MINISTRY OF EDUCATION AND TRAINING

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RESEARCH ON ROAD TRANSPORT IN THANH HOA PROVINCE UNDER GEOGRAPHICAL SOCIO-ECONOMIC PERSPECTIVE

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SUMMARY OF THE PH.D. DISSERTATION IN GEOGRAPHY

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INTRODUCTION

1. Reason to choose the thesis topic

- Road Transportation is a special and important economic sector, playing a role in boosting the socio-economic development.

- Thanh Hoa is a large and populous province with the economy being on development trend. So road transport has been playing more important role than ever.

- Over the past few years, Thanh Hoa Province's road transport have witnessed outstanding development… However, there remain many shortcomings (unbalanced distribution of transport network; inefficient exploitation of some traffic routes and coach depot system; frequently happening traffic congestion,…

- How can Thanh Hoa Province effectively exploit its comparative advantages so that its road transport can really become the supporting sector for socio-economic development? Does current road transport development commensurate with potentials?... are among questions faced by the scope of study of the thesis.

2. Objective, Task of the Research

2.1. Objective: Applying the theoretical basis to assess impacting factors, analyse the current situation of Thanh Hoa Province's road transport. On such basis, a solution and recommendation will be proposed for the development of Thanh Hoa Province's road transport till 2030.

2.2. Task

- Generally choose a theoretical basis on transportation and road transport
- Assess the factors impacting Thanh Hoa Province's road transport.
- Analyse the current road transport of Thanh Hoa Province during 2010-2016 period under geographical, socio-economic perspective.
- Propose and recommend solutions for the development of Thanh Hoa Province's road transport till 2030.

3. Research Scope

***3.1. Regarding content*:**

- Road transport infrastructure: study on the road network and road bridge network (among which, the road network includes total length, density, road quality, road network morphology; differentiation of road network).
- Road transport activities: study of transportation means (including: goods and passengers transport means; traffic volume of vehicles, results of transport activities (transport volume, rotation volume, average transport distance and transport revenue), calculation the rhythm of transport activities, transport and logistics services.
- Forms of territorial organization of road transport, including: coach stations, focal points, and transport routes.

3.2. Dimensionally*:* The thesis is mainly implemented in 24 districts, two cities and 1 town of Thanh Hoa Province as well as put Thanh Hoa road transport in relation with Northern Central Region provinces and the whole country.

3.3. Regarding time: The thesis uses most data sources in 2010-2016 period with an oritentation to 2030.

4. Perspectives and Research Method

4.1. Perspectives

Perspectives used in the thesis include: systematic perspective; Integrated view of the territory; Historical-Prospect perspective; Perspectives of sustainable development.

4.2. Research Method

Methods used in the thesis include: Methods of data, document collection and processing; Statistical processing method; Mapping method and geographical

information system (GIS); Interview method; Field survey methods; Professional solution.

5. Scentific and practical importances of the thesis

5.1. Scentifically

- The overview has seclected domestic and foreign research works as a basis for applying the research direction of the topic.
- Concluding, inheriting, updating and clarifying theoretical issue on transport and road transport is to apply to practical research.
- Determining the system of criteria for evaluation of road transport at provincial level is to apply to the study area of the thesis.

5.2. Practically

- Assessing the strengths and limitations of factors affecting the development and distribution of roads in Thanh Hoa province.
- Analysing the current development and distribution of road transport in Thanh Hoa province during 2010-2016 period.
- Proposing some solutions and recommendations to improve Thanh Hoa province road transport in order to gain high effectivness in socio-economics and environment till 2030.
- The thesis can be a useful reference document for Thanh Hoa province Department of Transport and relevant authorities of the province.

6. *Structure of the thesis*: The thesis consists of 3 parts: the introduction, the content and the conclusion

The content consists of four chapters:

- Chapter 1. Scientific basis on road transport.
- Chapter 2. Factors affecting the development and distribution of road transport in Thanh Hoa province
- Chapter 3. Current status of road transport in Thanh Hoa province
- Chapter 4: Solutions and Recommendations for the Development of Road Transport in Thanh Hoa Province by 2030.

CHAPTER 1. SCENTIFIC BASIS ON ROAD TRANSPORT

(Chapter 1 includes 39 pages, 1 data table)

1.1. Overview of studies on road transport

1.1.1. Studies worldwide

- *Road transport is a sub-sector in the group of service sector:* there are typical studies of I.Tarski (1985), WTO (2009)... With such researches, road transport is a sub-sector in the group of service sector. So, road transport will have features of service sector.

- *Transportation is a specialty of the industry*: there are typical studies of authors M.X.Rozin (1981), Jean-Paul Rodrigue (2009), Susan Hanson and Genevieve Giuliano (2004), Jonathan Cowie (2010)... Among which, authors state that road transport only exists when it transports people and goods and surrounding information. Otherwise, it will have no purpose. So, when the socio-economics gets more and more developed, the improvement of road transport will be paid more attention than ever to best meet with demand.

- *Researches on distribution and connectivity of road transport includes those of authors* M.X.Rozin (1981), Jean-Paul Rodrigue, Claude Comtois and Brian Slack (2009), I.Tarski (1985), David J. Keeling (2007),... showed that transport system can be usually represented by the use of the network as its structure and the flow, among

which, there are transport hubs and focal points. Accordingly, the distribution of road transport network is very special, the speciality is established by results of socio-economic development strategies of territories.

- *The development and distribution of road transport is heavily influenced by natural and socio-economic factors:* most road transport studies confirm that its formation and development are strongly influenced by natural factors (geology, topography, climate, hydrology ...) and socio-economic factors (population, labor, development and distribution of economic sectors. books, markets, capital, science and technology ...). We can find such features clearly in studies by Jean-Paul Rodrigue và Claude Comtois (2009), Abamson L.W.et al (1996), Amar S.et al (1991), Bell F.G (1995), Christina Malmberg Calvo, John E (1976), Woods Kenneth (1970), David A (2004)...

- *Studies on relationship between road transport and socio-econmic situation by* Jean-Paul Rodrigue, Claude Comtois and Brian Slack (2009), I.Tarski (1985), Hans A. Adler (1987), Christina Malmberg Calvo, Jonathan- Cowie (2010)... show that transport is present everywhere in the whole production chain, in all geological scales and is indispensable component of production-consumption cycle, vice versa, the development of transport will be a “godmother”, the start for the development of economic sectors and contributes to boosting social issues.

1.1.2. Studies in Vietnam

- *From the research viewpoint when road transport is a sub-sector of the service sector*: there are typical economic geographers such as Le Thong and Nguyen Minh Tue (2011), Nguyen Viet Thinh and Do Thi Minh Duc (2003). In addition, VSIC (2007) also indicates that transport is one of the 21 primary economic sectors, of which rail, road and pipeline transport belong to the second tier economy and road transport belongs to the level 3 economic sub-sector of of the system

- *The distribution of road transport is mentioned in the studies of* Le Thong and Nguyen Minh Tue (2011), Nguyen Viet Thinh and Do Thi Minh Duc (2013), Nguyen Ngoc Dong (2012)…According to Le Thong, Nguyen Minh Tue, road distrubution network is very distinctive with routes, hubs and focal points.

- *Typical studies on factors impacting road transport sector* include Nguyen Xuan Truc (1998), Nguyen Xuan Vinh (2006), Do Ba Chuong (2000), Pierre Lareal (1998), Khuat Viet Hung (2010), and road transport development planning and strategies of the Ministry of Transport and Departments of Transport.

- *The relationship between road transport and socio-economic development can be seen in the studies* of Pham Ngoc Con (1999), Nguyen Quang Vinh (1988), Lo Van Long (1996). Among which, transport is the premise for all socio-economic development activities, on the other hand, socio-economic development will be followed by the development of transport.

1.1.3. Road transport studies in Thanh Hoa:

There are many researches on road transport in Thanh Hoa province such as "Geography of provinces and cities of Vietnam" (volume 3) by Le Thong (editor) (2004), "Thanh Hoa Journal" (volume 3) of the People's Committee of Thanh Hoa province (2005), the plans, schemes, strategies of transport development of the provincial People's Committee, Thanh Hoa Department of Transport. In addition, with "*Research on the Development of Industrial Zones in the North Central Region*" (2015), Le Thi Le shows that road transport in Thanh Hoa is the foundation for the formation of industrial zones and creates an integrated industrial territory with tight and reasonable structure; Dao Thanh Xuan (2017) in the thesis "*Research on plantation*

structure transformation in Thanh Hoa province" has shown the role of road transport in Thanh Hoa province for agricultural development in the province.

1.2. Theoretical and practical basis of transportation and road transportation

1.2.1. Theoretical basis

1.2.1.1. Definitions

- *Transport* is the freight of people, goods and information via spatial connectivities and creates a multi-dimensional and complicated spatial system, closely linked with the way people interact via policies, ideaology and society.

- *Road transport* is an activity involving the use of road transport means to transport people and goods from one place to another on road by the road network system linked with each other into transportation routes, transportation corridors, transport hub and the formation of transportation hubs in different levels with the rear of hubs; The product of the road transport sector is the value of transportation from the place of production to the place of consumption on road.

- *The following concepts are related to road transport activities:*

Weight of transport: is the weight of goods or passengers transported by the transport sector, no matter how long the distance of transportation is.

Weight of rotation: is the weight of goods or passengers transported as per the length of the journey

Average transport distance is the actual distance that goods are transported from the place of departure to the place of destination, or passengers from the place of departure to the place of destination.

Turnover of road transport is the amount of a business earned after the provision of transport services for passengers or cargoes on means of transport on road

Traffic volume involved in road traffic: according to Phan Cao Tho, it means "the number of vehicles passing a cross section of a road route within a specified period of time."

Road transport service is the dimensional movement of passengers and goods on road which simultaneously satisfies two properties: being a non-material production activity and an independent economic activity.

Road infrastructure is a combination of material and technical works, architectural works and facilities for infrastructure organization, which are fundamental to the operation and development of road transport, including: Road networks, road bridges and other facilities for road transport such as parking lots, traffic signs, street lighting...

Logistics in transport is a continuous series of supply activities of service suppliers, laws and regulations, customers and products, transportation and storage activities ... are closely and systematically related to each other.

1.2.1.2. Role of road transport in transportation system

From the economic classification viewpoint: road transport is an integral part, a sub-sector in the transportation system

From the role viewpoint: Road transport plays an important and leading role in the transport sector

1.2.1.3. Roles of transport and road transport

a. For the economy:

- Contribute to the promotion of GRDP growth: Transport sector makes it

possible to use social products by introducing these products from production to consumption destinations, thus increasing the value of the product. This will contribute to GRDP growth.

- Promote the development of economic sectors

+ For industries: Road transport is one of the key decisive factors on the operation of the industrial sector, which is the foundation for the formation of industrial zones and creates an integrated industrial territory with tight and reasonable structure.

+ For agriculture: The development of road transport strongly affects the process of intensive farming and specialization in agriculture.

+ For tourism - services:

The contribution of the road transport sector to tourism is shown by: 1) expanding the road network will enhance the connectivity between tourist sites, the establishment of the tour; 2) upgrading the road infrastructure system will contribute to improving the quality of tourist services; 3) the connection between road transport and other transport forms will ensure the expansion of the tourism market; 4) Modern network and transport means systems contribute to the good travel and transportation of tourist flows.

In large cities, most of the consumer demand of the population is provided by the trade network, so the issue of transporting goods for the life by road transport is more important.

- Road transport contributes to the restructuring of the economy: Road transport network development has strongly affected the shrinking agricultural land area, the rapid increase in the process of industrialization - modernization and urbanization. Following which is the strong development of non-agricultural occupations.

- Road transport directly affects the economic activities of people such as: occupation, income, expenditure, adaptability of the market,... Especially for business households, the impact of the road transport system on their business is enormous

b. For the society:

- Road transport make it easier for local people in rural and remote areas to access soecial services such as medical care, culture and education,

- Road transport contributes to creating jobs, hunger elimination and poverty reduction.

c. For the environment:

- The road transport planning implemented will help contribute to the normal and smooth public circulation, having a good impact on the environment

- Public transport means (bus) development has contributed to reducing the involvement of private means of transport, contributing to the reduction of emissions, noise... to the environment.

However, the development of road transport also brings many inadequacies such as large capital investment, huge fuel consumption, shrinking agricultural land area, many people are facing the pressure such as: loss of production facilities, loss of housing, having to access new environment, can not find suitable jobs. In particular, transportation activities is one of the dominant factors behind the emission of most pollutants to the environment.

1.2.1.4. Characteristics of road transport:

In addition to the general characteristics of the transport sector, road transport also has its own characteristics:

- Large and diverse transport volume;

- Carrying out transportation in short distances;
- Volume of rotation is not high;
- Due to high transhipment, road transport has a strong connection with other modes of transport;
- The investment to build roads is easier and cheaper than many other types of transport

1.2.1.5. Factors impacting road transport

a. *Geographical location and territorial geometry* affect the formation of road network

b. Natural factors:

- Geology – Topography: defining the distribution of road network
- Climate: impacting the transport activities
- Hydrology: impacting the construction of road bridges
- Geology: impacting the construction of road routes
- Marine resources: impacting the connectivity and the connection capability
- Minerals: being the main source of material for construction and uprading of transport works.

c. Socio-economic factors

- The development and distribution of economic sectors

+ Economic development is important for the development and distribution as well as activities of the transport sector in general and roads in particular.

+ The distribution of economic sectors strongly affects the development and distribution as well as operation of road transport.

+ Economic territorial organization: the distribution of economic establishments regulates the direction of transport links, the intensity of transport and the structure of freight flows, thereby defining the road network.

- Population growth and population distribution

+ Population and population growth: strongly influence the development of the passenger transport industry

+ Population distribution: strongly influence the distribution of passenger transport flows

+ Labor source has great significance for the development of the road transport sector in two aspects, both the direct production force and the market consumption of products.

+ Culture and travel demand have a profound impact on infrastructure and road passenger transport activities in terms of frequency of traffic participation, the level of exploitation of road transport services, the direction transport...

- Investment capital: directly and decisively influences on the construction of road works
- Transport development policy: plays a decisive role in the organization of road transport
- Science and technology: associated with the development toward modern direction of road transport

1.2.1.6. The form of territorial organization of road transport

- Transport hub*:* is a place where connectivity among the territories in the area as well as the reach between the area and other territories can be created. In addition, the traffic hub is also a transit point of the road system, and the operating center of the transportation system.
- Coach station: The distribution of bus stations in the province plays an

important role in road transport, functioning as a place to serve passenger cars to pick up and drop passengers and provide supporting transport services; acts as the transit hub between the external and internal transportation, the point to distribute transport routes...

- Traffic streams and routes: In terms of distance, streams and routes may be near, can be far away; the frequency may be high or low... which all depends on the quality, quantity and connectivity of the transportation network as well as transportation needs of passengers.

1.2.1.7. Assessment criteria for Thanh Hoa Province road transport

- Group of road transport infrastructure criteria: including road network and road bridges (among which, road nework includes: total road length, road density; road quality, distribution types, road network morphology, road network differentiation).

- Group of Transport Criteria: road vehicles; circulation of vehicles involved in traffic; *Transport activitiy result (*transported volume, rotated volume, average transport distance and transport revenue); Rhythm in transport activities; Transport services; Logistics.

1.2.2. Practical basis

1.2.2.1. Vietnam road transport

- Vietnam *transport infrastructure system* in recent years has been formed and distributed relatively reasonable, developedn in a positive direction: expanding on scale, improving quality step by step; many main roads, large bridges have been upgraded to serve the national socio-economic development. Initially, the arterial road network has established well and systematically. However, the main road network density is still low, the capacity of individual sections is limited because most of the main roads have only two lanes, there are still many weak bridges, footbridges etc.

- *Transport activities*: significantly increased in terms of mechanical quantity, volume of rotation, transport, revenue... in which road transport accounts for the largest proportion compared to other modes of transport and is increasing. However, the increase of large tonnage vehicles and traffic of vehicles participating in road traffic are the causes for the roads to become overloaded, damaged, downgraded and unsafe; Logistics services in Vietnam have not developed wich has bad influence on the results of transport activities.

- *Forms of territorial transport* in Vietnam are gradually developing. However, the system of bus station is still few and in effective; Road passenger transport routes have developed almost all districts or commune cluster, but the strong development of inter-provincial passenger transport routes has been saturated and overlapped leading to imbalance and supply and demand; The whole country has three transportation hubs that have national significance are Ha Noi, HCM city and Đa Nang, the rest has regional and local significance.

1.2.2.2. Road transport in the North Central region

Recently**,** Road transport in the area has been upgraded**,** extended, the vertical and horiontal routes of the territory have formed the trapezoid in the region's transport system**;** some main roads such as**:** 1A national road, HCM road, 13 national road, 217 national road, 7

national road, 8 national road, ...are an important framework in transshipment of north-south traffic, a bridge to the sea of northeastern Thailand and Laos.

Thanks to economic development, transportation activities in the region have been promoted. As for feight transport, shipping volume over 90 million tons and the volume of circulation reaches over 4.500 million tons.km. As to passenger transport the number of turns of transport reached over 85,0 million people and number of turns over 7.000 million people.km, in which road transport dominates: over 90% of the volume transported nearly 70% of the volume of goods circulation; 88.5% and 99.6% of passengers transport and rotation.

The development of the transportation network in the region has formed important transport hubs with regional as well as local significance. Those hubs are also industrial centers and service, in which there are three typical traffic hubs: Thanh Hoa city, Vinh city and Hue city.

The reality drawn from the above mentioned situation of road transport development is the lessons learned for Thanh Hoa to apply for its locality.

CHAPTER 2. FACTORS IMPACTING THE DEVELOPMENT AND DISTRUBUTION OF THANH HOA ROAD TRANSPORT

(Chapter 2 includes 19 pages, 5 data tables, 3 maps)

2.1. Geographical location, territorial limit

2.1.1. Geographical location

Thanh Hoa is a North Central Regional province, located at $19^0$23’ – $20^0$40’ Northern latitude and $104^0$20’ – $106^0$05’ eastern longitude. Thanh Hoa borders Son La, Hoa Binh, Ninh Binh in the north; Nghe An province in the south; Hua Phan province of Laos PDR in the west; and the Gulf of Tonkin in the east. Therefore, Thanh Hoa will have many conditions to participate in road transport network with the Northn Central Regional provinces, Northern provinces as well as the whole country and neighboring Lao country. At the same time, the position also has a great impact on the characteristics, the formation and development of Thanh Hoa's transport hubs.

2.1.1. Territorial limit

Thanh Hoa province has a large province (11,129.48 km2), including 2 cities, 1 town and 28 townships and 24 districts. The territory is laterally wide with the width of 110 km from west to east, from north to south of being 100 km. This feature specifies the main transportation routes and inflows and the road axes that run in both directions: north-south and east-west. However, the major urban centers of the province are concentrated in the delta area, thus affecting the density and distribution of road network among the terrain areas of the province...

2.2. Natural factors

2.2.1. Geology – Topography

The coastal area is relatively flat, with a small slope, consisting of sandy areas mixed with swamps, many estuaries. Therefore, the construction of the roads here will be faced with great difficulty in strengthening the road ground and building bridges across the estuaries.

Delta area: The terrain is relatively flat, intermingled with low hills and independent limestone mountains, in some place there exists lowland terrain. The bottom geologic layer is the clay layer, followed by the sediment layer consisting of clay, sand clay.., characterized with varying degrees of organic composition. A quite typical feature is that the weak clay sediment in the 0-15 m range is in too-coarse state. Hence, to ensure the strength of the road ground, the most reasonable solution is to increase the foundation (top ground layer) to improve the elastic modulus of the road ground.

The Midland and mountainous area: has a complex terrain, high level of terrain classification, elevation of terrain surface has eratic changes. However, this area is geologically good, so when carrying out the road construction here, only handling the coating layer is enough to start construction the foundation of the road. But, due to the complex terrain, the roads in this area are often winding, steep and long. The investment in road transport development in this area is also very difficult and expensive

2.2.2. Climate

The climate in Thanh Hoa is quite diverse: high rainfall, high temperature, abundant light, besides there are also unfavorable phenomena such as floods, typhoons in rainy seasons, seasonal heavy rains with high intensity and storms. This has caused great difficulties for the upgrading of transport works and the operation of road transport including rapidly degraded and eroded road surface structures due to the influence of strong penetration of seasonal rain, or hot and dry sunlight asphalt surface is also easy to get peeling, for other types of road surface like soil and gravel it is dusty and easy to be abrasive...

2.2.3. Hydrology

- Thanh Hoa has a dense network of rivers will lead to supplementary works for road transport systems such as road bridge system, so costs and difficulties for bridge construction are inevitable.

- Landscape of lakes in Thanh Hoa provides the potential for ecotourism development. This affects the transportation and connectivity between road and waterways in transporting visitors to the resorts.

2.2.4. Sea and coastal resources

Thanh Hoa sea is located on the north-south sea transport route, also close to the international maritime routes via the East sea. Moreover, Thanh Hoa also has famous seaports such as Le Mon port, Nghi Son port, which is the most important gateway for economic exchanges between Thanh Hoa and other regions in the country and worldwide. This is also the basis for creating one of the important traffic hubs of Thanh Hoa province: Nghi Son economic zone transport hub.

In many coastal areas, there are beautiful beaches, with possible tourism development like Hai Tien, Hai Hoa, Sam Son... If different types of sea tourism are well exploited, it will be the condition to promote the development of road transport in passenger transport and also form an important basis for the establishment and construction of coastal road routes in order to well meet with passenger and cargo transport issues in estuaries, seaports and marine resorts.

2.2.5. Minerals

- First of all, minerals are the raw source of materials for the construction and upgrading of road transport works:

+ Stone of all kinds: used for road construction are present in most localities such as: plain area: Dong Cuong ward (Thanh Hoa city); Dong Tan commune (Dong Son district); Yen Thai (Yen Dinh district); Ha Tan commune (Ha Trung district); Nga An commune (Nga Son district); Truong Lam commune (Tinh Gia district); Chau Mountain (Tho Xuan district)…

+ Sand: used for construction of transport works, located along the Ma river, Len river, Tao river, Chu river.

- Second, the organization of mining sites is also the basis for the formation of new roads, increasing the number of means of transport. Especially in mining exploitation facilities such as cement exploitation (Nghi Son cement plant, Bim Son cement plant), stone exploitation (mainly located in Dong Son), tuyenen brick factories in Yen Dinh, Le Mon industrial park; Co Dinh chrome mining park…

However, in fact, many roads of the province are often degraded rapidly, severely damaged as vehicles transporting minerals throughout the day and the night, typically the section of Giat town - Tan Ninh (Trieu Son district) on 506 provincial road associated with the transport of ores from the Co Dinh chrome mine.

2.3. Socio-economic factors

2.3.1. Development and distribution of the economy

- The development of the economy:

Since 2010, the economy of Thanh Hoa province has always maintained a high (average GRDP increase of 8.5% each year) and quite stable growth rate (in 2010 it reached 8.7%, in 2013: 8.0& and in 2016: 9.1% per year). The economic scale has been increasing rapidly. In 2016, the gross output at constant prices reached 80,818.9 billion VND, 1.6 times higher than 2010, maintaining the leading position in the North Central provinces and ranking 7th nationwide.

The province's economic structuring has shifted positively: in 2016, the structure of agricultural, industrial and service sectors in total GRDP were 16.5%, 41.9% and 41.6% respectively; compared with 2010, the proportion of agro-forestry-fishery decreased by 7.2%; industry and construction increased by 5.5%; services increased by 1.7%.

In general, the high and quite stable growth of Thanh Hoa economy in recent years have had a great impact on the development of the road transport sector. This is shown in three aspects. Firstly, the developed economy requires that road transportation must develop rapidly in order to ensure more and more multi-facedted and diversified economic links. Secondly, the development of the economy accelerates the GRDP growth and the opportunity for road transport to have more capital for modernization and expansion of the system. Thirdly, with the economic development, improved people's living standard, people's demand for travel is increasing day by day, and it will be an important factor stimulating the development of passenger transport.

2.3.1.2 The development and distribution of economic sectors.

a. Agriculture

- Agriculture in Thanh Hoa province in recent years has made remarkable progress, productivity of most major agricultural products increased; Priorities for agricultural development have always been emphasized, contributing to the development of agricultural commodity.

- In Thanh Hoa, there is a clear distinction between natural and socio-economic conditions, so the distribution of agriculture is also influenced by this differentiation. However, the development of agricultural production areas in recent years has been concentrated mainly in the fields of the delta and coastal areas because of favorable conditions.

High-yield rice production with a scale of around 50,000 ha, concentrated in the districts of Dong Son, Tho Xuan , Thuy Hoa, Vinh Loc, Yen Dinh,...

Area for producing and processing vegetables for export in districts: Yen Dinh, Trieu Son, Dong Son, Tho Xuan, Thieu Hoa.

Flower and ornamental plants: concentrated in suburb areas of Thanh Hoa city.

The development orientation of Thanh Hoa agricultural areas is the basis to boost the development of road transport streams and routes to connect: production areas - supply points for agricultural materials, production areas - agricultural markets. In addition, the development of commodity-based agriculture is also a condition for the development of the goods transport, including a sharp increase in seasonal freight flows on the agricultural products transportation routes.

b. Industry

- Thanh Hoa industry production has maintained high growth rate. GRDP of industry-construction sector increase 13.9% per year. In 2016, GRDP reached 63.6 trillion VND... Developed industries increase the flow of raw materials and goods as well as stimulate the connectivity of the road network.

- Industrial facilities in Thanh Hoa Province:

+ Two industrial centers, including: Nghi Son Economic Zone Industrial Center and Thanh Hoa City Industrial Center.

+ Industrial parks: There are 03 industrial parks in operation including Le Mon industrial park, Dinh Huong - Tay Bac Ga industrial park, Bim Son industrial park and one industrial zone (Hoang Long industrial park) which has been licensed but has not been put into operation... So far, Industrial parks have attracted 154 domestic direct investment projects with a total registered capital of 11,889 billionVND and 10 FDI projects with a total registered capital of $ 162.1 million US with a diversified structure of industries.

Industrial cluster: there are 57 industrial clusters in Thanh Hoa, with an area of 1646.79 ha, among which, 37 industrial clusters being operational and 20 planned industrial clusters. Industrial clusters attract 255 businesses with nearly 18,300 employees. Among them, there are 27 industrial clusters with an area of 749.59 ha in the plain area, 13 industrial clusters in the coastal area and 17 industrial clusters with 522.20 ha in the mountainous areas.

Industrial centers, industrial parks and industrial clusters in Thanh Hoa province have been developing strongly in recent years, increasing the volume of transportation, circulation and transportation routes of goods of the road transport.

c. Services

- Trade

+ Import and export activities have achieved high growth rates: in 2016 the export turnover reached $ 1.737 billion VND, in the period 2010-2016, an average annual growth rate of 35.3% was achieved. This had big impact on the volue of goods transported as well as enhanced connection between the provincial road transport and other types of transport such as seaway, railway...

+ Trade centers: Thanh Hoa currently has 17 trade centers of grade 1 and 2 and 47 trade centers of grade 3. The development of trade centers has strongly influenced the transport streams and routes - the most significant of which is the inter-provincial transport streams and routes to Thanh Hoa.

Tourism: over the past years it has been quite robust. In 2016, the whole province received over 6.3 million tourists (average growth rate of over 13% per year), serving over 38 million visitors (average growth rate of over 12.5% per year), revenue from tourism reached 6.280 billion VND(growth rate of over 20% per year).

At present, Thanh Hoa province has three key tourist development destinations: Thanh Hoa city - Sam Son - Hai Tien, Ho Dynasty Citadel - Lam Kinh - Cam Luong fish stream and Nghi Son - Ben En. The development of Thanh Hoa tourism has impacted the road transport sector in three aspects: 1) contributing to increasing the volume of passenger transport and the connection of the road transport with airway; 2) the distribution of key tourism destinations and tours is the basis for building roads for the tourism industry; 3) the means of transportation will be standardized and managed systematically to ensure the transport of tourists

2.3.2. Population growth and population distribution

2.3.2.1. Population and population growth:

Thanh Hoa is a populous province with a population of 3528 in 2016. GRDP per capita of Thanh Hoa people is quite high and increases rapidly (2382 thousand VND per person / month, growth rate is 19.0% / year). The high population size, high and stable people's income are the advantages to create a large passenger market for the development of the road transport industry in Thanh Hoa province.

2.3.2.2. Population distribution:

High density population is in the delta, coastal areas and urban areas such as Thanh Hoa city, Sam Son city, Bim Son town, Ngoc Lac town... which have strongly dominated the development and distribution of passenger transport streams, making road transport in these areas always grow faster and stronger. However, the increase in population in these areas also put a lot of pressure on road transport infrastructure such as traffic jams, traffic congestion and environmental pollution issues. Meanwhile, in the midland and mountainous area, which occupies more than 90% of ethnic minorities in Thanh Hoa, its economic, cultural and social development is facing many difficulties and limitations; Therefore, transport infrastructure, especially road transport, needs to be invested to promote the development of the area.

2.3.2.3 Labor sources:

The number of laborers working in storage transport sector increased from 8.100 in 2010 to 9.700 in 2016, accounting for 0.4% of the labor force in the whole province and 39.4% of employees working in the service sector (2016). This is the main human resource that will be mobilized into the socio-economic development of the province in general and the transport sector in particular, including the road transport sector.

2.3.2.4 Culture and travel needs of the people:

The Kinh people (accounting for 84.4%) are concentrated in the coastal plain. They are dynamic, responsive and account for more than 80% of the province's qualified workforce. Living standards of the Kinh people are high, stable, and their living conditions are favorable. Therefore, the demand for travel among Kinh people is large. Accordingly, the market of the road transport sector here is wide with high exploitation level.

In contrast, ethnic minorities are concentrated mainly in the area of the Midland and Mountainous areas, the area accounts less than 20% of the province’s qualified labor forces. Their unfavorable living conditions have been affecting the frequency of service exploitation as well as the market of road transport sector here.

2.3.3. Funding sources

In the period of 2010 - 2016, the investment for transport in Thanh Hoa is 5,823.20 billion per year, accounting for 5.0% of the country; while the proportion of GDP of Thanh Hoa in comparison with the whole country is 1.9%. Therefore, the ratio of investment for transport in comparison with GDP of Thanh Hoa province in the past period is quite high: 9.1% (3.5% nationwide).

2.3.4. Policies

Road traffic law in 2008; transport and road transport development plannings of Thanh Hoa province and such policies as the one to support infrastructure construction, policy on development investment management, maintenance of traffic infrastructure in Thanh Hoa province, policy to attract transport businesses... have broght positive results in the road transport development of the Thanh Hoa province

2.3.5. Scientific, technical and technological issues

2.3.5.1 Science, technology in construction of transport infrastructure

In Thanh Hoa province, many advanced technologies have been applied in the design and construction of road works such as the "road maintenance management system" software, the model of comprehensive quality management, cylindrical structures with large delicacy...; e-commerce technology in passenger transport with two basic forms: "technology taxi" and "electronically contracted car"; seminars on science and technology in transport,... The remarkable contribution of science and technology activities has basically changed the quality of transport infrastructure in the province, many large scale transport works with modern construction techniques, have step by step created the most solid foundation for road infrastructure.

CHAPTER 3. CURRENT SITUATION OF THANH HOA ROAD TRANSPORT

(Chapter 3 includes 62 pages, 23 data tables, 5 graphs, 5 maps)

3.1. The role of road transport in the transporta system

Thanks to many outstanding advantages, road transport in Thanh Hoa province has managed to show its leading and dominant role in the transport sector with 87.2% of the whole industry revenue, 95.6% of passenger transport and 81.0% of goods transport. Road transport accounts for approximately 57.0% of the total length of the North Central Region (statistics in 2016). As such, the road transport sector occupies an important position and determines the overall development of the transportation sector.

3.2. Road transport infrastructure in Thanh Hoa

3.2.1. Road network

3.2.1.1. Total road length in 2016 is 22,857 km, up 2,521.0 km compared to 2010, accounting for 8.1% of the whole country and 22.2% of the North Central Region, including:

- National road: There are 13 routes with total length of 1,301.7 km, up 508.7 km and 5 routes compared to 2010. The total nationl road length in Thanh Hoa accounts for 5.69% of the total length of roads in the area, 6.04% of the national road length and 41.2% of the road length in the North Central Region. The national road network covers all the districts, towns and their distribution is quite reasonable. Among those, some 845.60 km are in the midland and mountainous area, accounting for 64.9% of the total provincial national road length, and 1.9 times higher than that in coastal delta,

The main national roads routes are the main road axis, which determine the connection between Thanh Hoa and other territories and play the most important role in socio-economic development of the province; some major national roads routes include: 1A national road, HCM road, 10 national road, 15 national road, 45 national road, 47 national road, 217 national road, Nghi Son-Bai Tranh road…

- Provincial roads: There are 51 road routes with the total length of 1,103 km in 2016 (up 10 routes and 76.43 km compared to 2010), accounting for 4.83% of the total road length in the province, 4.4% provincial road length nationwide and 49.5% of the North Central Region. Some 570.1 km of provincial road system in Thanh Hoa province is concentrated in the delta area, accounting for 51.67% of the total length of provincial roads.

The provincial roads in Thanh Hoa have an indispensable role in the connection between the towns and cities as well as the connection to the economic, political and cultural centers of the province. This is also the only network connecting national road and rural transport. However, so far, there remain many short-distance provincial road routes in the area (6 routes with lengths of less than 5.5 km, 10 routes with lengths of

less than 10 km), thus affecting the decentralization of length between provincial roads network compared to the national roads: among a total of 22,857 km of roads in Thanh Hoa, the national roads (main roads) account for 5.7% (1,301.7 km), while provincial roads (secondary roads) account for only 4.8%, which is 15.3% lower than the main roads. As a result, the unsatisfying coverage of the secondary road network will drive local traffic in small areas into the main roads, creating a too-much heavy traffic demand on major roads, causing traffic congestion between local traffic and long-distance traffic.

- Rural transport: The total length of rural transport in Thanh Hoa province in 2016 is 1,9741.2 km, an increase of 1,734.9 km compared to 2010, accounting for 57.1% of total rural roads of the North Central Region, 8.7% of the whole country and 86.3% of the total provincial road. Thanh Hoa province's rural transport network is rather highly concentrated in the coastal plain with 11,571.6 km (making up 58.0%), the Midland and Mountainous area with 8,223.6 km (accounting for 42.0%).

The "New rural" movement with the program "Rural transport" is the driving force for the total length of Thanh Hoa rural transport network to occupy a very high position and increase faster than the total length of other road networks. At present, over 75% of the population live in rural areas with 73% of the labor force working in agro-forestry-fishery. Therefore, Thanh Hoa rural transport network is considered as one of the most important factors for expanding production, accessing markets, acquiring science and technology and expanding people's knowledge.

- Urban transport: The total length of the Thanh Hoa urban transport is 711 km, up 201.0 km compared to 2010, accounting for 3.11% of the total road length in the province and only 54.6% of the total length of national roads, 64.5% of provincial road and 3.5% of rural transport. Thus, compared to the total length of other road networks, the current urban transport in Thanh Hoa is very thin.

3.2.1.2. Road density in 2016 is 3.66, 2.42 times higher than the national averge, and 1.16 times higher than the North Central Region. In which: national roads network density compred to the acreage is 2.1 times higher than the whole country and 1.4 times than the North Central Region; similarly, the density of Provincial Road network compared to the national average is 2.1 times higher than the country, 1.5 times than the North Central Region; for Rural Transport is 2.1 and 1.4 times; urban transport is 2.1 and 1.4 times.

The rapid increase in road length in recent years has resulted in the fact that the density of roads in Thanh Hoa province is higher than the average of North Central Region provinces and the whole country. With such a density, the ability to meet with demand for goods, passengers transport and connection at the moment is quite good for a province with a large population, economy on development trend.

3.2.1.3. Road quality

- National road network in Thanh Hoa has been provided with 100% of asphalt but only 1A national road, Ho Chi Minh road and some sections in 2 routes of Nghi Son - Bai Tranh, and 47 national road reached grade III delta (around 250 km, making up 19.3%). The remaining reached onlye grade IV, grade V with asphalt low-strength plastic stone (70%). Exceptionally in some sections in the new expanded national road in the midland and mountainous area, the road reached grade VI - lower than the provincial road level in plain districts and the same scale of provincial roads in the midland and mountainous area.

- Provincial road network: currently, 959.6 km of provincial roads in Thanh Hoa is asphalted, accounting 86.99%, most of it is grade IV to grade VI and mainly

distributed in the coastal plain area, the remaining 143.4 km is cement concrete and aggregate road, accounting for 13.01%, concentrated in the midland and mountainous area. The quality of provincial roads in the area is unevenly distributed among the routes and there remain many shortcomings.

- Rural transport network in Thanh Hoa with asphalt and cement concrete is quited high, reaching 11,114.7 km (accounting for 56.2%); The percentage of communes with 100% asphalted roads, concrete on the communal road is 63.6%, the backbone roads of the villages is 52.5%, the alley and the lanes: 43.8% and the village-inner roadway is 17.9%. In 2016 Thanh Hoa had nearly 100% of communes with car roads to the center, however, the rates of rural transport road in Thanh Hoa meeting with the road criteria in new rural construction remains low (merely 30%-40%).

- Urban Transport basically it is asphalt and concrete. The average width of internal urban road is 3-7m, national roads (running across urban areas) or ring road routes, detour roads have plain grade II, grade III. However, in such routes, the traffic is very high, so it is easy to get traffic jam during rush hours and make the capacity of routes become overloaded (ex 1A national roads - the section running through Thanh Hoa city)

3.2.1.4. Road network morphology

In Thanh Hoa there are two main roads in the north-south direction, including the HCM road in the west and 1A national road (also part of the AH1 trans-Asia road) in the east. To connect these two main roads, there are some national roads and provincial roads routes in the east-west (or northwest - southeast) such as 217 national road, 47 national road, 45 national road, linking the coastal plain with the Midland and Mountanous area, even to the Vietnam - Laos border. The connection between the roads creates a quite developed transport network, which has been playing an important role in promoting socio-economic development in the area.

a. Vertical and horizontal connection*: Longiditunal axes include* 1A national road, HCM road,10 national road,15A national road, 45 national road, 47B national road… Among those, 1A national road and HCM road are two most important Vertical connection. Horizontal axes include routes of 47 national road, 217 national road, Nghi Son-Bai Tranh road, 15C national road, 47C national road, 217B national road.

b. Connection inside and outside the province

- In the province

+ All district centers in Thanh Hoa province have connected with national roads, some districts have two to three connected ones. In addition to national road systems, the systems of provincial roads and rural transport also create an interconnected network, vertical axes connected to horizontal axes and connected to centers of districts and communes to facilitate exchanges of people, goods, contributing to the socio-economic development of the locality.

+ To connect with the economic - cultural - political centers and the connection between industrial zones and clusters.

* Connect with economic-cultural-political centers

To connect Nghi Son EZ, Thanh Hoa City - Sam Son, Lam Son - Sao Vang Industrial Park, Bim Son - Thach Thanh Industrial Parks into three axes: 1A national road, 45 national road and 47 national road.

At the economic, cultural and political centers in Thanh Hoa, in addition to the two main directions of north - south and east - west, there are specific characteristics with mixed types (with Thanh Hoa city being the center) and the chessboard (in the provincial cities).

* Connecting industrial parks and clusters: between industrial zones and clusters in Thanh Hoa province are connected by road routes to ensure the best interconnection as well as transport activities of raw materials and goods; 1A national road and 47 national road are the two main spindles that make up this connection.

- Connecting outside the province

+ Road network connecting Thanh Hoa with Laos through three border gates: Na Meo (217 national road), Ten Tan (15C national road), Kheo (47 national road). Among those, 217 national road is the most important route connecting Lao PDR and Thanh Hoa. It is also the only route connecting Sam Nua (Laos) and Thanh Hoa city.

+ Domestic connection: the two main roads taking on this role are: 1A national road and Ho Chi Minh road. This is an opportunity for Thanh Hoa province to connect with 6/7 economic zones, with areas rich in mineral resources, fertile plains, border gates, seaports and many big cities as well as industrial centers nationwide. In addition, the national road routes of 45 national road, 47 national road, 1A national road ... also play a big role in the connection between Thanh Hoa and other provinces in the region and nearby region.

c. Connection between modes of transport

Road transport is highly transferable. As a result, the connection between road transport and other modes of transport is a fundamental feature of this type of transport, including the connection of roads with railways, inland waterways and sea lanes and airlines.

3.2.1.5. Diversification of road network

a. As per districts and towns

- The total length of roads in the districts and towns of Thanh Hoa province depends on the length of the rural road network. Districts of Trieu Son, Ba Thuoc,... have total high length of the road because the length of rural roads in each district is over 1000 km. Districts with total high length of road such as Nong Cong and Yen Dinh with the length of 700 - 900 km. The two areas with the lowest total length of road are Bim Son town with 46.3 km and Sam Son town with 40.83 km because the rural transport road are very litte.

- Road density: The biggest road density are in Trieu Son (6.82) district and Nga Son district (6.62), followed by Tho Xuan, Quan Xuong, Yen Dinh, Vinh Loc, Thach Thanh, Ngoc Lac, Ba Thuoc district (from 4.6 - 6); The two areas with the lowest density of roads are: Bim Son town (1.09), Sam Son city (1.18). The remaining 17 districts and towns have average density of about 1.5 - 4.5 km / km^2.

Due to differences in road length, population and area, the density of roads in districts, districts is not uniform and has a high variance (from 1.1 to 6.8). Districts with low density will be greatly impacted in the expansion and development of economic sectors as well as on cultural and social security issues.

b. As per topography

- Total length: the total national roads length in Thanh Hoa midland and mountainous area is 1.2 times higher than that of the coastal plain, but in terms of rural roads, the area only accounts for 70.8% compared to the coastal plain. meanwhile the size of rural transport is 14.8 times larger than that of the national roads. Therefore, the total road length in the coastal plain is 1.17 times larger than the midland and mountainous area.

- Road density: Road density in the coastal plain is 1.22 times higher than the midland and mountainous area, so the road network has not ensured well for the socio-economic development of the midland and mountainous area.

- Road quality: road transport infrastructure in coastal plain areas is developed with good quality, the rate of asphalt road is high (reaching 88.6%), with grade III, IV, V. On contrary, the midland and mountainous area has high proportion of the soil road, relatively high ratio of aggregate road; the rate of asphalt road remains low, mainly in grade V, VI, and over VI.

c. As per rural and urban areas

- Total length of roads in urban areas in Thanh Hoa only accounts for 2.5% of the rural areas, as Thanh Hoa is an agricultural province, the urbanization process is still low, which makes a very huge different between rural and urban areas. As a result, there is a big difference in the road network.

- Road density in rural and urban areas in Thanh Hoa is high and witnesses a slight difference: in urban areas it is 1.64 while in rural areas it is 1.36; as compared to rural areas, total road length in urban areas accounts for 2.5% while the area just accounts for 2.1% and the population makes up 16.75.

- Quality: In rural areas, only 15.4% of roads are made of asphalt (mainly distributed in coastal plain districts and concentrated in national roads routes and mostly provincial roads), cement concrete road accounts for 40.8% while 43.8% are crushed stone, aggregrate and soil. In urban areas, the quality of road is quite good with road surface hardness covering 100% (in which, asphalt roads account for more than 50%, concrete casting covers 30%, the remaining road is made of stone, gravel.

3.2.2. Road bridges

- Bridge system on national roads there are 217 bridges, most of the bridges have over 50 m length each, and the width reaching the bridge design standard of 22 TCN 272- 05

- The bridge system on provincial roads: there is 172 bridges, most of these bridges are reinforced concrete but there are still extradosed bridges, suspension bridges and temporary bridges…

- In recent years, Thanh Hoa has completed five overpasses and a number of large bridges crossing the river to replace ferries: Tham bridge, But bridge; upgrading some weak bridges such as Dien Ho bridge, Na Sai bridge, etc.

- Currently, two overpasses are built on the 1A national road in Ha Trung district and on the section of Thanh Hoa city detour road and the former 1A national road.

The bridges are playing an important role to link the traffic circuits, limiting the difficulty in natural conditions, helping to reduce traffic jam in Thanh Hoa.

3.3. Road transport activities in Thanh Hoa

3.3.1. Transport vehicles

3.3.1.1. Scale and structure

The number of motorized road transport vehicles in Thanh Hoa in 2016 is 120,600, 1.7 times higher than in 2010, among which:

Trucks: including all types: under 2 tons, from 2 to 7 tons, from 7 to 20 tons and over 20 tons, reaching 60,043 vehicles (accounting for 49.8%) with a total load of 443,238 tons and unevenly distributed. .

The number of cars for passenger transportation is 60,557 (accounting for 50.2%), mainly cars and cars of 7 - 9 seats.

3.3.1.2. Increases

Since 2010, Thanh Hoa's road transport vehicles have been growing at a high rate (10% to 31% per year). Car growth is on the upward trend, with the highest rise in car under 10 seats (up 20 - 35%).

3.3.1.3. Density compared to the population is 34 cars/10^3 people, lower than the

national average (38 cars/10^3 people) (in 2016). Due to the increase in motorized vehicles, the density of motorized vehicles compared to population increases rapidly.

3.3.2. Traffic flow of vehicles

- *Current situation of vehicle traffic on some surveyed routes during peak hours*:

The most concentrated traffic vehicle volume is on the routes passing through cultural-political centers (from 5500 to 7000 PCU); On routes running through densely populated areas, traffic volume ranges from 2000 - 4000 PCU; On routes adjacent to the industrial zones, the traffic vehicle volume is low, always at the level of 700 - 900 PCU

- *Capacity of the roads*: On the routes adjacent to the industrial zones, 47 national road (Le Lai street section), 45 national road (passage through Thanh Hoa Lung hospital), 1A national road (section through the Cong town), 10 national road(section through But Son town) and Vo Nguyen Giap street, the current number of lanes has been met well for the circulation ability. At the remaining surveyed routes, the current number of lanes is not satisfactory for the traffic, especially during peak hours.

3.3.3. Transport activities result

- *The volume of passenger and cargo transportation* in Thanh Hoa province has increased, of which the volume of passenger transportation has increased faster than that that of goods; Passenger and cargo transport on road also dominates the whole transport structure, however, the overall passenger transport structure is always higher than that of cargo transport.

- *The rotation volume* of passengers is mainly on road (99%), that in other types of transport is almost negligible; Meanwhile, the volume of goods transported in the area is carried out by many modes of transport, the road transport only accounts for about 40 - 50%.

- *Average passenger transport distance* is relatively high (around 60 km in 2010-2016 period) and tends to decrease slightly; However, the average cargo transport distance is lower (ranging from 37 to 38 km, in 2010 – 2016 period) and has a greater fluctuation than the average passenger transport distance.

- *Transportation revenue*: high and fast, always reaches over 80% of total revenue of the sector

3.3.4. Rhythm in transport

Transport activities of Thanh Hoa province are strongly influenced by seasonal rhythm, associated with the rhythm of the demand for transport of people and goods: the peak transport activity is concentrated in the last months of the year, holidays 30 april - 1 may. For the months of the tourism season and the harvest season of agricultural products, transportation activities have increased, but mainly freight transport, and are concentrated only in the areas with the product and routes that are connected to product areas.

3.3.5. Transport services

- *Passenger transport services, include:*

+Inter-provincial fixed route service which is split into: normal service and high-quality service.

+ Intra-provincial services: intra-provincial fixed route service; Bus service; taxi service

- *Cargo transport services:* freely develop following market mechanism, small business model withesses rapid growth.

3.3.6. Logistics: The current situation of logistics in the area has not been properly exploited with potential and there remain many limitations.

3.4. Transport territorial organization in Thanh Hoa province

3.4.1. Road terminals: in terms of scale: the coach stations in the province of Thanh Hoa is still sparse (has not covered all districts in the province), in terms of quality: the coach stations only reached the standards of III and IV. Accordingly, the minimum criteria of the coach station such as the area of the station, the area to pick up and drop passengers, the area of the waiting room, the number of parking places to pick up and drop passengers... only reached the average level.

3.4.2. Transport hubs

- *Transport hub in Thanh Hoa City:* is a big hub not only of Thanh Hoa province and an important transport hub of the North Central Region. The role of Thanh Hoa City as a transport hub results from it is the biggest and the oldest center of economic, culture, politics of the province. Thanh Hoa City serves as a link between the districts and regions in the province, between Thanh Hoa province and the North Central Region, southern North Delta Rea, and the gateway to the East Sea of northeastern Lao provinces by many types of transport: roads, railways, waterway... in which road is the most important.

- *Nghi Son economic zone transport hub:* the second important transport hub as well as key economic area in southern Thanh Hoa province. The role of the hub results from it is of one the eight important economic zones nationwide, is the most developed economic center in Thanh Hoa province as well as one of the biggest economic and industrial centers. Nghi Son economic zone is located in economic zone of southern Thanh Hoa and northern Nghe An. It is one of the four development momentum clusters of Thanh Hoa province, a exchange gateway between the northern region, central region, Laos, Ho Chi Minh City, having direct access with three main types of transport: roads, railways and seaway, which is capable of integrating into the development of the whole country.

- *Ngoc Lac transport hub* is the third biggest traffic hub in Thanh Hoa province, located in the interconnected area of 11 mountainous districts with the delta districts of Thanh Hoa province. In Ngoc Lac, there are two inter-regional routes through HCM road and 15A national road, which are positively influenced by the border economic system and the border economy, have been bringing a huge advantage not only for Ngoc Lac district but also for all districts located in the western Thanh Hoa province.

- *Sam Son city and Bim Son town* are the fourth largest transport hubs of Thanh Hoa province. Among those:

+ In Sam Son city transport hub, there are 3 important roads serving as a bridge linking Sam Son and other localities in the province: 47 national road, Tran Hung Dao street and Ma river revenue. The role of the transport hub derives from the importance of marine tourism to the economic development of the area.

+ Bim Son town's transport hub is based on its role of being the dynamic economic centre in northern Thanh Hoa province. In the area, 1A national road, provincial road 522, North-South railway and intra-urban transport network are contributing to the development of the economic development zone with the functions of industry, service, trade and tourism. It is making important contribution to link socio-economic relations in the area.

- The transport hubs in the remaining 22 districts of Thanh Hoa province are important ones, in which the Lam Son - Sao Vang transport hub in Tho Xuan district is particularly cared and in the future it will become a big transport hub of Thanh Hoa Province and North Central Region, because here, in addition to the development of road network such as 47 national road, Nghi Son - Bai Tranh road, provincial road

system ... it also has got the effective support of Tho Xuan airport and Lam Son - Sao Vang dynamic economic zone behind with main functions of processing industry and clean agriculture.

Mostly in the remaining districts of Nga Son, Ha Trung, Hau Loc, Hoang Hoa, Thieu Hoa, there are small transport hubs. The formation of these hubs is quite simple, mainly due to the combination of several roads (national roads and provincial roads) with the main role to ensure the efficiency of the transportation network in the district and is a bridge connecting the district and provincial levels. In addition, in some of these hubs, due to the specificity of the area, they also undertake additional functions, such as: the Nga Son town transport hub with the function of handicraft and aquatic products, Hau Loc town transport hub with the function of developing agricultural products, aquatic products, Cam Thuy town and Vinh Loc transport hubs with the function of tourism ...

3.4.3. Road transport routes in Thanh Hoa province

3.4.3.1 Passenger transport routes:

- Inter-provincial routes:

+ Main route directions: Thanh Hoa - Hanoi, Thanh Hoa - Hai Phong, Thanh Hoa - Quang Ninh, Thanh Hoa - Thai Nguyen, Thanh Hoa - Nam Dinh, Thanh Hoa - Nghe An, Thanh Hoa - Phu Tho. These routes have average flow of over 20 trips per day.

+ Other route directions: from Thanh Hoa to Hai Duong, Bac Ninh, Binh Duong, Ho Chi Minh City with frequency of over 10 trips/day.

- Intra-provincial routes: in Thanh Hoa it is exploiting 23 intra-provincial fixed routes with around 110 trips/day. All districts and towns have connected with intra-provincial routes. The current intra-provincial routes all depart from 3 coach stations in the province center to the other districts, there is no route running among the district.

3.4.3.2 Cargo transport routes:

- Inter-provincial routes: The transportation routes of inter-provincial roads in Thanh Hoa province are not high as there are many modes of transport such as railway, seaway and part of waterway. Currently, there are main lines: Thanh Hoa - Hanoi, Thanh Hoa - Kien Giang, Thanh Hoa - HCM ...

- Intra-provincial routes: operate in short-distance range. The main cargo transport corridors are the sections on 1A national road, Ho Chi Minh road, the roads entering and existing the four momentum economic areas (including Nghi Son Economic Zone, Thanh Hoa city-Sam Son, Lam Son – Sao Vang, Bim Son – Thach Thanh), the routes entering and existing goods collection points such as Tho Xuan Airport, Nghi Son seaport, Le Mon seaport, Na Meo border gate (47 national road, Nghi Son - Bai Tranh road, 1A national road, 217 national road...).

3.5. Role of road transport in Thanh Hoa Province on the socio-economic development

3.5.1. For the economy,

3.5.1.1. Road transportation affects the overall economic development throughout the province

- *Contribution to GRDP growth*: Compared to 2010, in 2016, two criteria witnessed growth, among which, the road length increased by 2,521 km (1.1 times higher) with growth rate of 1.97%; total GRDP increased by VND 72,955 billion (2.5 times higher) with growth rate of 8.24%. Thus, every development of 1.0-km road will contribute to an increase of 28.9 billion, corresponding to the fact that the growth of 1.97% of the road length will contribute 8.24% growth rate of total province’s GRDP.

+ Contribute to promoting the development of economic sectors: industry, agriculture, services

+ Contribution to economic restructuring for positive orientation: In the period of 2010 - 2016, the proportion of industry and services tends to increase. In particular, the strongest increase belongs to industry, from 37.5% in 2010 to 43.9% in 2016, up 6.4%. The proportion of service sector increased from 38.0% in 2010 to 38.9% in 2016, up 0.9%. Accordingly, there is a sharp decline in the agricultural sector, from 24.5% in 2010 to 17.3% in 2016.

3.5.1.2 Road transport impacts people's economic activities

According to interviews with 150 households, 134 households were positively affected and 16 households were negatively affected after upgrading and expanding the roads in the area. Thus, the development of basic roads has brought more opportunities to benefit the people.

- *Occupation and main source of income*: the number of farming households whose the main income comes from agriculture is on decreasing trend while the rest of the sectors are likely to increase. The highest increase was observed in the number of households with income and working in the trading and business sector (up 27.9%), followed by the workers (8.0%); while the proportion of households earning and working in the agricultural sector decreased by 41.0%.

- Incomes and expenditures: the number of households with low average income per capita (less than 2.5 million) decreased from 34.5% to 1.4%. The group with income of over 2.5 million VND / person / month increased, the highest increase was the group with income of 5.5 million VND / person / month (13.7% increase of households). Meanwhile, household expenditure tended to increase, the highest increase was from households with income from 3.1 to 4 million VND / person / month (up 23.6%), the expenditure of those with income of less than 2 million VND / person / month plunged (33.3% decrease of households).

- *Capacity of the market*: road transport strongly and quite positively influences the business of the household. All economic indicators in the business increased and increased; the development of road transport makes it easier for people to trade and exchange goods, which is reflected in three aspects: 1) they trust and appreciate the increase in both quantity and quality of goods; 2) they choose products that are suitable with their own conditions (preferences, financial...), 3) geographical distance between buyers and sellers are not limited

- *With the business development factors of business households*: Road traffic has a strong and positive impact on the business of the household. All economic indicators in the business increased and increased sharply; among those, 3 out of 8 indicators including: production scale, number of customers and income level increase, the rest of 5/8 are seen as rocketing, including the quantity of goods, the variety of goods, the competitiveness, the market expansion and the number of households doing business in the area.

3.5.2. For the society

- *Contributing a good approach to cultural, health and education issues:* As the road transport system develops, there will be more opportunities for people to interact more effectively with cultural and artistic delegations inside and outside the province. Local people often go out, visit friends, relatives; the children of the households will have more opportunities to pursue higher education; the time for households to go from home to centers has significantly reduced...

- *Contributing to job creation, poverty reduction:* According to the survey, 91.7% of households responded that by facilitating the upgrading of the road, they

found jobs easier. According to statistics from districts, investment in rural transport in the whole province from 2010 to now has accounted for about 1% of GDP of the whole province and has contributed to reducing the poverty rate from 9.5% more than half, which means that if annually we invest every 1% of GDP for rural transport, the poverty rate will have a chance to reduce by 1.5% per year.

The majority of surveyed indicators on job opportunities and poverty reduction are "medium" (30-50%) and "high" (20-30%) levels. At "no" and "low" levels, there are only 10-20% of households.

3.5.3. For the environment

The most successful road transport development in environment of Thanh Hoa province in recent years has been the continuous development and expansion of the bus system in 19 districts, towns with the number of nearly 250 buses, with a trip every 15-20 minutes. This contributes to the reduction of the participation of private means of transport, reducing emissions, noise to the environment, especially in the central and densely populated areas in the province.

However, the downside of the road transport development is the large investment (total average cost of construction 1 km of roads in Thanh Hoa at current prices of 100-200 billion). Besides, when we build and expand roads, lives of local people are directly impacted. According to the survey result, as many as 16 out of 150 households are affected in terms of loss of production facilities, loss of housing, having to access new environment, inability to find suitable jobs, overload of public services, commodity prices increase.

In addition, road transport activities are also one of the causes of environmental pollution. Considering some places where traffic volume is high, the concentration of dusts and gases harmful to the environment such as SO2, CO, NO2, organic vapors is quite high.

CHAPTER 4. SOLUTIONS AND RECOMMENDS TO THE DEVELOPMENT OF ROAD TRANSPORT IN THANH HOA PROVINCE TILL 2020, WITH A VISION TO 2030

(Chapter 4 includes 18 pages, 4 data tables)

4.1. Bases to propose solutions:

Major bases to build measures and recommendations for Thanh Hoa province road transport development are *t*he documents of the Party, the State and Thanh Hoa province on socio-economic development in general and transport development in particular (including road transport) as well as on effectiveness yielded in the development of road transport of Thanh Hoa province in 2010 – 2016 period and on the social demand of a province on developing trend.

4.2. Solutions

4.2.1. General solution

4.2.1.1. Planning and Management solutions

+ Carry out planning of road transport development in the area, on the basis of promoting the advantages of each region.

+ Planning to invest in renovating, upgrading and building new traffic routes and works in service of transport; To prioritize investment in important and essential roads in mountainous and plain areas.

+ Prioritize licensing for transport businesses. Enterprises must be responsible for promoting good transport activities as prescribed.

4.2.1.2. Solutions on capital, investment

- Regarding capital mobilization: Funds for construction of road transport

infrastructure are mainly mobilized from three sources: 1) Central, 2) local (different levels), 3) local and foreign enterprises; Accelerating the capital mobilization from exploitation of land fund along transport works; Carrying out socialization the mobilization of resources to develop transport infrastructure; Diversification of investment forms such as joint ventures, combination, BOTs, public and private partnerships,

- Use of capital: To efficiently use the budget and assistance sources from the centre, ministries and sectors for key projects, bringing into play internal strengths for local projects such as: harbor for civil purposes; coach stations in remote areas,...

4.2.1.3. Human resource development solutions

Carry out training and retraining programs to raise the qualification and capacity of managers and skilled workers. To broaden the forms of training: short-term and long-term training, training at home and abroad, domestic training combined with foreign training, classroom training and self-training.

4.2.1.4. Solutions for science and technology development

It is necessary to strongly encourage the application of advanced technologies in all transportation sectors; installation of adequate signaling systems, proper traffic flow streaming, and towards application of modern transport technologies; To invest in the construction of solid transport works, preventing sliding such as viaducts, tunnels, evacuation routes, solidifying talus; Applying information technology to management and control.

4.2.1.5. Solutions to protect the environment

- For the design, construction and expansion of routes: Select the bypass route, limit the proximity to residential areas, schools; Select the location of gas stations to avoid the prevailing wind direction; Grow leafy trees along the national roads to filter contaminants; Traffic noise affects both vertically and horizontally, so the design of the road: elevation design, intersection design, pavement design should be considered in order to reduce the noise and control the noise...

- For the upgrading and maintenance of road works: The embankment exceeds the flood level; Regularly clean the road surface, promptly repair the damages, avoid excavation on road surface to make water or electrical piping; Strengthen the inspection and maintenance...

4.2.2. Specific solution

- Regarding infrastructure:

+ To develop the synchronous road system, put priorities on investment of important and essential routes to help reduce and create favorable conditions for investment attraction, goods transport, breaking the deadlock in socio-economic development.

+ To replace of all weak bridges on the national roads and provincial roads; To invest in the construction and replacement for the first step of suspended bridges and monkey bridges in the Midland and Mountainous area with reinforced concrete bridges and pre-stressed reinforced concrete bridges; To basically complete the construction of hard bridges and civil suspension bridges in some locations to replace wharf or in mountainous districts of the province.

- Regarding transportation activities:

+ To invest in transport development along the direction of connecting, towards the development of logistics centers in cargo transport.

+ To improve transportation quality with reasonable cost, accelerate the application of advanced transportation technology,

+ Promoting internal strengths, stepping up socialization and encouragement in investment for transport business;

- Regarding territorial organization of transport: Covering car terminals in all districts,

townships in the province; Upgrading of coach stations in Thanh Hoa city; Upholding the internal strength of traffic hubs; Promoting the development of long-distance, multi-way transportation routes...

4.3. Recommendations

- Promote the maintenance of transport network infrastructure, solidify the degraded roads, ensure regular exploitation.
- Expand and upgrade some routes to serve the general development of the province:
- To develop road routes in parallel with sustainable environmental protection.
- Strengthen the management, planning and anti-encroachment of corridors, decentralize detailed planning for management demarcation, strengthen management of the means of transport on the road transport routes.

CONCLUSION

1. Transportation in general and road transport in particular are the blood vessels of the socio-economic development. Therefore, in the socio-economic development of any area, the transport is always receiving the attention and support. For Thanh Hoa province, in order to promote sustainable economic development, transportation, especially road transport, always has to go one step ahead to create the premise for economic and social development. Nowadays in the global integration trend, the role of road transport in the province has become more important than ever.

2. Thanh Hoa province has many favorable conditions to develop transportation and road transport system. Highlights include geographic location, rich mineral resources, rich marine resources, human resources and the level of economic development... Thanh Hoa is located in the center connecting the red river delta, central coastal region, mountainous northwestern, northeast Laos, and Tonkin Gulf; the nearest gateway to the sea of the Vietnam's western - northwestern region and northeastern Laos. At the same time, it is located on the economic corridor of Lang Son - Hanoi - Ho Chi Minh City - Moc Bai, economic belt along the Gulf of Tonkin and many national transport axes, especially in the east of the province there is a coast of 102 km in length and Nghi Son Economic Zone with huge potential in international exchange. That position creates favorable conditions to promote the development of road transport in order to effectively serve the industrialization and modernization, to expand cooperation and integration with regional economies.

3. Over the past time, the road transport of the province has witnessed remarkebale changes, especially the increase in both quality and quality of the routes... this has strongly affected the socio-economic development, including the growth and shifting of economic sectors, as well as had strong impacts on industries in the province. The development of road transport also leads to socio-economic prosperity of households... Even though, the environment is facing some negative impacts from the transport.

4. However, the road system of the province has many difficulties and limitations that need to be overcome. The number of roads is still few, especially the provincial road system; Rural transport has not reached national standards; Road network in many places has small scale, technical standards are not high, transport activities – especially cargo transport is not high, logistics centers have not been developed to commensurate with the potential... So, it has significantly influenced the socio-economic development of the province.

5. In the coming time, Thanh Hoa province should take effective measures to overcome the weaknesses in road transport development, among which, focus should be paid on issues of planning, investment mobilization, science and technology, human resources training,... I strongly believe that transport in general and road transport of Thanh Hoa province in particular will develop stronger to contribute effectively to the socio-economic development of the province and the country.

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