CHAPTER II

LITERATURE REVIEW
AND
CONCEPTUAL AND METHODOLOGICAL FRAMEWORKS

In order to achieve the overall objectives of the research on the impact of the Greater Mekong Sub-region integrated land transport network on urban development, a wide range of related theory and previous studies will be reviewed in this chapter. The literature is related to various aspects of transportation, economic and urban development. The literature review facilitates the development of the conceptual and methodological framework of the research.

This chapter begins with the concepts and definition of the terms frequently used in the research, followed by the theory on urban development and economic growth. Finally, the previous studies on the theme mentioned above will be reviewed. Based on the literature review, conceptual and methodological framework of the research will be built up as a guide to the research.

1. Concepts and Definitions

The concepts and definition of the terms that will be used in the research is presented to get the identical meaning of the term throughout the research.

A. Network

A network is a set of elements that may be material, the infrastructure, and immaterial, electro-magnetic (waves) or informational, which ensure the establishment of relations between different places of a territory and between the entities that are occupying them. It comprises not only linear, permanent or temporary, elements which express the existence of relationships and ensure that they are possible, but also nodal elements needed in order to organize flows and to make the system in which the network is included work (European Federation for Transport and environment, 2005).

Among linear elements may be mentioned railways, roads and motorways, waterways, telephonic and electrical cables, pipe-work needed for water conveyance and for purification,

rivers and their tributaries forming hydrographical networks or, in a more abstract way, exchanges of information, of resources, social relationships, etc.

As for nodal elements, they refer to railway stations, airports, subway stations, interchanges in road and motorways networks, electrical transformers, manholes, railway bifurcations, satellites, or also, at another scale, to cities, banks, firms, persons when some maintain between them various (political, economic, social, etc.), numerous and regular relationships in the context of urban networks, of bank networks, of firms networks or of social networks.

Existence of networks is guided by a need for mobility, communication, and exchange due to the heterogeneity of geographical space. To satisfy such a need implies interconnection of geographical places. Interconnection allowed by transport and telecommunication networks. The role of nodes in network working is essential, as they allow multiple exchanges, transfers, commutations, hence, partly compensate the absence of direct links between each pair of places to serve. Often places of access to networks, nodes are, in some cases, places of power, distinct from the other parts of the territory and hierarchically organized in function of the quality of service they are able to provide via the networks serving them. It is indeed discontinuity, the more or less pronounced rarity of entry and exit that create power.

This discontinuity, which opposes to continuity of the territory, constitutes, with the performance of transport systems that serve it and with the structure, the morphology of their network component, one of the main explanatory factors of the differences in accessibility characterizing geographical space. The most usual representation of networks relies on simple graphical elements, points and arrows, which compose a mathematical object with numerous properties, the graph.

B. Transport Network

A transport network is typically thought about in terms, as transport infrastructure has a presence (e.g. roads, railways, inland waterways, stations, ports, airports, etc.) with such a view, the transport network comprise of a set of inter-connected physical links (footpaths, cycle land, roads, waterways, railways, etc) with connection provided at nodes such as road junctions, bus and tram stop, stations, airports and ports. However, transport networks are not always defined by the existence of physical infrastructure, as ships and airplanes often use an agreed set of routes (European Federation for Transport and environment, 2005)

Schematically, such networks are represented as a collection of inter-connected linked and nodes. Realistically, therefore we can think of the transport network not as a single entity but as a series of overlapping entities, some time substitutes, sometime complementary. Of particular interest are the places and phenomena that help the networks to come together there may be physical facilities such as terminals or transfer options. They may be virtual inter-available tickets, inter-operatable charging systems.

C. Transport Capacity and Level of Service

The capacity of a transport system or facility is defined as *the maximum number of vehicles, passengers, or the like, per unit time, which can be accommodated under given conditions with a reasonable expectation of occurrence (*European Federation for Transport and Environment, 2006) is independent of demand in the sense that it does not depend on the total number of vehicles (or whatever) demanding service. It is expressed in terms of units of some specific thing, however, so that it does depend on traffic composition (for instance, for highways, the percentage of trucks or other heavy vehicles; or for airport runways, the percentage of heavy jet aircraft). It is dependent on physical and environmental conditions, such as the geometric design or facilities or the weather.

A concept closely related to capacity and often confused with it is that of service volume or service flow rate. A service volume is the maximum number of vehicles, passengers, or the like, which can be accommodate by a given facility or system under given conditions at a given *level of service*. Although levels of service are defined somewhat differently, depending on the situation, they are always intended to relate the quality of traffic service to given volumes (or flow rates) of traffic. Levels of service may be based on such things as travel times (or speeds), total delay, probability of delay, comfort, safety, and so forth.

D. Accessibility

In Geography, accessibility of a place is generally defined as the more or less great ease with which this place can be reached from one or several other places, by one or several individuals able to travel by means of all or part of existing transport modes (Hyperge, 2005)

Thus, accessibility does not only refer to the sole possibility of reaching or not a given place, it also expresses the hardness of travel, the difficulty to establish the relation, most of the time estimated by measuring space and time constraints.

For this reason, accessibility will depend not only on the respective geographical position of origin and destination places, but also on the level of service offered by the transport system(s) used to make the travel.

In the case of individual transports, into which we include walking, the level of service provided is essentially conditioned by:

- Structure of the network (winding and configuration of ways).
- Quality of the infrastructures, assessed through their technical characteristics (number and width of lanes, laying-out of verges, existence of a central separator between lanes, etc.).
- Topographical constraints (slope).
- In force regulations.
- Technical features of the vehicle in use (or, to make the parallel with walking, physical condition of the person).
- And congestion that disrupts the working of the system and thus makes the quality of service varies according to the days of the year and to the hours of the day.

For what regards collective modes, to the six previously mentioned explanatory factors, should be added:

- Service organization in use, taking security rules into account (served nodes, frequency of services and circulation schedules), and occupation ratio of the vehicle, which may prohibit its use when its maximal capacity is attained, in case of transport systems with obligatory reservation.

Definition of accessibility as formulated above refers to space and time assessment criteria. Other criteria might however be envisaged: economic, aesthetic, relative to landscape, to environment, to tourism, etc. The observed accessibility level is thus closely linked with the chosen measurement criteria. Besides, there are many - often complementary - indicators allowing assessing the relative importance of the different explanatory components of accessibility. Many of these indicators share as a common characteristic the preliminary computation of shortest paths following a given logic (minimization of time, of length, of cost of travel, etc.).

Finally, in a more general acceptation, accessibility is not limited to the sole travel of individuals from one place to another. For example, in a telecommunication network, accessibility to a node refers to availability and quality of acquisition or even exchange of information from one or several other nodes.

E. Connectivity

In theory of graphs, intensity of interlinking between nodes through edges of a network; more generally, degree of internal connection of a network. As opposed to mere proximity relations, called relations in continuity, connectivity relations are those using the support of a network to link two places that may be far apart from each other (Hyperge, 2005)

F. Integration

Integration is a process of combining or accumulating. It may also refer to: the bringing together of two or more economies, cultures, religions (usually called syncretism), etc.

Economic integration is a term used to describe how different aspects between economies are integrated. The basics of this theory were written by the Hungarian Economist Béla Balassa in the 1960s. As economic integration increases, the barrier of trade between markets diminishes. .The most integrated economy today, between independent nations, is the European Union and its Euro zone. The degree of economic integration can be categorized into six stages: Preferential trading area , Free trade area , Customs union , Common market , Economic and monetary union and Complete economic integration.

Regional integration is a process in which states enter into a supranational regional organization in order to increase regional cooperation and diffuse regional tensions. Past efforts at regional integration have often focused on removing barriers to free trade in the region, increasing the free movement of people, labor, goods, and capital across national borders, reducing the possibility of regional armed conflict (for example, through Confidence and Security-Building Measures), and adopting cohesive regional stances on policy issues, such as the environment.

There have been several efforts at regional integration, including ASEAN and Mercosur. Perhaps the most famous (and, according to some, successful) attempt at regional integration has been the European Union, which in some policy areas has moved beyond an intergovernmental approach to decision-making at a federalist or supra-state level.

Closer integration of neighboring economies is seen as a first step in creating a larger regional market for trade and investment. This works as a spur to greater efficiency, productivity gain and competitiveness, not just by lowering border barriers, but by reducing other costs and risks of trade and investment. Bilateral and sub-regional trading arrangements are advocated as

development tools as they encourage a shift towards greater market openness. Such agreements can also reduce the risk of reversion towards protectionism, locking in reforms already made and encouraging further structural adjustment.

In broad terms, the desire for closer integration is usually related to a larger desire for opening to the outside world. Regional economic cooperation is being pursued as a means of promoting development through greater efficiency, rather than as a means of disadvantaging others. Most of the members of these arrangements are genuinely hoping that they will succeed as building blocks for progress with a growing range of partners and towards a generally freer and open global environment for trade and investment. Integration is not an end in itself, but a process to support economic growth strategies, greater social equality and democratization (Wikipedia, 2005).

G. Integration through transport networks and corridors

Transport plays a major economic, social and geo-political role. Transport is, indeed, vital to the well functioning of the economic activities, to production and distribution of goods as well as to trade. Transport ensures everyday mobility of populations and allows them to perform their economic and social activities. It provides access to basic services such as health and education. In addition, transport is an important economic sector itself, which accounts for a large share of GDP and employment. Furthermore, transport is crucial for the integration of regions, particularly those that are peripheral or isolated and for the reduction of unbalances among them (United Nations Economic Commission for Europe, 2005).

At the international level, transport is vital to the development of international trade. International transport is also crucial for the integration of countries and for reduction of economic and social disparities among them. Globalization and the unprecedented increase in international trade is a major opportunity for countries, particularly for developing countries to boost their economic growth and improve the living conditions of their populations. In addition, international transport is a basic precondition for the development of tourism, another factor for socio-economic development. Facilitation and development of international transport is, therefore, of strategic importance for all countries.

2. Theories on Urban Development and Economic Growth

A. Urban Development and Urban Growth Types

Urban Development – *the growth and decline of urban areas* – as an economic phenomenon is inextricably linked with the process of urbanization. Urbanization itself has punctuated economic development. The spatial distribution of economic activity, measured in terms of population, output and income, is concentrated. The patterns of such concentrations and their relationship to measured economic and demographic variables constitute some of the most intriguing phenomena in urban economics. (Jaeger , 2000)

Measurement of urban growth rests on the definition of 'urban area', which is not standard throughout the world and differs even within the same country depending upon the nature of local jurisdictions and how they might have changed over time (this is true even for the United States). Legal boundaries might not indicate the areas covered by urban service-providers. Economic variables commonly used include population, area, employment, density or output measures, and occasionally several of them at once, not all of which are consistently available for all countries.

Theoretically, the existing road network connects all current urban development creating one large and complicated path. Jaeger (2000) describes how the patchwork development of cities, all connected by a linear infrastructure, causes landscape fragmentation and produces a series of isolated segments of habitat, ecosystems, or land-use type. This concept is used throughout the definition of urban growth types because the relation (or distance) to the exiting urban patch is important when determining what kind of urban change is occurring or has occurred. There are five types of urban growth: *infill, expansion, linear branch, and cluster branch.* Note that urban means developed and includes residential as well as commercial and industrial areas.

- *An infill growth* is characterized by a non-urban pixel surrounded by at least 40% urban being converted to urban. Ellman (1997) defines infill policies as the encouragement to develop vacant land in already built-up areas. Infill development usually occurs where public a facility such as sewer, water, and roads already exits.
- *An expansion* type growth is characterized by a non-urban pixel surrounded by urban but no more than 40% being converted to urban. This conversion represents an expansion or "spreading out" of the existing urban patch. Humphrey Carver (Harvey and Clark, 1965) states that the growth of cities will continuously have a belt of land on the outskirts that will be undergoing the

conversion from rural to urban uses. Expansion type development has also been called urban fringe development (Heimlich and Anderson, 2001; Theobald, 2001).

- *Isolated growth* is characterized of a new house or construction generally surrounded by non-urban and some distance from an existing urban area. Forman (1995) calls this type of spatial process perforation, and defines it as "the process of making holes in objects such as habitat or and type."
- *Linear branching* represents a new road or new linear development surrounding by non-urban and some distance from exiting urban areas. A linear branch is different from an isolated growth in that the interior-to-urban pixels are connected.
- Clustered branching is characteristic of a new neighborhood or large complex. Harvey and Clark (1965) define leap-frog development as the settlement of discontinuous, although possibly compact, patches of urban uses."

The types of urban growth: *infill, expansion, linear branch, and cluster branch* will be used as a reference in identifying the types of urban growth in Lao PDR in the following chapter.

B. Urban Growth and City Structure

Understanding urbanization and economic growth requires understanding the variety of factors that can affect city size and therefore its short-term dynamics. All of them lead to the basic forces that generate the real and pecuniary externalities that are exploited by urban agglomeration, on one hand, and congestion, which follows from agglomeration, on the other.

The size of urban agglomerations is the result of a trade-off between the relevant agglomeration and congestion forces. Urban growth can therefore be the result of any city specific or economy-wide change that augments the strength or scope of agglomeration forces or reduces the importance of congestion forces. One example that has been widely used in the literature is reductions in commuting costs that lead to larger cities in terms of area, population, and in most models also output (Chatterjee and Carlino, 1999). Another example is the adoption of information and communication technologies that may increase the geographical scope of production externalities, therefore increasing the size of cities.

Much attention has also been devoted to the effect that this type of urban growth has on urban structure. Lower commuting costs may eliminate the link between housing location choices and workplace location. This results in more concentration of business areas, increased productivity because of, say, knowledge spillovers, and lower housing costs in the periphery of the city. Urban growth can therefore lead to suburbanization as well as multiple business centers,

as in Fujita and Ogawa (1982) or Lucas and Rossi Hansberg (2002). Those phenomena become increasingly important because of the decline in transport and commuting costs brought about by the automobile along with public infrastructure investments. In other words, urban growth is associated with sprawl (Anas, Arnott and Small, 1998).

C. Economic growth and Urban development

Most economic activity occurs in cities. This fact links national economic and urban growth. An economy can grow only if cities, or the number of cities, grow in term of both urban area and urban population. In fact, Jacobs (1969) and Lucas (1988) underscore knowledge spillovers at the city level as a main engine of growth. The growth literature has also argued that, in order for an economy to exhibit permanent growth, the aggregate technology has to exhibit asymptotically constant returns to scale (Jones, 1999). If not, the growth rate in an economy will either explode or converge to zero. How is this consistent with the presence of scale effects at the city level? Eaton and Eckstein (1997), motivated by empirical evidence on the French and Japanese urban systems, study the possibility of parallel city growth, which is assumed to depend critically on intercity knowledge flows together with the accumulation of partly city-specific human capital across a given number of cities. Rossi-Hansberg and Wright (2004) propose a theory where scale effects and congestion forces at the city level balance out in equilibrium to determine the size of cities. Thus, the economy exhibits constant returns to scale through the number of cities increasing along with the scale of the economy. Hence, economic growth is the result of growth in the size and the number of cities. If balanced growth is the result of the interplay between urban scale effects and congestion costs, these theories have important implications for the size distribution of cities and the urban growth process. These implications turn out to be consistent with the empirical size distribution of cities, that is, Zipf's Law, and with observed systematic deviations from Zipf's Law.

The economic approaches make use of what is known in economics as equilibrium theory by Alfred Weber, Losch, Isard and others in the early 1956. The view taken in theses approaches sees urban development processes as economic phenomena. The organizing concept is the market mechanism and the sorting process it provides in the allocation of space to activities. In the work on urban spatial structure, this involves allocation of space in both quantitative and location aspects to various users according to supply-and-demand relationships and a least cost concept in an equilibrium system. This work provides perhaps the most systematic and rigorous statement of urban spatial structure in the framework of equilibrium theory.

Ian Scott (1982) discusses the basic relation between urbanization and economic growth derives from the growth of incomes and the related shift of consumer preferences forward nonagricultural goods. Whereas demand for foodstuffs becomes increasingly income inelastic, demand for manufactured goods and services tends to increase, particularly for products that can be most feasibly produced in urban agglomeration, in which economics of scale, transfer cost reductions, intersectional links, a wide array of externalities are uniquely available. The city provides a natural environment for innovation and technological process, whether original or adaptive. Industrialization and urbanization are thus linked by necessity and logic, and thus link is supported by both theoretical and empirical explanations. He pointed out that growth fosters growth, through the process of the urban multiplier in a dynamic and circular process. As new market thresholds were reached, the expansion of specialized firms led to more construction activity, more demand for inputs, more population growth, more household consumption, and the achievement of even grater market threshold. The urban multiplier resulted in the concentration of economic activity, because the few cities with the large international markets became the most attractive ones for economic expansion and establishes positions of supremacy in the urban system.

D. Population growth and Urban development

The study of urban growth has proceeded in a number of different strands. *One strand* has emphasized historical aspects of urbanization. *Massive population movements from rural to urban areas have fuelled urban growth throughout the world (Ian Scott, 1982).* Yet it is fair to say that economics has yet to achieve a thorough understanding of the intricate relationships between demographic transition, agricultural development and the forces underlying the Industrial Revolution. Innovations were clearly facilitated by urban concentrations and associated technological improvements. A related strand focuses on the physical structure of cities and how it may change as cities grow. It also focuses on how changes in commuting costs, as well as the industrial composition of national output and other technological changes, have affected the growth of cities. *A second strand* has focused on understanding the evolution of systems of cities – that is, how cities of different sizes interact, accommodate and share different functions as the economy develops and what the properties of the size distribution of urban areas are for economies at different stages of development. Do the properties of the system of cities and of city size distribution persist while national population is growing? Finally, there is a literature that studies the link between urban growth and economic growth. What restrictions does urban growth impose on economic growth? What economic functions are allocated to cities of different sizes in a growing economy? Of course, all of these strands are closely related and none of them may be fully understood, theoretically and empirically, on its own.

E. Transportation Network and Urban Development

Guttenberg (1960) develops a theoretical approach to urban structure and city growth with utilized *accessibility* as an organizing concept- what he calls "a community effort to overcome distance". In the sense that human interaction is the underlying reason for minimizing distance, he is implicitly viewing interaction as the basic determinant of urban spatial structure. He identifies three components. He subdivides the first into "distributed facilities", and "undistributed facilities", which these being a function of the third component, "transportation." The rational states that if transportation is poor, the workplaces, trade centers, and community services will tend to assume a pattern of distributed facilities; if it is good, these activities will assume more concentrated patterns in the form of undistributed facilities. Thus Guttenberg maintains that urban spatial structure is intimately tied up with the aggregated effort in the community to overcome distance. In examining the implications of growth for his concept of urban structure, he points out that the transportation system holds the key to the way in which growth proceeds. The transportation decisions made from one year to another will result in a constantly changing urban structure, with the emphasis shifting along the continuum between the situations with highly distributed centers to the situation with one major undistributed facility. He implied that that there is some limit in the ability of the undistributed facility continuing indefinitely to function as the only major centers have for absorbing growth. As growth occurs, structural adjustments to overcome distance can take the form of either new centers or *improved transport facilities*. Commonly both occur. However Guttenberg acknowledges that *transport efficiency is not the sole variable*. He notes that activities may choose a location in relation to central place for reason other than time-distance.

Other work which should be cited here includes Hansen's (1959) use of the accessibility concept in the analysis of the growth of residential areas and Voorhee's (1961) use the concept in the analysis of other use activities. However, both are primarily dealing with the pragmatic aspects of prediction rather than the formulation of a more general system of thought governing urban spatial structure. Hansen defines *accessibility* as "a measurement of the spatial distribution of activities about a point, adjusted for the ability and desire of people or firms to overcome spatial separation." His concept of accessibility is very similar to Guttenberg's, and he has formulated a model which has useful immediate applications.

F. Dependency theory

Dependency theory is a body of social science theories, both from developed and developing nations that create a worldview which suggests that poor underdeveloped states of the periphery are exploited by wealthy developed nations of the centre, in order to sustain economic growth and remain wealthy (Hyperge, 2005).

Dependency theory states that the poverty of the countries in the periphery is the result of how they are integrated into the world system, whereas free market economists argue that they are not 'fully' integrated.

The premises of dependency theory are:

Poor nations provide a destination for obsolete technology, and markets to the wealthy nations, without which the latter could not have the standard of living they enjoy. First World nations actively, but not necessarily consciously, perpetuate a state of dependence through various policies and initiatives. This is multifaceted, involving economics, media control, politics, banking and finance, education, sport, and all aspects of human resource development.

Attempts by the dependent nations to resist the influences of dependency often result in economic sanctions and/or military invasion and control. Many dependency theorists advocate social revolution to effect change in economic disparity.

Dependency theory first emerged as a reaction to liberal free trade theories in the 1950s, advocated by Raúl Prebisch, whose research with the Economic Commission on Latin America (ECLA) found that the wealth of poor nations tended to decrease when the wealth of rich nations increased. Paul Baran developed dependency theory from Marxian analysis. The theory quickly divided into diverse schools. Some, like Andre Gunder Frank, adapted it to Marxism. "Standard" dependency theory differs sharply from Marxism, however, arguing against internationalism and any hope of progress in less developed nations towards industrialization and a liberating revolution. Theotonio Dos Santos described a 'new dependency', which focused on both the internal and external relations of less-developed countries of the periphery, derived from a Marxian analysis. Former Brazilian President Fernando Henrique Cardoso wrote extensively on dependency theory while in political exile, arguing that it was an approach to studying the economic disparities between the centre and periphery. The American sociologist Immanuel Wallerstein refined the Marxist aspect of the theory, and called it the "World-system." It is has also been associated with Galtung's Structural Theory of Imperialism.

Dependency theory became popular in the 1960s and 1970s as a criticism of modernization theory (also known as development theory) that seemed to be failing due to the continued widespread poverty of large parts of the world. With the seeming growth of the East Asian economies and India in the last few years, however, the theory has fallen somewhat out of favour. It disagrees sharply with classical and free-market economics. It is far more accepted in disciplines such as history and anthropology, which can count for or against it. It can also be detected in some of the reasoning underpinning recent NGO campaigns such as Make Poverty History and the Fair Trade movement.

Dependency was said to be created with the industrial revolution and the expansion of European empires around the world due to superior power and accumulated wealth. Some argue that before this expansion, the exploitation was internal, with the major economic centres dominating the rest of the country (for example southeast England dominating Britain, or the Northeast United States dominating the south and west). Establishing global trade patterns in the nineteenth century allowed capitalism to spread globally. The wealthy became more isolated from the poor, because they gained disproportionately from imperialistic practices. This minimized the dangers of domestic peasant revolts and rebellions by the poor. Rather than turn on their oppressors as in the American Civil War or in communist revolutions, the poor could no longer reach the wealthy and thus the less developed nations became engulfed in regular civil wars. Once the imperialist rich nations established formal control, it could not be easily removed. This control ensures that all profits in less developed countries are remitted to the developed nations, preventing domestic reinvestment, causing capital flight and thus hindering growth.

3. Previous Studies

- *"Freight Transportation and the economy: A description of the linkages" has been written by ICF Consulting & HLB Decision-Economics, 2002.* It have been pointed out that transportation investment is important because its principle influence is on productivity. *Investments in transportation infrastructure can lead to generative effects*[1] *and growth in the national economy.* The paper discussed the improvements in passenger and freight transportation reduces the costs of moving goods (and services) to and from markets is critical to economic expansion. Improved transportation systems reduce costs for delivery of goods and services; they also support faster, more reliable transportation from one place to another. These, in turn, reduce the costs of collecting inputs and delivering products to markets in several ways: less driver time on the road thus lower labor costs; increased trip miles per time period per vehicle and thus smaller vehicle fleet needed for the same amount of work; lower vehicle repair

[1] Generative effects are those that increase income by using resources more effectively and/or by using resources previously underutilized.

and operating costs; and improved transportation reliability. Cost reductions that are realized enhance the competitive position of enterprises with access to the improved system. Expanded demand can generate economies of scale and improved productivity as enterprises take advantage of this market opportunities-thus inducing another round of cost reduction. Therefore, investments that reduce the cost of moving goods to and from markets (via improvements in reliability, transit times, service level, etc.) can help to increase and sustain economic growth.

- *"The study of the economic impact of transport projects: developing guidance in the UK" have been made by Paul Chapman, 1963.* The research sets out the background analysis and the proposals for revised guidance about how to measure the economic impact of transport projects in the UK. *The model on the impact of the transport on the economy growth has been developed which can estimate changes in all key economic parameters, including the workforce, the number of businesses, population and jobs* (figure 2.1). The model is being developed to examine the distribution of take up of jobs by area, which is required specifically for analysis of regeneration areas. The time taken for these changes to occur is calculated within the model and results can be shown using time series graphs. Simulations can be run for any number of years; although in regeneration situations there is typically a focus on short to medium term impacts.

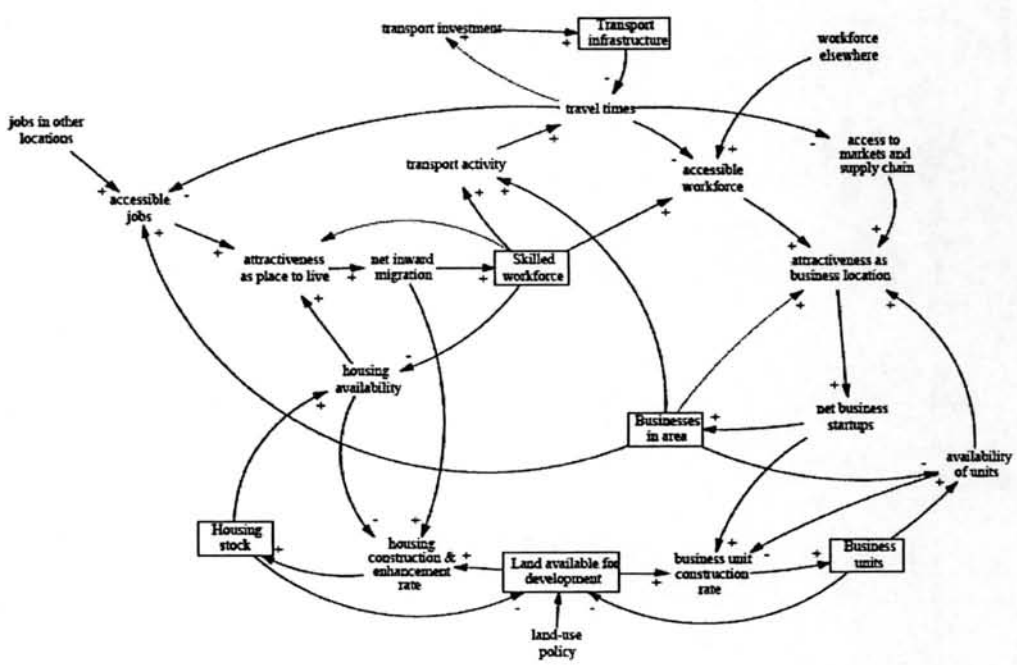


Figure 2.1 Causal Link Diagram for Transport and the Economy
Source: Chapman (1963)

The diagram illustrates several processes that take place simultaneously. *If travel times in the area are reduced, this will tend to increase access to jobs, increasing the attractiveness of the place to live in, and increasing the net inward migration rate.* In turn this will increase transport activity, leading to congestion and increased travel times. In a similar way, reduced travel times will improve access to a workforce and to external markets and supply chain, making the place more attractive as a business location, and tending to increase the net start-up rate. This stimulates more transport activity, leading to congestion and increased travel times.

In this version, land-use policy is determined externally. If the stock of land available for development increases, this will tend to stimulate new construction, as long as conditions are right for developers, in that there is evidence of rising demand and current availability is low. As houses or business premises are built this reduces the stock of land available, constraining further construction. On the other hand, reduction in housing or business premises, such as via demolition, increases the stock of available land.

Activity in the city is thus represented as a series of interlocking loops with feedback and interactions. The model has been built to simulate the processes indicated in the diagram. It is grounded in data from the census and other sources describing numbers of jobs and the workforce in the towns, and information about transport conditions generated by its internal transport model. It moves forward through simulated time in increments of one month, constantly calculating how circumstances have changed, and how this affects decisions about where to live, locate businesses and so forth.

- *Mackie et al (2001)* categorizes transport related networks effects into two groups direct transport networks effects and indirect transport network effects. The differences between these two categories are best illustrated using an example. When a new road is constructed it leads to:

(i) *Direct transport networks effects:* changes in the number of trip, distances, travel times and so on that result from changes in travel behavior (e.g. changes of route, mode, and time of travel, destination and frequency of a trip). Such travel behavioral change is stimulated directly by the change in generalized cost of travel brought about by the transport initiative.

(ii) *Indirect transport network effects:* Transport networks provide opportunities for these linkages to occur. Principally there are three types of economic linkages that transport facilitates. These are:

- Linkages between consumers
- Linkages between consumers and producers
- Linkages between producers

From the economic viewpoint it is clear that opportunities to form economic linkages increase significantly with network expansion. The accessibility and cost changes brought about by the transport initiative will also impact of land use, production and labor market pattern. Migration of people and firms will occur and new residential, commercial or industrial development may also occur.

Table 2.1 Major Economic Effects of Transport Improvements

Type of Effects	Major Effects
Investment Effects	• Multiplier effect on job creation, production increases, economic expansion and tax revenues
Facility usage Effects (Stock Effects)	**Direct Effects** • Increased capacity and services • Increased accessibility • Increased availability of services • Reduction of transport cost • Travel time savings • Regularity and reliability of transport services • Ease and amenity of driving • Reduction of packaging and handling costs
	Indirect effects • Industrial development - Expansion of markets - Wider choice of material procurement sources - Increased productivity of local industries - Immigration of firms - Development of tourist industries - Increased business opportunities • Local residents - expansion of daily activity sphere and choices - increased accessibility to socio-economic activities - security of life • Community - Space for accommodating utilities - Development and guidance of land uses - Formulation of new activity centers, etc.
Non-Economic Impacts	• Environmental Impacts - Air, pollution, noise vibration - Ecological balance - Water system • Social Impacts - Community severance - Scenery and Visual inlusion - Right-of-way acquisition and demolition

Source: Mackie et al (2001)

- *"Factor in understanding urban development " (Papageorgiou and Smith, 1983)* pointed out that the concentration of population and economic activity in urban areas may increase either because agents migrate from rural to urban areas (urbanization) or because economies grow in terms of both population and output, which results in urban as well as rural growth.

- *Research on the process of urbanization* spans the early modern era (the case of Europe having been most thoroughly studied; De Vries, 1984) to recent studies that have applied modern tools to study urbanization in East Asia (Fujita, Mori, Henderson and Kanemoto, 2004). The *'New Economic Geography'* literature has emphasized how an economy can become 'differentiated' into an industrialized core (urban sector) and an agricultural 'periphery' (Krugman, 1991). That is, urban concentration is beneficial because the population benefits from the greater variety of goods produced (forward linkages) and may be sustained because a larger population in turn generates greater demand for those goods (backward linkages). This process exploits the increasing returns to scale that characterize goods production but does not always lead to concentration of economic activity.

-In the research on *"the Dynamics of Global Urban Expansion"* points out that the expansion of the urban areas is determined by the interaction of three broad types of phenomena: the physical constraint of geography and environment, the demand for land by the households and firms who inhabit the city, and the policy constraints that govern land use and spatial interactions in the city.

- The range of different possibilities is explored extensively in Fujita, Krugman and Venables (1999). These ideas have generated new lines of research; several related papers in Henderson and Thisse, eds. 2004. *The process of urban growth is closely related to the size distribution of cities.* As the urban population grows, will it be accommodated in a large number of small cities, or in a small number of large cities, or in a variety of city sizes? While cities have performed different functions in the course of economic development, a puzzling fact persists for a wide cross section of countries and different time periods.

- Duranton (2004) refines the theory by means of a quality-ladder model of economic growth that allows him to model *the growth and decline of cities as cities win or lose industries following technological innovations.* Ultimately, the movements of cities up and down the hierarchy balance out so as to produce a stable, skewed size distribution. This theory is sufficiently rich to accommodate subtle differences across countries (in particular the United States and France) that constitute systematic differences from Zipf's Law.

- *"The effect of the improved integrated transport network on process of urban development or redevelopment in the areas benefiting from better accessibility" has been discussed by Makie et al (2001) in his recent research.* The processes are regarded as being represented by a broad spectrum of effects, including local economic and land-use effects, but also taken into account more subjective appreciation of people involved inn each area.
Improved integrated transport network on processes of urban development or redevelopment in the areas may be summarized as follows:

- Improved integrated transport network can have a catalytic effect on re-urbanization development, but there are a lot of other influencing factors which make the re-urbanization development to a successful or unsuccessful story.
- Whether the potential of re-urbanization is used in a successful way is dependent of a number of factors not associated directly with the transport investment itself. These factors are:
- The willingness of the city authorities to invest in the public space of the catchments' area in addition to the transport investment itself.
- The local market demand for new space in offices, housing etc. and the local economic situation.
- The local institutional and political framework, which can promote a climate of redevelopment situation.
- The local institutional and political framework, which can promote a climate of redevelopment and private follow up investment.

-Ian Scott (1982) conducted a study on urban and spatial development in Mexico; he found that differences in Transport conditions were clearly associated with different rates of urban growth, particularly with the growth of the three largest cities. This conclusion is father supported by an analysis of the relative accessibility between large cities, which provides a direct measure of the relation between change in relative accessibility and urban development between 1940 and 1970. The analysis of relative accessibility between twenty five of the cities that dominated the urban system in both 1940 and 1970 shows those cities with the highest levels of accessibility in 1940 grew more rapidly than others in 1940-70. Thus within an area in which spatial connections were greatly improved, the places that achieved the greatest relative as well as absolute improvements in accessibility were those with the greatest transport advantages in 1940. The analysis also shows that there was close relation between relative accessibility and relative urban size and economic growth. This does not, however, alter the earlier conclusion that transport advantages and disadvantages were less crucial determinants of urban growth that they had been in earlier periods.

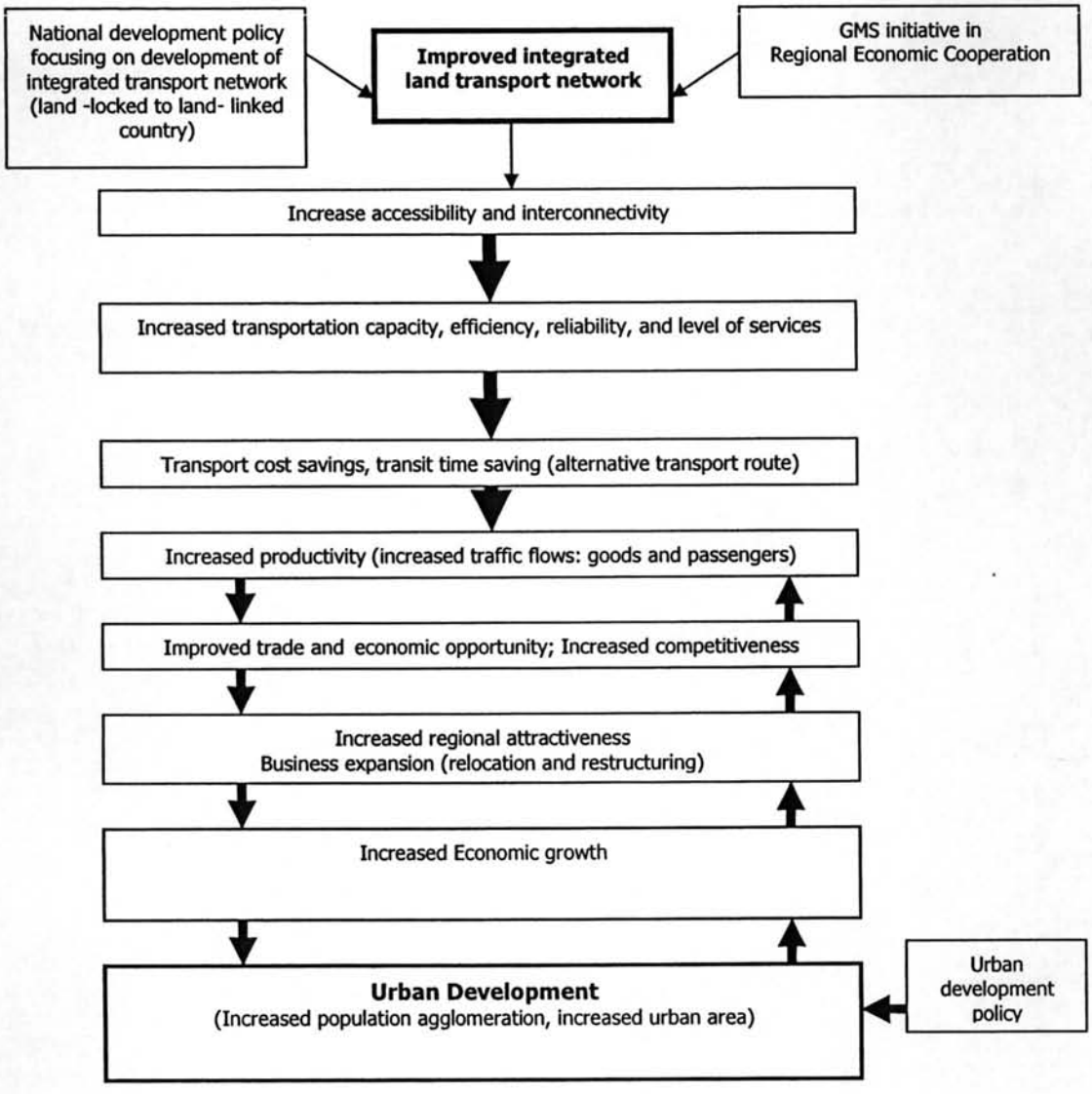
4 Previous Studies in Lao PDR

In Lao PDR various studies on urban development has been conducted by Ministry of Communications, Transport, Posts and Construction, Department of Housing and Urban Planning; however the analyses on the causes of the urban development have never been discussed, particularly, the urban development due to the impact of the improved transport network. The transport development was also studied by Ministry of Communications, Transport, Posts and Construction, Department of Transport, however the study did not discuss on its relation to the urban development.

5. Conceptual Framework

Having developed an overview of related theories and examined several previous studies relating to the research on the impact of the improved transport/transport network, the conceptual framework has been built up with the aim to analyze the impact of the integrated land transport network on urban development. Figure 2.2 Illustrates on how improvement in the integrated land transport network can lead to growth in the national and regional economic development which results in urban development.

Figure 2.2 Correlations between the Improved Integrated Land Transport Network and Urban Development



Source: Author's Compilation

As illustrated above, improved integrated land transport network has had an impact on the economic growth, resulting in the urban development in the related area. According to available data, the research will deal only with the following effects:

- Increased accessibility and interconnectivity: This will be addressed by the rate of accessibility and interconnectivity in each period of time.

- Increased productivity (increased traffic flows: goods and passengers). This will be interpreted by the data obtained of the transportation volume and the development of different transportation modes during the past three decades.
- Improved trade and economic opportunity; increased competitiveness; business expansion (relocation and restructuring). These will be looked into via the increased of trade volume and increased external trade of Lao PDR.
- Increased Economic growth: will be presented by the GDP growth and
- Urban Development: Increased population agglomeration and an increased urban population/area.

6. Research Methodology

In order to reach the objectives of the thesis, the following research steps are defined

Step 1: A literature review and build up of knowledge of the theoretical background about the impact of an improved transport network. In this step the concepts and definition of relevant key terms will be addressed, such as: *transport network, urban growth and urban growth type.* The theoretical background and literature reviews related to the relationship of the transport network improvement and urban development will be performed. Following this, the theory and previous studies on both the impact of the transport network on the economic growth and the impact of the economic growth on the urban development will be reviewed. In this step, based on the literature reviews, the conceptual and methodology framework of the research will be built up.

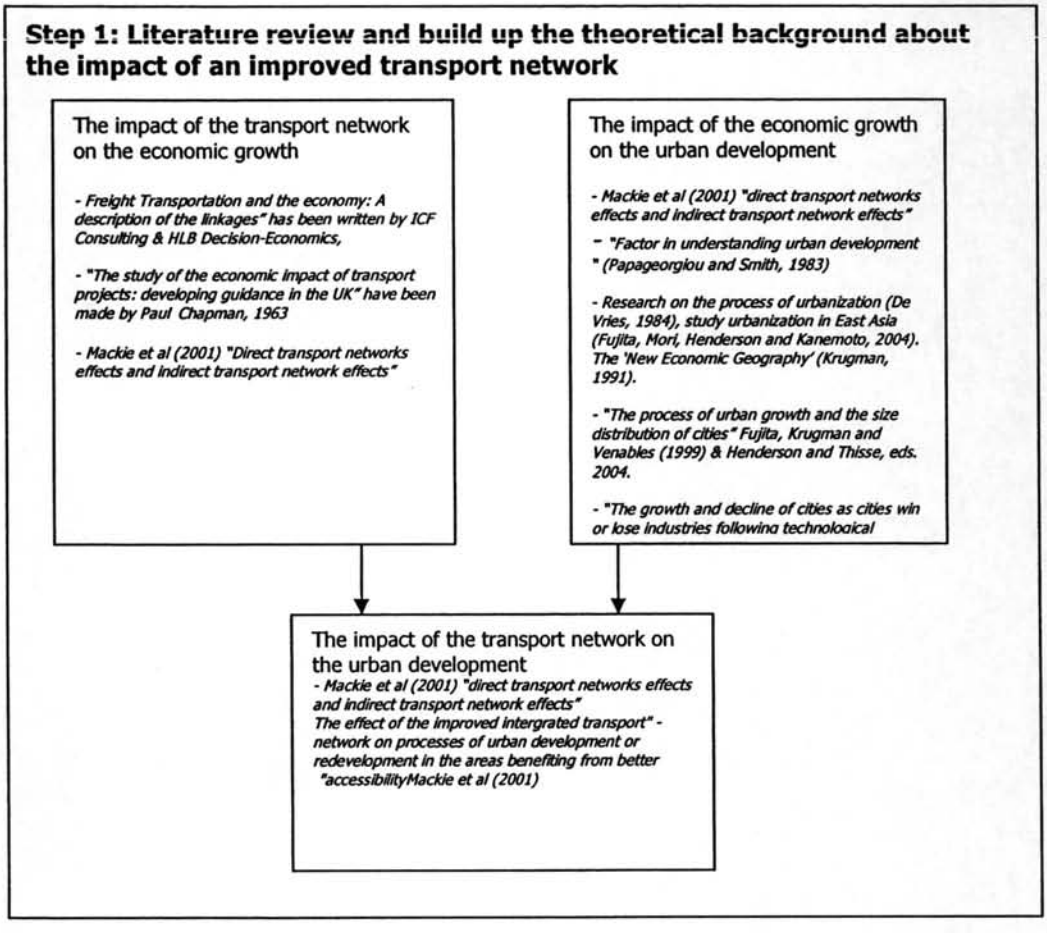
Step 2: Overview of Lao PDR country's status as a land locked country, including the related policy and implementation in transforming its status to land-linked country. The GMS land integrated transport network and GMS integrated land transport network in Lao PDR, including transport development and transit transport corridors are reviewed. Finally, the integrated land transport network variables and phases is introduced, which will be used to determine the evolution of the transport network in the past three decades and to examine the impact of the integrated land transport network on urban development.

Step 3: Review the socio-economic development of Lao PDR during the past three decades by looking at (i) Economy policy in each time frame, (ii) the achievement in the GDP growth of each sector (iii) the trade relations in international and regional economic integration and (iv) at the local level concerning the industry and handicraft establishments in the Country (v) Tourism industries. In addition the changing in population distribution in each time frame, including the percentage of poor by province and urban development throughout the country is

presented. Beside the urban policy is addressed to perceive the government intervention in the urban development process.

Step 4: Analyze the impact of the integrated land transport network on both population agglomeration and urban development by utilizing of the GIS software i.e. 'MapInfo' and 'Arc View' to handle the spatial attributes of land use data in order to identify and distinguish the patterns and density of new urban growth i.e. infill, expansion, isolated, linear branch and cluster branch. In order to analyze the impact of the integrated land transport network on the population agglomeration and urban development in each time frame it is necessary to link the integrated land transport network phases (chapter 3) to the changing in the population agglomeration and urban development (chapter 4). The phenomenon of the growth and declination of the population agglomeration and urban development in Lao PDR both at provincial and district level due to the improvement of the integrated land transport network in each time frame will be analyzed by calculating a value of mean, variance and closely-related standard deviation of the population agglomeration. The standard deviation is the most common measure of statistical dispersion, measuring how widely spread the values in a data set is. By comparing standard deviation of population agglomeration in each time frame the change in the population distribution in each province such as the increased/decreased annual population growth rate and the annual population growth rate distribution could be examined. This aspect also includes the analysis of the shift of the size rank of each province in each phase describing the shifting of the importance of its role within the country. The analysis is discussed intensively on population agglomeration and urban development in Vientiane Capital and Savannakhet Province as case studies which somehow reflect the pictures of other provinces which share similar characteristics. In addition the analysis of the population agglomeration level, percentage population agglomeration share of each district in its province of each time frame will be calculated and compared, to identify the tendency of the increased/decreased population agglomeration of individual district. The impact of integrated land transport network on population agglomeration is also verified by correlating the dispersion of the annual population growth rate with the increased traffic volume, the degree of integration, the improved transport network over time and the increased freight and passenger transport.

Figure 2.3 Research Methodology



Step 2:

- Overview of Lao PDR country's status as a land locked country, including the related policy and implementation in transforming its status to land-linked country.
- The GMS land integrated transport network and GMS integrated land transport network in Lao PDR, including transport development and transit transport corridors are reviewed.
- Finally, the integrated land transport network variables and phases is introduced, which will be used to determine the evolution of the transport network in the past three decades and to examine the impact of the integrated land transport network on urban development

Step 3:

- Review the socio-economic development of Lao PDR during the past three decades by looking at (i) Economy policy in each time frame, (ii) the achievement in the GDP growth of each sector (iii) the trade relations in international and regional economic integration and (iv) at the local level concerning the industry and handicraft establishments in the Country (v) Tourism industries.
- In addition the changing in population distribution in each time frame, including the percentage of poor by province and urban development throughout the country is presented. Beside the urban policy is addressed to perceive the government intervention in the urban development process.

Step 4:

- Analyze the impact of the GMS integrated land transport network on both population agglomeration and urban development by utilizing of the GIS software i.e. 'MapInfo' and 'Arc View' to handle the spatial attributes of land use data in order to identify and distinguish the patterns and density of new urban growth i.e. infill, expansion, isolated, linear branch and cluster branch.
- In order to analyze the impact of the integrated land transport network on the population agglomeration and urban development in each time frame it is necessary to link the integrated land transport network phases (chapter 3) to the changing in the population agglomeration and urban development (chapter 4). The phenomenon of the growth and declination of the population agglomeration and urban development in Lao PDR due to the improvement of the integrated land transport network in each time frame will be analyzed by calculating a value of mean, variance and closely-related standard deviation. The comparison of the standard deviation of the population agglomeration in each time frame will examine the change in the population distribution such as the increased/decreased annual population growth rate and the annual population growth rate distribution in each province.
- The detailed analysis on the extent and growth rate of the population agglomeration/urban development both at provincial and district level is also performed. This aspect also includes the analysis of the shift of the size rank of each province in each phase describing the shifting of the importance of its role within the country.
- The analysis is discussed intensively on population agglomeration and urban development in Vientiane Capital and Savannakhet Province as case studies which somehow reflect the pictures of other provinces which share similar characteristics.
- In addition the analysis of the population agglomeration level, percentage population agglomeration share of each district in its province of each time frame will be calculated and compared, to identify the tendency of the increased/decreased population agglomeration in individual district. The impact of GMS integrated land transport network on population agglomeration is also verified by correlating the dispersion of the annual population growth rate with the increased traffic volume, degree of integration, the improved transport network over time and the increased freight and passenger transport.

Step 5: Getting conclusion and recommendation

7. Data Collection

To analyze the correlation between the integrated land transport network and urban development, 2 kinds of data, transportation network data and socio-economic data have been applied.

A. Transport network data:

The previous and present transport network data of the Lao PDR consists of the strategic national highway which integrates the GMS countries, as well as an assumption about their future development in various scenarios according to the international and national transport policies.

1) *The historical and future developments of the networks* are required as input information. The established database contains information for the year 1976-2004. The development of the networks over time is reflected in the evolution of the land-linked transport network and used to calculate accessibility level. A new link was constructed with new alignment. In this case, the new link became part of the road network in the year in which it was opened. Once the link became part of the network, it resulted in increasing the total network length and connectivity over time. A link was upgraded in the past (e.g. from earth and gravel road to paved road) but the alignment and the network did not change. However it could be say that the connectivity has been improved.

2) *The increased traffic volume*, passengers and goods transportation volume, due to the improved transport network, as well as base information needed to specify transport policy scenarios.

3) *Border crossing* are a major concern for road traffic such as ferry or bridge. Border crossings are introduced as border links. The improvement of border crossings is definitely reflected in the significantly increased traffic flows.

4) *Political and cultural barrier* to the border crossing is other concern. It can be argued that the decision to make a cross-border trip, to establish international trade relationships or to move or to establish a firm or a household permanently in a different country, is not only influenced by accessibility but also by less tangible factors. Different political systems, bureaucracies and legislation, different languages, different cultural and historical backgrounds, and also tolls, trade restrictions or physical barriers influence all kinds of cross border spatial interactions.

B. National socio-economic data

National socio-economic data are about the performance of the country's economy. The country's socio-economic data includes data on the socio-economic development of the entire study region. The data also includes economic and demographic data, GDP by sector, employment and unemployment, number of industrial-handicraft establishment, interregional commodity and passenger flows.