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MODEL AND MANGEMENT SOLUTION FOR PUBLIC TRANSPORT SYSTEM AT HAI PHONG CITY

SUMMARY OF DOCTORAL THESIS

SPECIALIZATION: URBAN MANAGEMENT AND CONSTRUCTION

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INTRODUCTION

1. The research's urgent

Public transport has been selected to develop by the Government together with the municipal government to solve urban problems such as congestion, environmental pollution ... Public transport (PT) has not brought high efficiency, especially in the stage of planning management and operation. With large cities all orienting to multimodal development of PT such as buses, BRTs and trains, but currently there are no specific management guidelines, research in this field is limited. The management of operation and exploitation has not met the demand for use, service quality is not high, there is a lack of management tools, especially the application of technology in administration ...

Haiphong city is a centrally-affiliated city of type I, a general economic - scientific - technical center of the North Coast region, an important traffic hub of the Northern economic key region, also the third most popular city in Vietnam. According to this scale,the city has to developed to multimodal, but currently the city has only 1 type of bus with 10 operating routes. The management of PT still has shortcomings leading to the PT system not yet developed and not covered throughout the city, the infrastructure and vehicles are not focused, the quality of service is low, not meeting the demand for people's need , many bus routes have stopped working, the image of the city's PT services is quite faint ...

Therefore, the study of the management of the city PT system and the selection of the topic: "Models and solutions for the management of the PT system in Hai Phong city" is necessary and highly practical

2. Research purposes

Proposing models and solutions for the management of the PT system in Haiphong city in the stage of planning, operation and exploitation. Create a quality transport system that is convenient, manageable, attractive and meets the demans for travelling in the present and the future.

3. Object and research scope

- Research object: Haiphong city's PT management system.

- Research scope: + Field: Manage the planning and operation of the PT system with different types of buses, BRTs, urban railways under the perspective of state management.

+ Location: Haiphong city.

+ Time: According to the general planning orientation of the city to 2025 with a vision to 2050 and the task of adjusting the general planning of Haiphong city to 2035 with a vision to 2050.

4. Research methodogy

The thesis uses research methodologies including: Surveying and collecting information; Inheritance; Analysis and synthesis; Specialist; Comparative and comparison; Map layer overlap. method

5. Scientific and practical significance of the topic

- *Scientific significance:* Theoretical system of PT system management. Additional materials for research on PT and PT management. Contribute to perfecting the PT system management model.

- *Practical significance:* Research results help professional agencies and state management agencies of Hai Phong city manage

the urban PT system more effectively; Research results of the topic can be used as references for similarly sized cities in Vietnam.

6. New contributions of the thesis

i) Theorized systematization of the PT system and the management of the PT system, especially the contents related to integration.

ii) The management model of the PT system is suitable for Haiphong city from the planning stage to the operation stage. The model defines the functions, management subjects and performance levels.

iii) Identify 9 integrated points of PT methods considering land use and urban transport.

iv) Solutions to manage the integrated PT system for Haiphong city such as: Completing legal documents; Supply mechanisms and policies to encourage the development of the PT system; Integrated planning management solution for PT system; Solution for managing, operating and exploiting the integrated PT system; Community participation in PT management.

7. Concepts and terms used in thesis

Integrated PT system: the Integration of multimodal PTation according to a common and unified principle such as: Route network is linked at the integration points to create trips travel conveniently, shorten transit time, means; Integrate tickets to reduce costs and hassle of using a variety of PT offered by many transportation companies. *PT integration point*: The integration point in a PT system integrates various types of PT with consideration of land use and urban traffic. *Integrated PT system management*: is the management of a multimodal PT system, with synchronous integration from planning stage, construction investment to the operation and exploitation stage. Managing an effective integrated PT

system must create institutional integration; integrated planning; field integration; integrating operation, exploitation, price - ticket integration, passenger information integration and image integration

8. Thesis structure

The thesis includes 3 parts: Introduction, Content; Conclusions and recommendations. In which the content consists of 3 chapters: Chapter 1. Overview of urban PT system management (42 pages). Chapter 2. Scientific basis for management of urban PT system (44 pages). Chapter 3. Models and solutions for managing PT system in Haiphong city (52 pages)

CONTENTS

Currently, cities in Asia, Europe, America are developing modern PT systems along the direction integration of multimodal PTation such as buses, BRT, metro, LRT ... and integrated fare - ticket. Management of the PT system in those cities is managed by a separate management agency of the PT system, accommodated management according to the main functions of planning, construction investment and exploitation.

Most of them use technology in management such as operational coordination and ticket control. The image and brand name of PT are also focused on creating their own mark by cities around the world. Information about multimodal transfer procedures is fully provided, constantly updated at waiting lounges, integrated points or websites…

1.1.2. Vietnam

Currently, Vietnam cities with PT, the development of single-modal buses, a few big cities have BRTs.

In urban centers with PT systems, management has not yet been effectively used in the following contents: Promulgating mechanisms and policies to encourage development of PT; Managing the planning of the PT system; Management, operation and exploitation; Not paying attention to applying smart transport tools and community participation in management. Some cities have initially focused on building images and brands such as Hanoi and Ho Chi Minh City

1.2. Introduction of urban transport in Haiphong

Haiphong city has a total natural area of 1,527.4 km2, in 2019 the population will reach 2,028,514 people whereas the population density will reach 1,299 people/km2; There are 15 administrative units at district level (7 urban districts, 6 suburban districts and 2 island districts).

Urban traffic: Including 330 DT roads with a total length of 324.5 km, the main axis system includes 33 streets, forming axes and belts. Bus station: there are 9 interprovincial and provincial bus stations.

1.3. Haiphong PT management

1.3.1. City's PT current state

** Current state of the PT network*

According to the PT system planning to 2020, Haiphong city has 03 types of PT, namely bus network (34 routes), BRT (2-4 routes) and urban railway (2-4 routes), however the city only has an active bus transit network.

The process of developing the bus transport network in the city

started in 2004 and has gone through many stages, the most recent stage is: In the 2016-2020 period, there are many changes such as opening more routes, merging routes and stopping 03 routes, eventually by 2020 there are only 10 bus routes operating with a total length of 223.6km, the total number of vehicles operating is 79 vehicles, operating time from 4:30 to 20:45 daily, frequency from 15-40 minutes, the total number of vehicles per day is 599 in which the longest route is Le Hong Phong intersection, Ngo Gia Tu - Hoa river flamboyant bridge:40km, the shortest one is 5 Cat Bi intersection - So Dau 3 junction: 6.5km

Infrastructure: currently there are approximately 365 stops, 88 terminals, 24 start-end points, 04 bus ticket houses. These infrastructure are not satisfactory and the quality has deteriorated.

Information on PT is poor, there is no information for passengers searching and only information about route names at bus stops, waiting rooms, some shelters have old route maps which cannot be used.

1.3.2. Policy mechanism of Haiphong PT

Haiphong city has enacted mechanisms and policies to encourage the development of financial institutions related to interest rate support when purchasing PTation, economic - technical norms, price subsidy mechanisms for equity companies.

The City People's Committee has issued a policy on tickets: Fares (according to the length of the route); Form of ticket (paper ticket); Type of ticket (one-way ticket, monthly ticket); Free tickets for 03 subjects (children under 06 years old, people with severe disabilities and people with extremely severe disabilities); Discount 25% of monthly ticket price for 04 priority subjects.

1.3.3. Organizational structure and stakeholders in the city's PT system management

Department of Transport, Water Registration Center and PT are in charge of bus traffic inspection management with the functions as shown in *Figure* 1.17. Other related subjects: Department of Construction; Financial Department; Industrial and commercial facilities; Resource base and environment; Transportation companies

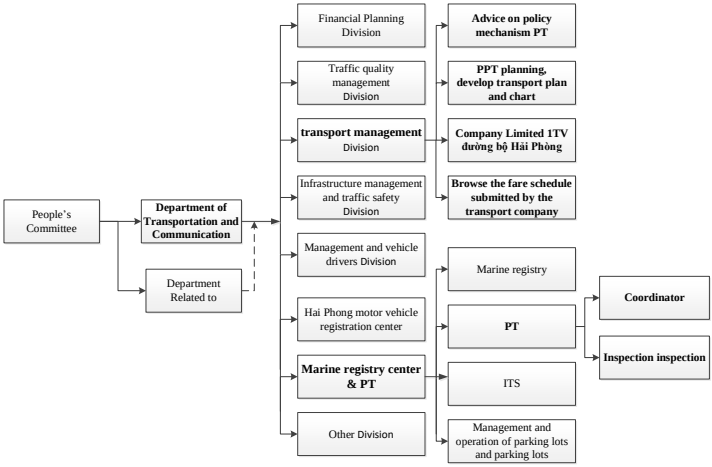

Figure 1.17: Organizational model and administrative functions of PT diagram in Haiphong city

1.3.4. City PT system planning management

The general planning of city construction (the Department of Construction is responsible for formulation) was approved in 2009, according to this plan, the PT system has two modes: bus, railway and non-integrated, undeveloped. urban in the direction of TOD.

The Department of Transport of the city undertook 3 planning and adjustment of the master plan for PT by bus (from 2007-2018), in these 3

times, the PT targets were reduced lower than the previous time and both proposed two the mode is the bus and the BRT.

Planning management has not focused which leads to conflicts in the type of PT in the approved plans. This leads to planning contradictions that make it difficult for the management and development of PT.

Comparative analysis of the number of bus routes approved in the plan and the actual operation will clearly see that the calculation in the plan is far different from reality in 2020

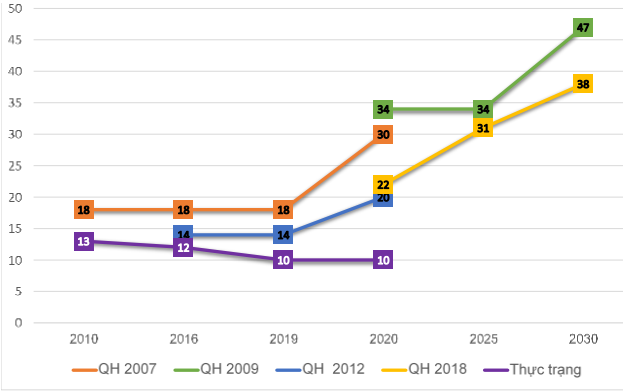

Figure 0.18. Diagram of comparing the number of bus routes between the planning and the current situation

1.3.5. Managing operating the PT system

From April 2018 up to now, the Waterway Registration Center and PT undertake the management, supervision and inspection of operations and coordination of public passenger transport (PPT).

The difficulty of operating transportation is reflected in the decreasing volume of transportation in the last three years, especially in 2019, it reached 2.5 million passengers/year and nearly 2/3 compared to 2016, also closed and suspended cascade multiple routes. The main reason is

that the infrastructure have not met the demand of quality guarantee, does not meet the service quality, the number of passengers is few, the revenue from ticket sales does not guarantee the cost ...

Operational management and exploitation have not used intelligent technology in administration. Currently, quality management only implements vehicle management, however bus vehicles with the age of over 09 years account for over 60%. The management agency does not have an effective service quality assessment management tool. The image and brand of Haiphong city bus have not been focused. The process of mining operation has not focused on community participation.

1.4. Relevant research works

Worldwide speaking, there are many researches to manage the PT system in the direction of integrating and applying intelligent management tools. In Vietnam, most scientific topics and dissertations are researched on the contents of PPT by bus. Studies related to the management of the PT system are limited, and there is no comprehensive approach. For the studies on PT in Hai Phong city, there is no management aspect of the PT system

1.5. Major issues to be solved

- Identify and systematize theoretical and practical bases related to the research field.

- Proposing the model for the management of the PT system of Hai Phong city to 2025 with a vision to 2050.

- Proposing a management solution to planning, operating and exploiting the community's participation to match the proposed model and create the attractiveness of the PT system to the people.

CHAPTER 2: SCIENCE BASIS FOR MANAGEMENT OF URBAN PTATION SYSTEM

2.1. Theoretical basis

2.1.1. The PT system in the urban planning structure

The PT system is studied in urban transport planning for urban of grade III or higher. The development of the PT system is an important content and has an influence on the urban structure, especially the orientation of the urban development towards the TOD direction.

2.1.2. Public transport management

The management of PT administrative procedures plays an important role such as: Completing state management and creating legal corridors, policy mechanisms, suitable to encourage the development of public institutions; Managing the planning of the PT system also investment and construction of public securities.

Management of PT has an important role in such contents as: Complete state management and create legal corridors, policy mechanisms, suitable to encourage the development of PT. PT system planning management; Investment management and construction. Management, operation and exploitation

2.1.3. Subjects and tools in urban PT system management

Subjects: City's People Committee, Department of transportation, Department of Construction and relevant Departments, single-modal administrative management center (if any), bus company, passenger Tools: The commonly used management tools for the PT system are: Legal tools; Economic tools; Technical tools-technology- Educational tools; Communication tool.

2.1.4. PT management paradigm

Organizational structure model to 3 levels; Extensive organizational model; Functional model of PT management.

2.1.5. Integrated PT system management trend

There is a need to create a combination of factors such as: Institutional integration; Integrated planning of PT system; Field integration; Integrating operation and exploitation; Integrated price - ticket; Image integration.

2.1.6. Urban citizen's need for transportation

Traffic demand management is a strategy to maximize the efficiency of the urban transport system by encouraging people to use PT. It measures are divided into three main groups: Improving travel options; Economic measures; Land use policy and smart development.

2.1.7. Urban transport quality management

Quality management to ensure the operation and service of the transport transport system provided by different transportation companies is of the best efficiency and quality. There are many quality assessment tools such as assessment frameworks, benchmarks, standardization and certification ...

2.1.8. Smart traffic appliance in PT operation administration

Services related to improving the service quality of the PT system should encourage the use of smart transport such as: vehicle operation management; Manage plans and schedules; Ticket management ...

2.1.9. Community participation

Community participation in public security management is very important. The community has the role of planning consultation, is the subject in the operation and exploitation, directly benefiting and having a strong impact on PT.

2.2. Legal basis

2.2.1. Legal documents

Including laws, decrees, circulars, regulations and decisions of Haiphong city related to PT system management.

2.2.2. Haiphong developments orientation

Including the Socio-Economic Orientation, Haiphong City Construction Master Plan to 2025 with a vision to 2050 such as: Land use planning and spatial development; Urban Transport Planning, PPTation planning of Haphong city.

2.3. Factors impacting PT management

The group of factors of natural, economic and social conditions; Group of technical factors - infrastructure; Organization, management and administration; Scientific, technical and technological factors.

2.4. Synthesize and analyze survey data in Haiphong

Based on the subjects in the management of the PT system to select three survey objects: Passengers using bus services or people having access to PT services but have not yet used them. Application - Form No. 1; PPT company - Form No. 2; PT management agencies, experts - Form No. 3.

- Main survey contents of sample form No. 1: Age, occupation, vehicle, demand for PT, quality of PT, personal opinion about views in the management and operation of the PT system .

- The main survey content of the sample form No. 2: Age, occupation, level, experience in management and operation, contents in PT work, personal opinions about opinions in the management of PT.

- The main survey content of the sample form No. 3: Age, occupation, qualifications, management experience, content in management work,

opinions about the views in the management of PT.

Survey results have given reliable and verified information consistent with the current situation. Helping graduated students have a clearer view of the management of the PT system and wishes of the subjects so that there are practical bases to propose more effective solutions.

-Passengers and citizens of Haiphong want PT to meet the demand at factors such as: Reasonable prices and preferences for more subjects; Better service quality; Provide free internet. They also agreed with the surveyed views such as: creating a modern and convenient PT system; Fast, Safe & Secure Journey; Willing to support policies to encourage participation in the use of PT, building PT culture.

-Trucking companies want: No overlapping in management; Create mechanisms and policies to encourage institutional development; The bus route covers all over the city, reaching the people; The stops are conveniently linked to attractions or with urban traffic. Upgrade repair and maintenance of infrastructure. The companies also agreed with the surveyed views such as: Quality management should be assessed according to clear criteria; Create travel habits by PT for people. Supporting policies to encourage the development of PT; Application of technology in route distribution; Must be preferentially supported, increase revenue sources and want to change the quality of the PT system and build brand image ...

-The agency managing the PT system wishes to: Apply modern science and technology; Orientations are proactive and appropriate; No overlap in management; There are mechanisms and policies to encourage institutional development; It is necessary to have tools in planning management, managing and exploiting more effectively.

Proposed views during the survey are also supported such as: It is necessary to have a separate management model when the city has a multi-type administrative system; Planning adjustments should be made to match the development trend; There is a need to integrate in management; Quality management according to clear criteria; Increase the attractiveness of the PT system to the people; Investing in smart technology in routing, infrastructure management; PT activities are concerned and invested by organizations, individuals and people.

2.5. Pratical experience

2.5.1. World

Lessons learned in the management of the PT infrastructure in the US, France, UK, Spain, Brazil, Singapore, China, lessons in the management organization structure, the management of the operation stage and apply technology in administration.

2.5.2. Domestic

Lessons learned from Ho Chi Minh City, Hanoi, and Danang such as price - ticket policy; Intelligent traffic application in the management of the PT system.

CHAPTER 3: MODEL AND SOLUTIONS PTATION SYSTEM MANAGEMENT IN HAIPHONG CITY

3.1. Perspectives, goals, principles

3.1.1. Perspectives

The thesis proposes 05 points of view, including: i) Developing the PT system in accordance with the development orientation and planning of the PT system of Haiphong city; ii) Prioritize and encourage the development of the PT system on the basis of appropriate policies and mechanisms; iii) Improving service quality to

meet the needs of people; iv) The PT system is integrated by 03 methods of bus, BRT, urban railway; v) Operational management must have a multi-modal management model, apply smart traffic.

3.1.2. Goals

Managing public administration with the desire to achieve 4 main goals: i) Society; ii) Economy; iii) Environment; iv) Development.

3.1.3. Principles

The thesis proposes 5 main principles in managing the PT system: i) Planning; ii) Construction investment; iii) Operation and exploitation; iv) Encourage community participation; v) Comply with State and local regulations, standards and laws.

3.2. Haiphong PT management model

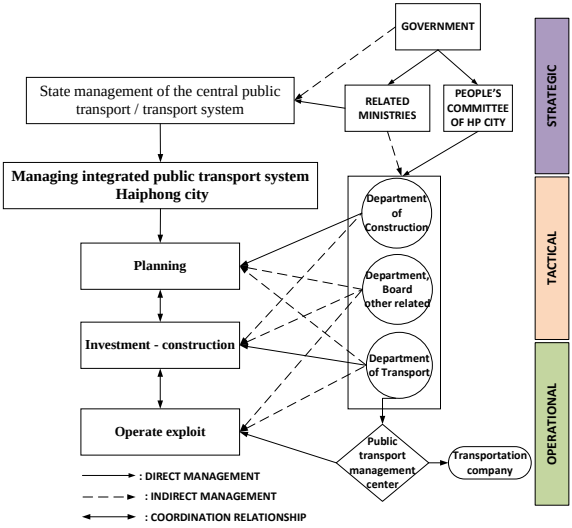

Figure 3.1 Haiphong PT management intergrated model

3.2.1. Planning management integrated PT system

Hai Phong city needs to make integrated PT system planning.

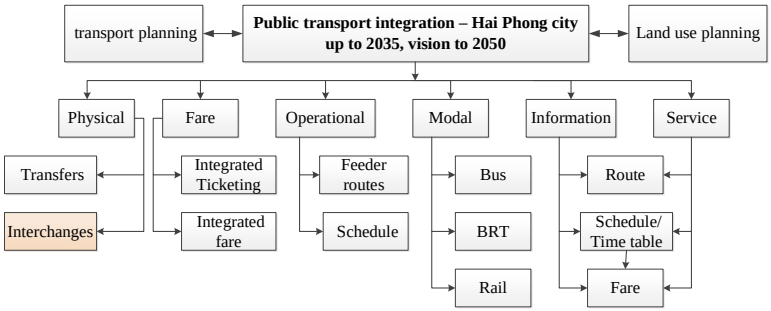

Figure 3.2 Integrated PT system for Hai Phong city

Integration points are a characteristic element of the integrated PT infrastructure model, which connects various types of PT with urban transport and high-density construction sites.

3.2.2. Managing the operation and exploitation of the integrated PT system

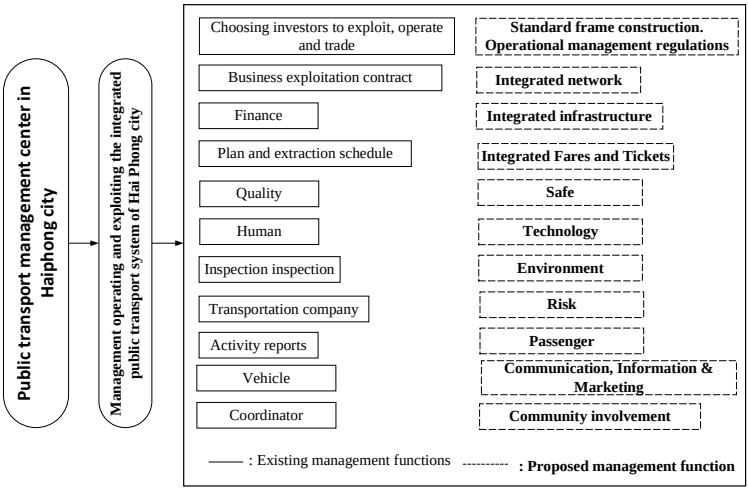

Figure 3.3 Model of management, operation and exploitation of the integrated PT system for Hai Phong city

3.2.3 Completing the organizational structure model of the management of the intergrated PT system

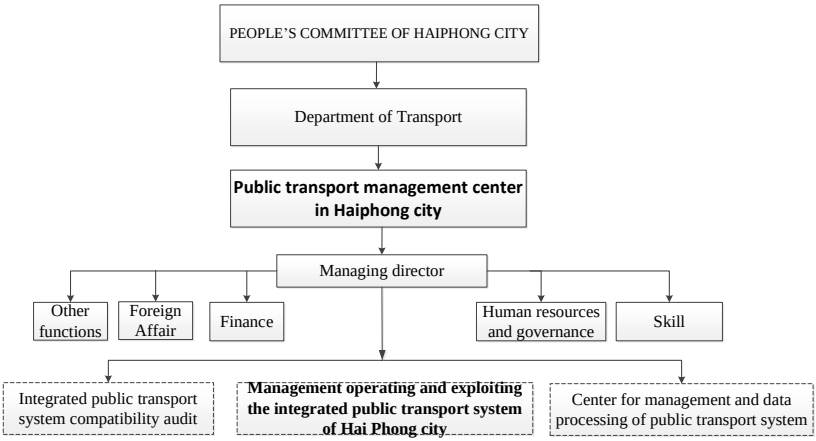

Figure 3.4. Organizational structure model of the management of the PT system in Haiphong city

Proposing the administrative procedures to manage separately from the water registry. Establish Hai Phong City Public Traffic Management Center. This hub has the functions as shown in figure 3.3

3.3. Solutions to complete legal documents

3.3.1. Complete and supplement the current legal documents

Proposing the Law document to supplement regulations related to PT such as: i) For urban centers of grade III and above, it is necessary to study and elaborate the PT system planning. ii) Research direction taking into account TOD and multi-modal integration.

Proposing to supplement the content of guidance on formulation and organization of PT system planning in sub-law documents such as: i) Current state of urban PT system; ii) Urban PT system planning.

Proposing to promulgate design standards and standards and plans related to urban railways and BRTs.

3.3.2. Guiding framework for implementing PT system integration in Hai Phong city

Table 3.3.Guiding framework for implementation of PT system integration

NO	Main Contents
I	Analyze relevant contexts: urban development, urban transport, PT in Hai Phong city
II	Evaluation of PT integration experience
III	Review the policy and planning framework to enable PT integration
IV	Determining the vision of the PT integration of Haiphong City
V	Barriers to integration of PT
VI	The goal of integrating PT in Haiphong city
VII	Choosing an integrated form of PT in Haiphong
VIII	Develop an action plan to implement administrative integration PT of Haiphong City
IX	Monitoring and evaluation mechanism

3.3.3. The framework for evaluating the quality of the integrated PT system

Proposing a framework for evaluating the quality of the PT system, applicable to all types of PT services and operators. The evaluation framework is built on the criteria related to performance and service quality, including 8 basic criteria such as: i) Usability; ii) Accessibility; iii) Time; iv) Information; v) Comfort; vi) Security; vii) Passengers caring; viii) Environmental impact.

3.4. Solutions to supplement mechanisms and policies to encourage the development of the PT

3.4.1. Allow business, advertising

To generate revenue to help mining companies solve financial difficulties, research proposals to allow business and advertising at integration points, endpoints and on PT.

3.4.2. Encourage and allow free bus ticket

It is proposed to add 03 additional subjects to receive discounts when using monthly tickets of PT in Haiphong city: People with mild disabilities; Workers working in industrial zones; Poor households.

Proposing to add 01 additional free beneficiary when using administrative procedures in Haiphong city: Elderly people (over 60 years of age).

To create a habit for people to ride the Haiphong city bus, the study proposes a free bus ride at a certain time frame with the entire network or with a few fixed routes.

3.4.3. Integrating ticket prices - tickets for multi-methods transport agencies

Standard fares will be applied on all routes run by different carriers and use integrated ticket types of different carriers. Paper tickets need to be replaced with an electronic ticket or smart card. Recommended more tickets: Integrated tickets; Tickets from time to time; Tickets according to itinerary; Combo tickets and services; Tickets 6 months or 1 year; Tickets by region; Family ticket.

3.5. Integrated planning management solution for PT system

3.5.1. Research content when planning an integrated PT system

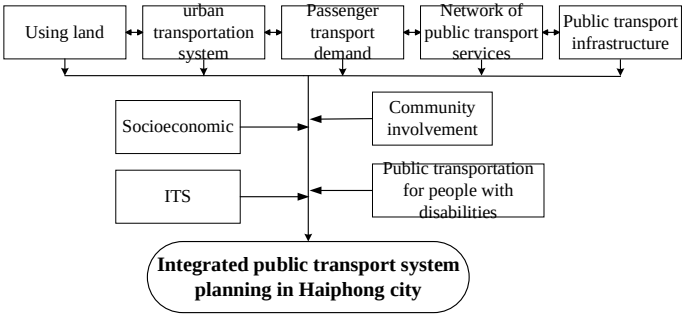

Figure 3.7. Research contents on planning integrated PT system planning for Haiphong city

3.5.2. Proposing integrated points in the planning of PT system

Determining each integrated point of PT in Haiphong city must consider the following factors: location, topography and land fund for construction; Transportation infrastructure; Type of PT connection; Stop points or terminal points; Functions, land use density in the vicinity ...

Proposing 09 integration points for the research on planning orientation of integrated PT system for Haiphong city to 2025 with a vision to 2050, this suggestion is based on concurrent study of approved Hai Phong city planning orientations such as: using land; urban traffic; urban railway and bus network, master plan for PT ation by bus

3.5.3. Intergrated point management

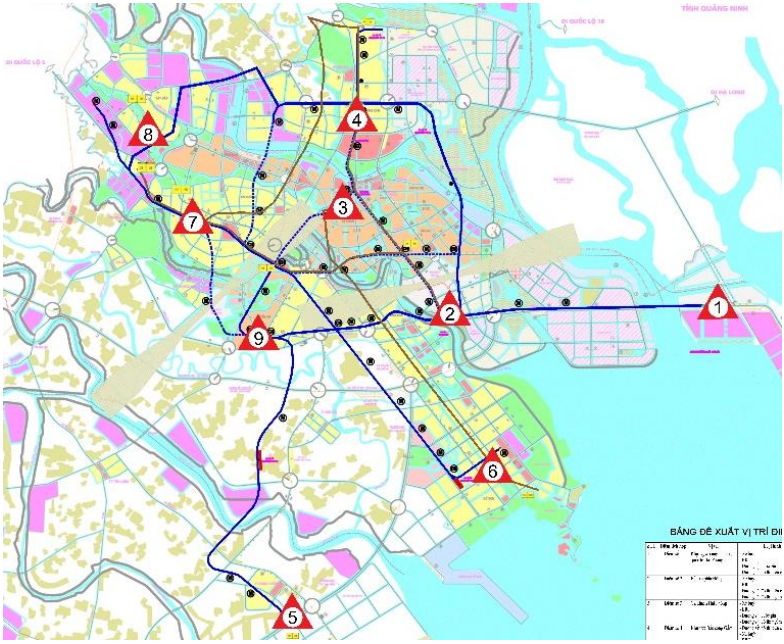

Figure 3.8. Map of proposed PT integration points for Hai Phong city up to 2025 with a vision to 2050

Integrated point management to provide the best service for PT, ensuring safety for passengers. Focusing on managing factors such as: Information; Notice board; Security; Service; 24/7 customer care.

Facilitating people to change their mode of transportation, considering specific requirements for the elderly, children, people with disabilities, tourists or foreigners.

3.6. Solution for managing, operating and exploiting the integrated PT system

3.6.1. Using geographic information systems

Proposing to use GIS tools to create the central administrative examination database and through that data, the most accurate and fastest processing and operating of PT operations.

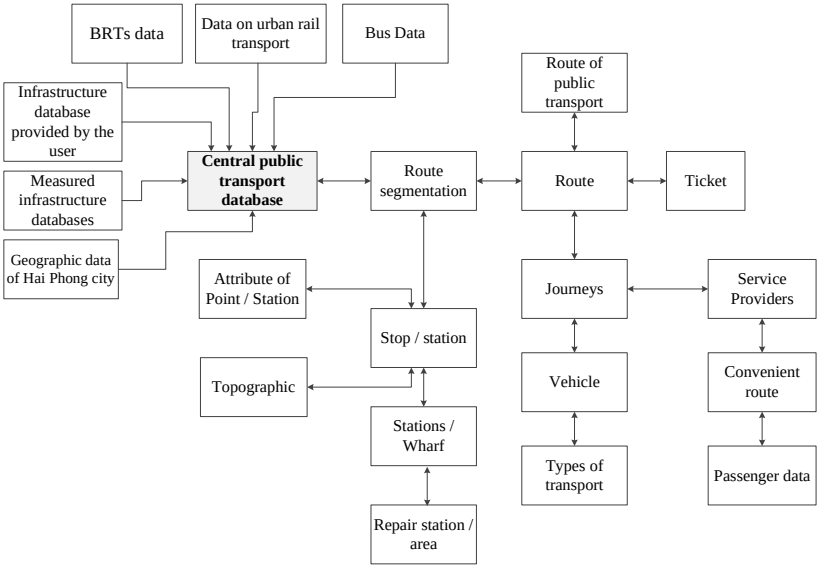

Figure 3.10. Integrated PT system database model

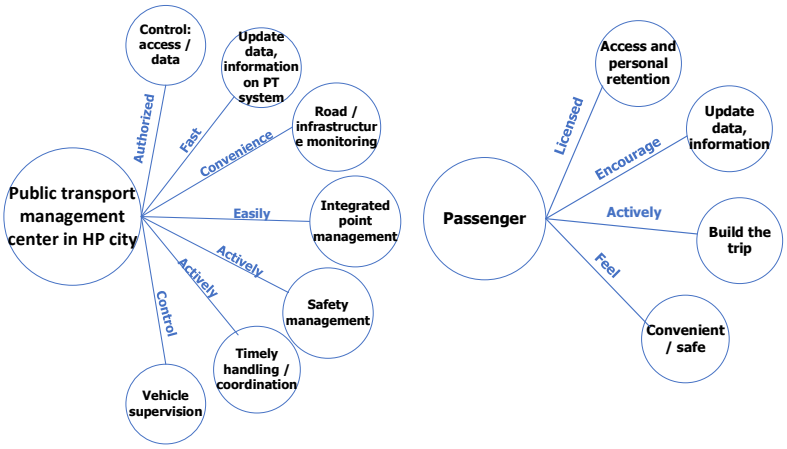

Figure 3.11 and 3.12. GIS assists the Center for Passenger and PT Management

3.6.2. Building and promoting the image and brand of PT

- Building image and brand through: Means of PT; Information, communication & marketing; Improving and upgrading infrastructure; Modern civilized behavior; Capacity building & service human resources.

- Publication of PT information, ensuring the following factors: Tools used; Location of publicity, publicity information propaganda; Content promotion and propaganda; Information about PT; Publication of customer service phone numbers and a complaint receiving address.

3.7. Community participation in PT management

Proposing the stage of operation and exploitation, the community participates in building the database of the central PT system; Service quality supervision and service; public education culture; propaganda to use PT.

3.8. Discuss research results

The thesis discusses the research results on 3 angles: i) Feasibility; ii) Effectiveness; iii) Practicality and scalability. Specifically, discussing the

achieved results include: Model of integrated PT system management for Haiphong; Guiding framework for implementation of PT system integration; Encouragement / free bus ride policy; Proposing 09 integrated points in the planning of the PT system of Haiphong city; Application of geographic information systems.

CONCLUSIONS AND RECOMMENDATIONS

1. Conclusion

The current management of the PT system of Haiphong city still has many limitations, especially in the management of planning and operation and exploitation. On the basis of researching, surveying the current situation and systematizing the scientific basis, the thesis has given out 5 points of view, 04 objectives, 05 principles and proposed the model of management of the PT system of Haiphong in the direction of integration. Complete the model of organizational structure and management of PT in Haiphong city; Completing legal documents; Supplementing mechanisms and policies to encourage the development of the PT system; Managing the planning of the integrated PT system; Managing, operating and exploiting the PT system and community participation. These solutions are tools and methods to help the management model of the PT system in Haiphong city to be more effective and suitable for the current and future development and trend of management of the PT system.

The model and solution for the management of the integrated PT system for Haiphong city can be applied to urban areas with similar conditions in Vietnam.

2. Recommendations

The dissertation proposes to management agencies at all levels: i) For the Government, Government agencies: it is necessary to soon complete the system of legal documents related to public administrative procedures in the direction of integration as guidance on implementation of regulations. planning the integrated PT system and guiding the implementation of the operation and management. ii) For departments, research institutes and universities, it is necessary to do in-depth research on the integrated PT system in order to perfect the system of theory and practice. iii) For Haiphong city: issue a resolution on integrated urban development. Requesting the consultant to elaborate and adjust the master plan of Haiphong city to study in the direction of integration, especially the integration of the multimodal PT system. Established the administrative center of Haiphong city. Issue local policies and mechanisms to encourage the development of the integrated PT system. Requesting departments and agencies to coordinate to issue specific guidance on contents of integrated management of PT. Propagating people to participate and create a habit of using PT. Upgrade and repair infrastructure and transport vehicles. iv) For the people of Haiphong, it is necessary to change the habit of traveling by private means to using vehicle transport. Actively participate in contributing to PT projects to create a fully integrated, modern and safe PT system.

LIST OF PUBLISHED SCIENTIFIC WORKS OF THE AUTHOR RELATED TO THE THESIS

1. Le Thi Minh Huyen (2018); *Public transportation management: international experience and oriented development for urban cities in Viet Nam.* Proceedings of international conference "Strategy for smart cities and transport infrastructure for urban development and sustainable development: Responding to future trends and climate change" – Construction Publishing House - October 2018 - ISBN: 978 -604-82-2696-1.

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