alternative services: public and private car-sharing; other individual motorised and non-motorised means (e.g. skates, scooters)	• Population shrinkage • Growth rate trends among elderly people • Increasing operational costs due to the underuse of existing transport infrastructure • Population migrating to municipalities distant from Barcelona city centre seeking lower house prices and rents – risks of sprawl • Increasing traffic congestions

Source: from the author

Table 43: SWOT Analysis: Bogotá

BOGOTÁ	Strengths	Weaknesses
	• POT • Urban transport master plan • Cycle plan • High capacity public transport by bus: BRT Transmilenio • Urban Renewal and rehabilitation in the central district integrated with public and non-motorised transport • Cycling infrastructure • Mobility management in the central district to promote non-motorised transport • Cooperation with other institutions for the implementation of measures for traffic safety	• Lack of integration for urban and transport planning in various aspects • Lack of integration for the urban transport network • Lack of integration for mobility concept and urban and spatial planning in various aspects • Large peripheral and unruly areas, difficult integration and cohesion of the territory • Non-official planned and regulated services overcharging for public transport
	Opportunities	**Threats**
	• Development of an integrated mobility concept for the whole urban area • Continuation and enlargement of investments for recovering and converting degraded urban spaces into areas for people coming together and congregating, and reinforcing the use of non-motorised transport • Development of environments for social learning and exchange of knowledge on planning • Conducting of studies in order to evaluate and develop a concept for micro- and macro accessibility in the city • Introduction of alternative transport services like the StadtMobil and Car2Go in Stuttgart, rent-a-bike, searching for local possibilities for developing sustainable personal or collective alternative services • Cable railway	• High diversity and complexity of spatial planning (planned and unruled spaces), socio-economic and cultural landscape • Large amounts of investment are required for the rehabilitation of urban spaces and the transport infrastructure network

Source: from the author

Table 44: SWOT Analysis: Curitiba

	Strengths	Weaknesses
Curitiba	• Integrated public transport by bus: Bus Rapid Transit (BRT) • Co-ordination of urban transport planning and spatial planning • Urban Renewal “acupuncture” • Non-motorised transport • Investments for the use of clean energy for public transport • Experienced technical staff • Solid institutional organisation (since 1967 (URBS , IPUCC); • Trust of the population. • Co-ordination of public transport at regional level	• Traffic congestions • Limited participation of general public • Relatively low participation of non-motorised transport in the modal split • Traffic safety
	Opportunities	**Threats**
	• Continuation and enlargement of investments for recovering and converting degraded urban spaces into areas for people coming together and congregating, and reinforcing the use of non-motorised transport • Development of environments for social learning and exchange of knowledge on planning • Conducting of studies in order to evaluate and develop a concept for micro- and macro accessibility in the city • Introduction of alternative transport services like the StadtMobil and Car2Go in Stuttgart, rent-a-bike, searching for local possibilities for developing sustainable personal or collective alternative services	• Large amounts of investment are required for the rehabilitation of urban spaces and the urban transport network in the periphery • Large investments are required for the expansion or for the introduction of higher capacity public transport, for instance the rail systems

Source: from the author

Table 45: SWOT Analysis: Porto Alegre

	Strengths	Weaknesses
Porto Alegre	• Institutional integrated planning, management and operation for urban transport • Urban Master Plan Enforcement • Cycle plan • Institutional co-ordination for urban and transport planning – internal commissions and committees • High capacity public transport by bus and metro • Public participation – O.P.	• Lack of integration for urban and transport planning in various aspects • Lack of integration for the urban transport network • Lack of integration for mobility concept and urban and spatial planning in various aspects • Large peripheral and unruly areas, difficult integration and cohesion of the territory • Traffic congestions • Traffic safety • Low participation of non-motorised transport in the modal split
	Opportunities	**Threats**
	• Development of an integrated mobility concept for the whole urban area • Continuation and enlargement of investments for recovering and converting degradated urban spaces into areas for people coming together and congregating, and reinforcing the use of non-motorised transport • Development of environments for social learning and exchange of knowledge on planning • Conducting of studies in order to evaluate and develop a concept for micro- and macro accessibility in the city • Introduction of alternative transport services like the StadtMobil and Car2Go in Stuttgart, rent-a-bike, searching for local possibilities for developing sustainable personal or collective alternative services	• High diversity and complexity of spatial planning (planned and unruled spaces), socio-economic and cultural landscape • Large amounts of investment are required for the rehabilitation of urban spaces and the urban transport network • High complexity (political and spatial) at regional level – difficult to develop an integrated mobility concept

Source: from the author

Table 46: SWOT Analysis: Stuttgart

	Strengths	Weaknesses
STUTTGART	• Urban Planning guidelines from federal, state, and regional planning towards integration in planning urban transport • "Stadtentwicklungskonzept" • "Verkehrsentwicklungskonzept" • Urban Renewal • Alternative transport services • Information and facilities for users: website services, availability of information using different channels of communication. • Public transport: measures for preference in the network, infrastructure technology. • Integrated traffic centre • Integrated ticketing for public transport within the Stuttgart Region	• Traffic congestions • Limited participation of general public • Relatively low participation of public transport and non-motorised transport in the modal split.
	Opportunities	**Threats**
	• Enhancing direct public participation in planning • Enhancing the participation of public transport and non-motorised transport among the modal share • Re-evaluating existing urban transport infrastructure in order to avoid future increases of costs.	• Population shrinkage • Growth rate trends among elderly people • Increasing operational costs due to the underuse of existing transport infrastructure • Population migrating to municipalities distant from Stuttgart city centre seeking lower house prices and rents – risks of sprawl • Increasing traffic congestions

Source: from the author

6.2 STRATEGIES FOR TRANSFERABILITY: LEARNING FROM THE CSAs

a) Participation in associations of municipalities

- The five CSAs participate within their regions in municipality associations, aiming to find solutions for their regions.

b) Cities network

- The five cities participate today in at least one network for discussing urban transport.
- It is evident that networking influences the planning process in the five cities. The actors have on their agendas fixed events, meetings etc, where the purpose is the exchange of knowledge or the finding of effective instruments for planning.
- All five cities participate in the worldwide network "Cities for Mobility" (CfM), coordinated by the city of Stuttgart.
- The example of the network 'Cities for Mobility', where the city maintains a website and an open platform for discussion in different languages, is an indication of the simplest way to connect with cities on all continents. The primary condition to engage in the network is a

simple connection to the Internet. The number of contacts and the possibilities of participating in the discussions grow with the number of interests and the ability to speak different languages.

c) Urban transport association

- Curitiba and Porto Alegre: Associaçao Nacional de Transporte Urbano (Urban Transport National Association - ANTP)

d) Cooperation at institutional level

- Institutions from the five cities have permanent contacts for learning from other cities and exchanging of best practices
- Some institutions or technicians offer their experience and services through consulting, in order to support specific projects in which they are experts.

e) Capacity building

Glaeser (2009) wrote that cities which reinvent themselves are able to attract innovative and skilled people from all over the world. In this sense Stuttgart is a good example, considering the great number of international professionals working for companies in the city. Rothfuß (2006) analysed the success or otherwise of the European Union cooperation programme URB-AL in building joint project developments and knowledge-sharing regarding urban mobility. The author highlights in his conclusions that one of the most valuable results of the programme was the capacity building among technicians. Furthermore, the kind of knowledge gained in this arena would be difficult to develop within the same time period using other institutionalised methods such as attending courses abroad, and the results are possible only because of the environment created within the cooperation network.

The city of Stuttgart participates greatly in international affairs, aiming to exchange experience. In 2008 the city offered training for technicians from two Brazilian cities (Porto Alegre and Belo Horizonte) to transfer know-how gained during the football world cup of 2006 concerning the preparation of the transport infrastructure to the proposed world cup of 2014.

7 FINAL CONSIDERATIONS

This study was carried out motivated by an interest in investigating the foundations of the development of urban transport in European and Latin American cities, especially their approaches for the development of urban transport planning. Each region has had its own path for development but throughout history there has been cooperation and interdependence between both continents. Moreover, philosophies, concepts and the sharing of knowledge have influenced the development of these societies. Empirical experiences show that this is also true when related to the issues of urban development and transport planning. Therefore, the research was founded on the following questions: ***How*** do we explain the urban transport planning approaches practiced in European and Latin-American cities? ***What*** is the main influencing framework that affects urban transport planning approaches in use in these two geographical areas? ***What*** are the main results of the planning approaches and influencing framework on the mobility concepts of the case study areas? ***What*** could we learn from the theory and practice and ***how*** could we share social learning in planning urban transport to support sustainable individual and collective development?

Based on the above questions the main issue of this study was to analyse urban transport planning (UTP) in use in European and Latin-American cities, focusing on comparisons between the planning approaches of five selected cities used as case study areas (CSAs), in order to support the conclusions and recommendations of an integrated urban transport planning approach towards accessible cities meeting individual and collective development. The study discusses the urban transport planning approaches of cities located on two continents and in four different countries. The analysis considers the socioeconomic and development stages, cultural and political particularities and complexity, and the urban development contexts.

The ‘logic of investigation’ used, based on deductive and inductive approaches, has been adequated for the purposes of the study. The deductive approach helped in forming concepts and gaining understanding about the theory, about the discussions surroundng planning traditions in Europe and Latin America, and about socioeconomic development. These results gave the theoretical support needed for the conducting of the empirical inquiry of the multiple-case studies, using an inductive approach to interpreting reality. Both approaches helped the development of a more abstract understanding, leading to the design of a representation or simplified picture of the reality of urban transport planning, in a model format (Chapter 2.5) aiming to deliver contributions to planning theory and practice.

For the empirical investigation, the use of the multiple-case design strategy of inquiry (the five cities chosen: two in Europe - Barcelona and Stuttgart - and three in Latin America - Bogotá, Curitiba and Porto Alegre) was also adequated for the research. Yin (2009, p.53) argues that multiple-case design has both advantages and disadvantages in comparison with single-case design. One major disadvantage is that “the conduct of multiple-case study can require extensive resources and time beyond the means of a single student or independent research investigator.” This idea is confirmed as one of the main constraints of this study, mainly because

the cities were located on 2 continents and in 4 countries, requiring a significant amount of personal investment in order to reach the study's conclusions. However, multiple-cases were essential for reaching the results and findings. The triangulation of theories and their relation to planning practices in different socioeconomic environments and cultural landscapes could not be possible if a single case had been used. Analytical conclusions were much more powerful, helping with the possibility of the replication of these results and findings among other cities, based on the design of the model for urban transport planning.

The investigation was conducted seeking the validation of two hypotheses:

- Hypothesis 1:

The type of urban development (governance, socioeconomic, political, cultural, spatial, technological aspects) influences the design of the urban mobility concept and impacts on the accessibility for the population.

The results of the investigation show that the urban mobility concept is influenced by the pattern of urban development. The modal split illustrated that the compact city and the transit oriented development possess the highest shares for non-motorised transport and for public transport. On the other hand, sprawling cities are car-dependent. Furthermore, socioeconomic and cultural aspects of governance and planning influence the mobility concept (Chapter 5).

- Hypothesis 2:

If urban transport planning is integrated, then urban transport networks present better services for their populations.

To perform the qualitative analysis of the UTP, approaches were used with criteria related to political and administrative organisation, regulation and urban development concepts. A check-list was ordered for the determination of the existing types of integration in urban transport planning in the CSAs. The results were used to analyse the influence of the integrated approach on planning and on the interface of UTP and urban development, the influence of the characteristics and design of the urban transport network, and the performance of the urban transport services in the cities. The results show that integration in urban transport planning, and its co-ordination with urban planning, supported the improvement of transport services in the case study areas. (see Chapter 5).

Chapter 6 presented through the SWOT analysis various opportunities for improvements for the CSAs, and on the other hand also displayed their weaknesses and possible threats. Analysing the five charts for each city it is possible to see that inside this group alone there are possibilities for sharing knowledge and for social learning. This analysis can be an opportunity to find improvements and solutions for planning urban transport and for the design of the mobility concept.

Based on this analysis however, in order to share planning concepts among various different urban transport systems, it is necessary to develop instruments for networking the actors involved in the process, to identify the potentialities, to use adequate methods for sharing

knowledge, and to convert or adapt the solutions to local conditions and development patterns, looking towards sustainable individual and collective development.

For instance, the following points can be considered for further research and for cooperation and social learning in urban transport planning between cities in Europe and Latin America:

- Institutional organisation of regional urban transport planning: the share of responsibilities, capacity building, legitimacy of civil authority, for example.
- The cities' capability of technological acquisition in order to support the development of the plans.
- Organisation, quality and availability of information used for planning.
- Availability of information and opportunities for interactions between the general public and institutions.
- Urban Transport Development Strategies
- Reinvention and conversion of brownfield and degraded areas, especially seeking the regeneration of city centres.
- Redesignation of mobility concepts.
- Projects assessment, related to investments in infrastructure due to the lack of an adequate one versus the decreasing growth trends of the population: learning from the shrinkage of European cities.
- Disconnection of urban planning and urban transport planning: increasing mobility for the population versus urban spatial planning and city accessibility.

7.1 INTEGRATED URBAN TRANSPORT PLANNING APPROACH TOWARDS ACCESSIBLE CITIES FOR INDIVIDUAL AND COLLECTIVE DEVELOPMENT: ASSUMPTIONS AND PRINCIPLES

"What matters is access and how transport can contribute to it"
(Vasconcellos, 2001)

Any vision of an accessible city that supports individual and collective development needs to recognise the individuals within the multiple relationships of the society where it is located and their possible connections to outside areas. The conditions, within the urban spaces, of accessibility to any kind of facilities people might need in order to develop, educate or entertain themselves, to work, or simply in order to get around, are related to multifarious factors and pre-conditions that can be of individual, collective or public responsibility. One of these factors or pre-conditions is related to the mobility concept and to the overall system of urban transport. The idea of an integrated approach should, therefore, create the conditions needed for the smooth and unrestricted flow of information, material and people. The questions are: How can we facilitate integration, preserving the individuality, dignity, cultural identity and fundamental rights of individuals and social groups? What mobility and transport concepts and techniques

contribute to it? This study does not necessarily intend to answer these questions fully, but to simply outline previous discussions on the principles that could guide further studies for the development of an integrated approach for the urban mobility concept, in order to promote individual and collective development, containing the aspects and values mentioned. Most of all, this study intends to highlight the fact that mobility, accessibility and urban transport cannot reach high levels of service without considering these issues in the planning process.

Therefore, key principles that should be taken into consideration for the development of public policies and for urban transport planning are presented below. They are considered basic assumptions for an integrated system of urban transport planning that seeks to promote accessibility for individual and collective development.

I - Integrated policy-making towards territorial and social cohesion

- Governance of the territory: development of co-ordinated public policies involving social, political, historical, environmental, economic, and cultural aspects, together with the mobility concept for each area, that can guarantee safe and efficient flows of people, material and information.
- Strengthening of a common space for the development of public policies.
- Understanding of governance, administration and governability within the municipal territory to promote citizens' participation in the development of public policies.

II – Co-ordination of urban and regional transport planning, management and operation institutional organisation

- Coordination between various planning levels.
- Coordination of the decision process.
- Integration of mobility concepts for urban and regional transport planning.
- Integrated concepts for urban and regional transport planning, and urban planning.
- Integration of planning code with cooperative planning (stated laws, establishment of agreements and protocols for planning).

III - Territory Cohesion: integration in the macro-space and micro-space

- Urban development is related to the socioeconomic and cultural developments that have taken place over time. The way the spatial development is designed will integrate or segregate individuals or social groups; therefore, planning needs to consider solutions of integration in the macro and micro-spaces, promoting sustainability.
- Territorial Cohesion: integration in the macro-space and micro-space, considering that the flows affect both public and private spaces, requiring the construction of spaces without

barriers (physical, communication, cultural, social, educational, gender, etc), infrastructure and facilities.

- Accessibility, taking into account the wide diversity of users: standard, children, elderly people, people with disabilities, pregnant women, and other gender and socio-cultural differences.
- Integrated transport network: integration through transport connections towards universal access for all, using the most sustainable techniques and technologies.
- Finding solutions for integration in the macro-space in order to diminish or overcome barriers, maintaining sustainable environments:
    - Physical barriers:
        - Geographical accidents (rivers, mountains, protected areas, etc.)
        - Constructed barriers: motorways, railways, monuments, Brownfield, segregated dwellings (gated communities)
    - Legal barriers
    - Cultural barriers
    - Socioeconomic barriers
- Integrating spaces in order to:
    - Reduce energy consumption;
    - Reduce land consumption;
    - Reduce insecurity;
    - Reduce environmental impacts;
    - Improve traffic safety;
    - Optimise time and costs for both users, and private and public investors.

IV – Social learning in planning to support individual and collective development

- Gaining understanding and forming concepts from the theory and practices of social learning in planning, in order to enhance public participation and create channels for sharing good practices.
- Developing strategies for identifying partners, practices in different areas and focus groups, in order to help interpret reality and build knowledge needed for innovation in urban transport planning (for instance, conducting case studies).
- Creating methodologies, material conditions and social knowledge, in order to transform tacit knowledge into explicit knowledge within the planning process.

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12 LIST OF ACRONYMS AND ABREVIATIONS

ANTP - Associação Nacional dos Transportes Públicos

BBR - Deutsches Bundesamt für Bauwesen und Raumordnung

BTS - Bureau of Transportation Statistics

CMDUA - Conselho Municipal de Desenvolvimento Urbano Ambiental

EPTC - Empresa Pública de Transporte e Circulacão

FTA - Federal Transit Association

IBGE - Instituto Brasileiro de Geografia e Estatística

IMT – Idividual Motorised Transport

IPUCC -

METROPLAN - Fundação Metropolitana de Planejamento

NMV – Non-Motorised Transport

ÖPNV - Öffentlicher Personennahverkehr

PDDUA - Plano Diretor de Desenvolvimento Urbano Ambiental

PLAMET - Plano Diretor de Transportes Urbanos da Região Metropolitana de Porto Alegre

PuT- Public Transport

RMPA - Região Metropolitana de Porto Alegre

RMSP - Região Metropolitana de Sao Paulo

SMT - Secretaria Municipal de Transportes de Porto Alegre

SPM - Secretaria de Planejamento Municipal

SMOV - Secretaria Municipal de Obras e Viação

TM – Transmilenio S. A.

TRANSCOL - Plano de Transporte Coletivo de Porto Alegre

TRENSURB - Empresa de Trens Urbanos de Porto Alegre S.A.

UAMPA - União das Associações dos Moradores de Porto Alegre

UN - United Nations

URBS -

UTP – Urban Transport Planning

VVS – Verband Region Stuttgart