

Collaborative Research between Da Nang and Seoul

Strategic Plan for Developing Da Nang Metropolitan Region and Da Nang Hub City



DISED



서울연구원
The Seoul Institute



녹색도시건축연구센터
Smart Green City Lab

UNO HABITAT
FOR A BETTER URBAN FUTURE

Collaborative Research between Da Nang and Seoul

Strategic Plan for Developing
Da Nang Metropolitan Region and Da Nang Hub City

The Seoul Institute · The Green Smart City Lab of Sungkyunkwan University
The Da Nang Institute for Socio-Economic Development · The Da Nang High-Tech Park
Management Board · UN Habitat Vietnam

Research Participants

The Seoul Institute

Ko Joonho	Research Fellow, Department of Transportation System Research
Kim Inhee	Senior Research Fellow, Office of Planning and Coordination
Lim Heeji	Research Fellow, Department of Urban Society Research
Kim Mookhan	Research Fellow, Department of Civil Economy Research
Ki Hyeongyun	Researcher, Department of Transportation System Research
Kim Daejin	Researcher, Department of Transportation System Research
Nam Sunhee	Researcher, Department of Urban Society Research
Song Meekyong	Researcher, Global Future Research Center
Song Seungmin	Researcher, Office of Planning & Coordination
Ryu Seonghee	Researcher, Department of Urban Society Research

Sugkyunkwan University

Kim Donyun	Professor of Urban Design, Director of Smart Green City Lab
Sohn Saehyung	Professor of Urban Design, Director of Smart Green City Lab
Park Jihoon	Senior Researcher
Baek Sooyoung	Senior Researcher
Choi Eunhee	Researcher

Da Nang Institute for Socio-Economic Development

Nguyen Phu Thai	Director
Nguyen Van Hung	Researcher, Deputy Director
Huynh Huy Hoa	Researcher, Deputy Director
Quach Thi Xuan	Researcher, Head of Urban Studies Division
Mai Thi Thanh Hoa	Researcher, Head of International Cooperation Division
Hoang Van Long	Researcher, Center for Consultancy, Training Cooperation and Technology Transfer
Le Anh Duc	Researcher, Urban Studies Division
Bui Thi Quynh Tram	Staff, International Cooperation Division

Da Nang City

Bui Huy Tri	Head of Planning Management Division
Le Duc Yen	Deputy Head of Planning Management Division
Ho Quang Vinh	Deputy Head of Urban Transportation Management Division
Vo Xuan Tung	Staff, Danang Urban Planning Institute

Thua Thien Hue

Le Anh Tuan	Vice Director, Thua Thien Hue Department of Transportation
Nguyen Van Thanh	Head of Planning Division, Thua Thien Hue Department of Transportation

Quang Nam

Nguyen Ba Nghia	Vice Director, Quang Nam Department of Transportation
Nguyen Van Toan	Head of Transportation and Industry Management Division

UN Habitat

Nguyen Quang	Program Manager
Lee Juhyun	Urban Specialist
Lee Narea	Urban Specialist

KOICA

Seo Youngsuk	Visiting Officer, KOICA
Shin Damho	Visiting Officer, KOICA

Contents

Chapter 1. Introducing the Collaborative Research between Da Nang and Seoul.....1

- 1-1 East Asian Knowledge-Sharing Program of the Seoul Institute
- 1-2 Joint Research by Da Nang and Seoul as a Pilot Research Program
- 1-3 Cooperation Method

Chapter 2. Strategy on the Development of Da Nang and Da Nang High-Tech Park ...7

- 2-1 Overview
- 2-2 Da Nang's Potential and New Tasks for the City
- 2-3 Creating the Da Nang Metropolitan Region
- 2-4 Creating the Da Nang Hub City
- 2-5 Strategy for Da Nang High-Tech Park
- 2-6 Implications and Future Directions

Chapter 3. Implementation Plan for Developing Da Nang Metropolitan Region.....29

- 3-1 Introduction
- 3-2 The Need for Clustering as a Metropolitan Region
- 3-3 Strategies to Develop Da Nang Metropolitan Transportation Network
- 3-4 Advancing Da Nang's Transportation Management System
- 3-5 Implementation Plan for Constructing Regional Infrastructure
- 3-6 Organizing Da Nang Metropolitan Regional Governance
- 3-7 Implications and Future Directions for Further Study

Tables

Table 3-1 Transportation Demand Analysis: Two Scenarios

Table 3-2 Travel Demand Analysis: Mode Share Structures by Scenario

Table 3-3 Average Delay Per Vehicle and Average Travel Speed by Scenario

Table 3-4 Petrol and Diesel Tax Ratios (South Korea)

Figures

Figure 1-1 Research Cooperation System

Figure 2-1 Research Method to Identify the Potential of Da Nang on Various Spatial Levels

Figure 2-2 New Vision and Tasks for Da Nang

Figure 2-3 Concept of Developing Da Nang Metropolitan Region and Da Nang Hub City

Figure 2-4 Development of Korea's Southeast Metropolitan Region

Figure 2-5 Strategy for Industrial Links between Da Nang and Surrounding Cities

Figure 2-6 Direction on Improving Inter-Regional Transportation: Expressway and Express Railway

Figure 2-7 Strategies for Access Management and Increasing Inter-Regional Mobility

Figure 2-8 Strategy for Developing the Da Nang Hub City

Figure 2-9 Methods to Advance the Public Transportation System

Figure 2-10 Major Korean Logistics Hubs

Figure 2-11 Method for an Efficient and Environmentally Friendly Distribution System

Figure 2-12 Developing Central Business Districts in Seoul

Figure 2-13 Method to Diversify Central Business Districts in Da Nang

Figure 2-14 Suggestions for Distribution Centers and Shopping Centers

Figure 2-15 Development Process of the Guro Industrial Complex

Figure 2-16 Industrial Complexes in Da Nang

Figure 2-17 Direction for the Structural Changes of the Manufacturing Industry

Figure 2-18 Concept of Cluster

Figure 2-19 Old and New Land Use Plan for Da Nang High-Tech Park

Figure 2-20 Step-by-Step Development Plan for Da Nang High-Tech Park

Figure 3-1 Urbanization Rate and Population Density of Major Cities in Vietnam

Figure 3-2 Retail Goods and Services Sales Revenue vs Gross Output of Industry/Tourism and MICE Industries in Major Cities around the World

Figure 3-3 Alternatives to Improve Da Nang's Domestic Competitiveness

Figure 3-4 Da Nang's Regional Traffic Status

Figure 3-5 Mode Share in Da Nang and Neighboring Provinces

Figure 3-6 Mode Share of Inter-Regional Transportation in the Metropolitan Area: Da Nang vs Seoul

Figure 3-7 National Route A1

Figure 3-8 Condition of National Route A1 in Da Nang

Figure 3-9 Strategy for Improving the Da Nang Metropolitan Transportation Network

Figure 3-10 Goals for Adequate Change of Da Nang's Mode Share Structure

Figure 3-11 Strategies for the Transportation System According to Distance

Figure 3-12 Commute Trips and Average Commute Distance in Seoul Capital Area

Figure 3-13 Vietnam Railway and Da Nang Station

Figure 3-14 Seoul Railway Systems

Figure 3-15 Subway Network and Subway Line 1 Extension Process in Seoul Capital Area

Figure 3-16 Inter-Regional Bus Routes and the Central Bus Terminal in Da Nang

Figure 3-17 Current and Planned BRT Routes in Gyeonggi Province

Figure 3-18 Travel Times Before and After Construction of the New Expressway

Figure 3-19 Transportation Demand Analysis in the Da Nang Metropolitan Region

Figure 3-20 Downtown Road Conditions in Da Nang

Figure 3-21 Current and Planned Exclusive Bus Lanes in Seoul (as of January 2015)

Figure 3-22 Da Nang: Intersection without Traffic Signals (R); Intersection with Traffic Signals (L)

Figure 3-23 Strategy to Expand Da Nang Metropolitan Governance Network

Figure 3-24 Priority Agenda for Each Stage

Figure 3-25 Tentative Organization Structure of Metropolitan Da Nang Transportation Association (MDTA)

Chapter 1

Introducing the Collaborative Research between Da Nang and Seoul

Chapter 1. Introducing the Collaborative Research between Da Nang and Seoul

1-1 East Asian Knowledge-Sharing Program of the Seoul Institute

In 2013, the Seoul Institute began the Megacity Knowledge-Sharing Program to promote cooperation between cities to interactively solve the common problems of rapidly changing global megacities. A megacity¹ is an enormous metropolitan area that acts as the center of the region. It is rich economically, but at the same time, it faces many complicated problems such as traffic congestion, natural disasters, and income disparities.² In addition, as we enter the era of world trade and financial liberation, megacities have become the basis of global trade and international activities. This means that the impact of a problem in a megacity can affect not just the regional area but the whole world, becoming an international problem.

Acknowledging such changes, Seoul Institute initiated a program to share experiences based on the cooperative system between global megacities to seek solutions together. In July 2014, the Megacity Think-Tank Association (MeTTA) was established among East Asian cities currently experiencing rapid urbanization and population growth. MeTTA is a platform where Seoul can share its experiences of economic growth and urban development and actively exchange information with other cities in the East Asian region that have homogenous cultural value and geographical proximity.

1-2 Joint Research by Da Nang and Seoul as a Pilot Research Program

The joint research between Da Nang and Seoul was performed before the establishment of MeTTA. Da Nang wished to learn and reflect the successes of Sang-am Digital Media City (DMC) in Seoul in realizing Da Nang High-Tech Park, which is currently under development. At Da Nang's request through UN-Habitat, the preliminary research was initiated by Professor Donyun Kim of Sungkyunkwan University who was involved for a lengthy time in developing Sang-am DMC. During this process, the need for a more comprehensive approach was realized in reviewing the strategy for the successful development of Da Nang High-Tech Park, including the areas of urban planning, transportation, and industries on a metropolitan scale. At this point, the Seoul Institute began to consider participating in the joint research.

In December 2013, the preliminary research between Da Nang and Seoul began. A workshop was hosted by Da Nang, where the main research tasks were discussed and decided upon. On April 1, 2014, Seoul Institute and Da Nang Institute for Socio-Economic Development (hereafter DISED)³ signed a MOU on research

¹“Megacity” refers to a metropolitan area, usually with more than 10 million in population, consisting of major cities that are functionally connected as one-day life zones and an economic scale that enables global business creation.

²Joonho Ko and Sun-wung Kim, 2014, “Strategies for Building Collaborative Asian Megacity Think-Tank Network,” The Seoul Institute, pp. 3–4.

³Research institute affiliated with the People's Committee of Da Nang City. It was established in 2007 for the social, cultural, and economic development of Da Nang City and currently consists of 54 researchers in four departments.

cooperation and started a joint research on “Strategizing for Forming the Da Nang Metropolitan Region and Realizing Da Nang High-Tech Park.” The 2014 joint research focused on creating strategies to develop Da Nang Hub City and Da Nang Hi-Tech Park based on the successful experiences of Sangam DMC, Magok Urban Development Project, and the 2030 Seoul Plan.

The 2015 joint research focused on narrowing the research scope and developing a detailed plan for the priority task, which was to improve the transportation system of the Da Nang Metropolitan Region while laying the foundation for the governance system between the cities in the central region of Vietnam (hereafter, the central region). Seoul’s experience in expanding the public transportation network to the Capital Region, which includes Incheon and Gyeonggi Province, was also reviewed in this process.

1-3 Cooperation Method

The key organizations handling the joint research on Da Nang’s side were DISED and Da Nang Hi-Tech Park Management Committee. The counterparts in Seoul were the Seoul Institute and Green Urban Research Center under Sungkyunkwan University. UN-Habitat (Vietnam office) also played an important role in facilitating the cooperation between Da Nang and Seoul.

The development strategy for Da Nang Metropolitan Region was mostly handled by the Seoul Institute, based on its diverse experiences in establishing the urban master plan of Seoul. Green Urban Research Center of Sungkyunkwan University assumed responsibility for developing the strategy of realizing Da Nang High-Tech Park considering its expertise in smart city development. DISED acted as a research counterpart of the Seoul Institute, while the Da Nang High-Tech Park Management Committee took charge of the tasks related to Da Nang Hi-Tech Park.

In international research between cities, mutual trust and understanding are important. The UN-Habitat Vietnam office played an important role in facilitating this trust between the two cities and was involved in the cooperation process from the beginning. Even though Seoul had much experience in urban planning and development, Da Nang’s urban planning system, decision-making processes, and its urban status were unknown; therefore, the UN-Habitat Vietnam office acted as the adviser in the understanding of Vietnam’s political and social circumstances. In addition, both cities actively communicated through emails and workshops to understand each other’s interests better and to find consensus on the scope of the research content.

Figure 1-1 Research Cooperation System



Chapter 2

Strategy on the Development of Da Nang and Da Nang High-Tech Park

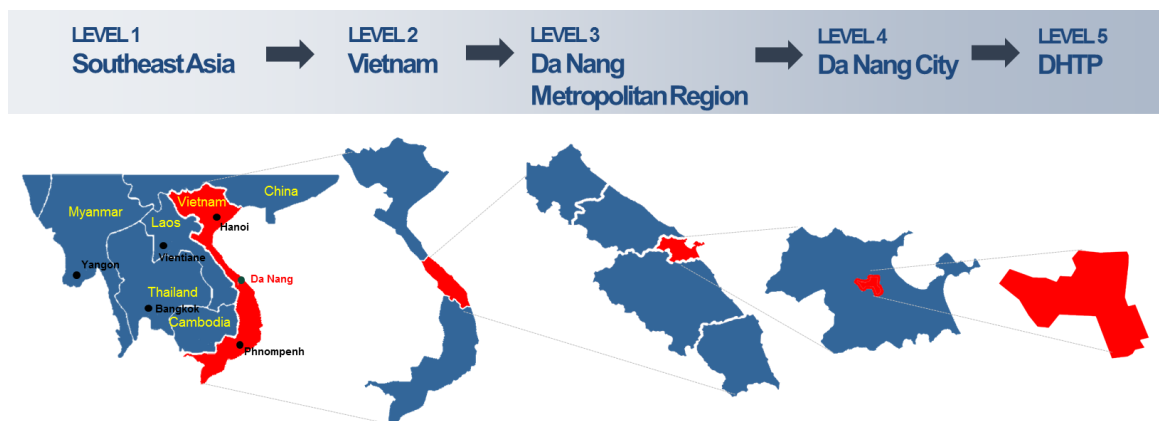
Chapter 2. Strategy on the Development of Da Nang and Da Nang High-Tech Park

2-1 Overview

Recently, Da Nang became one of the most popular tourist sites in Southeast Asia. The city's mix of mountains and ocean adds beauty to a variety of historic and cultural resources, a combination that is rare globally. Da Nang's economic importance is also growing. The demands for new industries such as the high-tech industry and business services are continually increasing along with the existing industries of tourism and distribution in this area, largely from its locational advantage.

In the first stage of the joint research, Da Nang's situation was reviewed on various spatial levels to examine the city's current vision objectively. The research scope was not only to identify Da Nang's existing potential but also to identify its status and competitiveness in relation to the surrounding areas at the local, national, and regional levels. The result of this process was then used to refocus Da Nang's vision in a more feasible direction.

Figure 2-1 Research Method to Identify the Potential of Da Nang on Various Spatial Levels



2-2 Da Nang's Potential and New Tasks for the City

A. Da Nang's Potential

Da Nang is a tourist city with a rich natural environment and resources and relatively good educational and living infrastructure. It has 140 hotels and 14 universities. It is also known to be "clean and quiet" and "a good city to live in." Moreover, Da Nang is an important transportation and logistics hub in Vietnam with the third largest international airport and the eighth largest international harbor.

Based on this excellent infrastructure, Da Nang has recently strengthened its position to become the center of the central region. Tourism is a typical example. Many domestic and foreign tourists visiting the nearby World Cultural Heritage sites

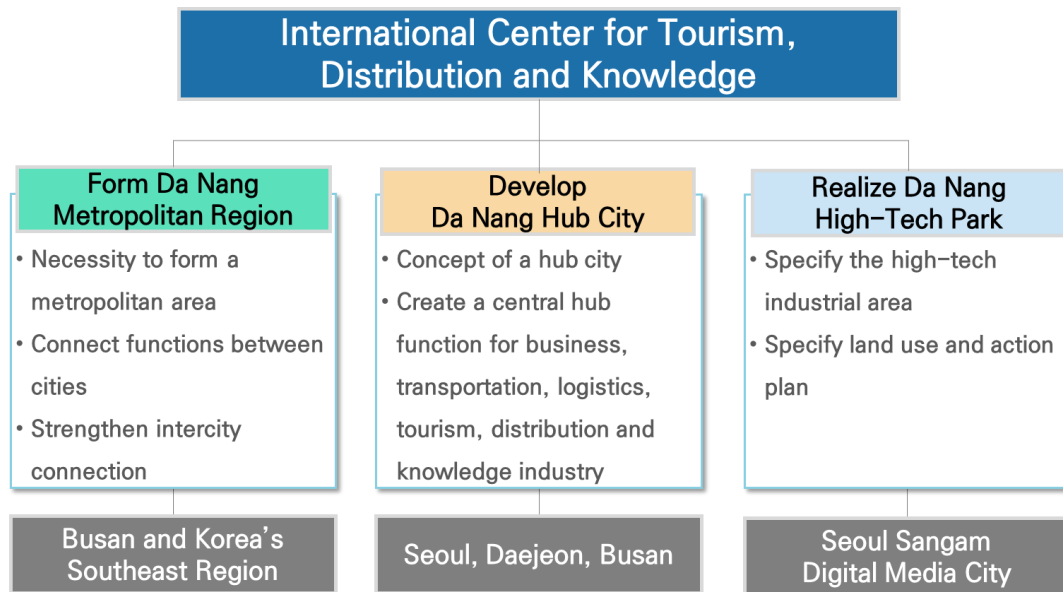
in Hue, Hoi An, and My Son often use the international airport, harbors, and hotels located in Da Nang, making Da Nang the tourist hub for the central region. In addition, new industrial parks such as Da Nang Hi-Tech Park (DHTP) and the IT Park are also under construction. When these parks are completed, they are expected to play an important role in structuring a self-sustainable industrial economy in the central region overall, linking the Chu Lai Special Economic Zone in Tamky and the Dung Quat Economic Industrial Zone in Quang Ngai. These parks in Da Nang and its surrounding areas were designated by the central government as Key Economic Zones in an attempt to disperse the flow of development concentrated in Hanoi and Ho Chi Minh City towards the central region for more balanced development. Actually, due to its geographic advantage located in the middle of a long, narrow nation, Da Nang played a traditional role as the national transportation hub connecting the two major cities, Hanoi in the north to Ho Chi Minh City in the south. However, now Da Nang is acknowledged more as a good city for doing business. In fact, in Vietnam's 2013 "Provincial Competitiveness Index," Da Nang was ranked first as the most competitive city in Vietnam among the 63 cities and provinces surveyed by the Vietnam Chamber of Commerce.

Lastly, Da Nang is emerging as the gateway to the Indochina Peninsula. Among the cities on the "Greater Mekong Subregion East-West Economic Corridor" (hereafter "East-West Corridor") that links Vietnam, Lao PDR, Thailand, and Myanmar across the peninsula, Da Nang has the largest international airport and harbor. Since these nations plan to strengthen the distribution network and industrial functions along the East-West Corridor, it is highly likely that Da Nang will also grow as the international logistics hub for connecting the Indochina Peninsula to Northeast Asia and, furthermore, to America.

B. Vision and Tasks for Da Nang

Through the 2030 Urban Master Plan, Da Nang's vision was set as "the central city of Vietnam in society, economy, culture, sports, education, training, technology, science, domestic and international distribution, next-generation information communication technology, finance, and national security." However, after reviewing Da Nang's status and potential on various spatial levels, between the Indochina Peninsula, Vietnam, and the central region, the research team concluded that Da Nang's potential goes beyond just being the domestic center of Vietnam. The research team believes that Da Nang has the potential to become an international hub city based on its great geographical advantages, natural, historical, and cultural resources, and excellent transportation infrastructure. Therefore, Da Nang's vision was redefined as "a hub city for global distribution, tourism, and knowledge," and the following suggestions were made to realize this vision.

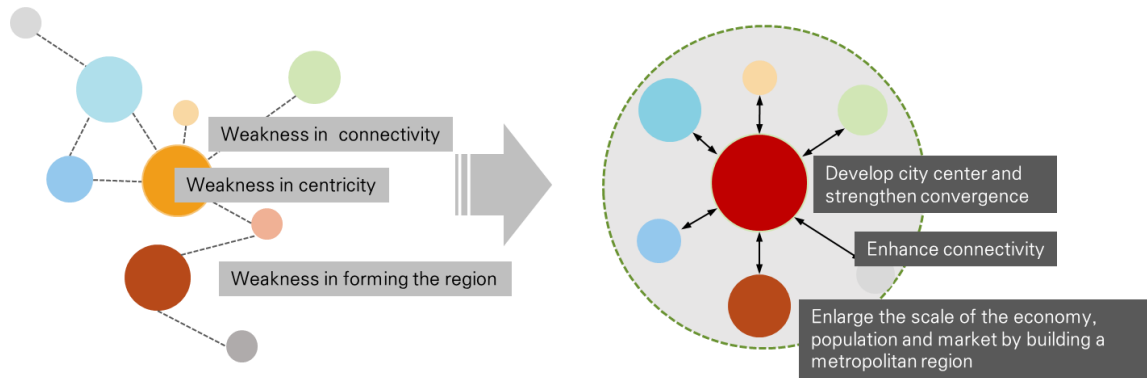
Figure 2-2 New Vision and Tasks for Da Nang



The first suggestion is to make Da Nang a Metropolitan Region. Forming a metropolitan region is a strategy to strengthen the regional competitiveness by linking nearby cities to realize “economies of scale” and connect each city’s key functions. If each city’s total population increase and separate industrial functions can be combined as a whole, this structure would become a self-sustainable industrial ecosystem that can attract domestic and international private investments. Additionally, it would be easier for the cities and provinces in the metropolitan region to share large-scale facilities such as harbors and airports that have high construction and operation costs. In addition, it can not only resolve unnecessary competition and conflicts between cities but also provide new opportunities for different urban environments and cultures to merge and create a completely new creative environment. In this research, the experience of developing Korea’s southeast region was reviewed to provide insights into making a metropolitan region, linking industrial functions between cities, and designing a metropolitan transportation system.

The second suggestion is to develop Da Nang into a hub city. A hub city is a city that has central functions on regional, national, and global scales for industries such as logistics, distribution, finance, business, and the knowledge industry by increasing the concentration and connectivity with neighboring cities. Developing a hub city is a required step in forming a metropolitan region because it can strengthen the linkage among the cities through the concentration and connectivity to the central city. Da Nang is already a major city in the central region with the potential to act as the hub city for the metropolitan region. Therefore, it should play a more active role to lead in promoting the linkage and cooperation between cities in the central region. The Korean cases of Seoul, Daejeon, and Busan were referenced in determining strategies to develop Da Nang as a hub city for business, work, transportation, logistics, tourism, distribution, knowledge industry and manufacturing industry.

Figure 2-3 Concept of Developing Da Nang Metropolitan Region and Da Nang Hub City



The last suggestion is to strategize the Da Nang High-Tech Park, a high-priority project for converting Da Nang into a metropolitan region and a hub city. The experiences of Seoul’s industrial complex development, specifically, Sangam DMC and Magok Urban Development, were reviewed to conceive ideas that render Da Nang High-Tech Park substantially different from the high-tech industrial complexes developed in Hanoi and Ho Chi Minh City. Furthermore, to accommodate the new central functions of Da Nang in becoming a hub city, the park’s status was repositioned, and detailed plans were specified for the land use, high-tech industrial function, and implementation strategy.

2-3 Creating the Da Nang Metropolitan Region

A. Case Study on Korea’s Southeast Region

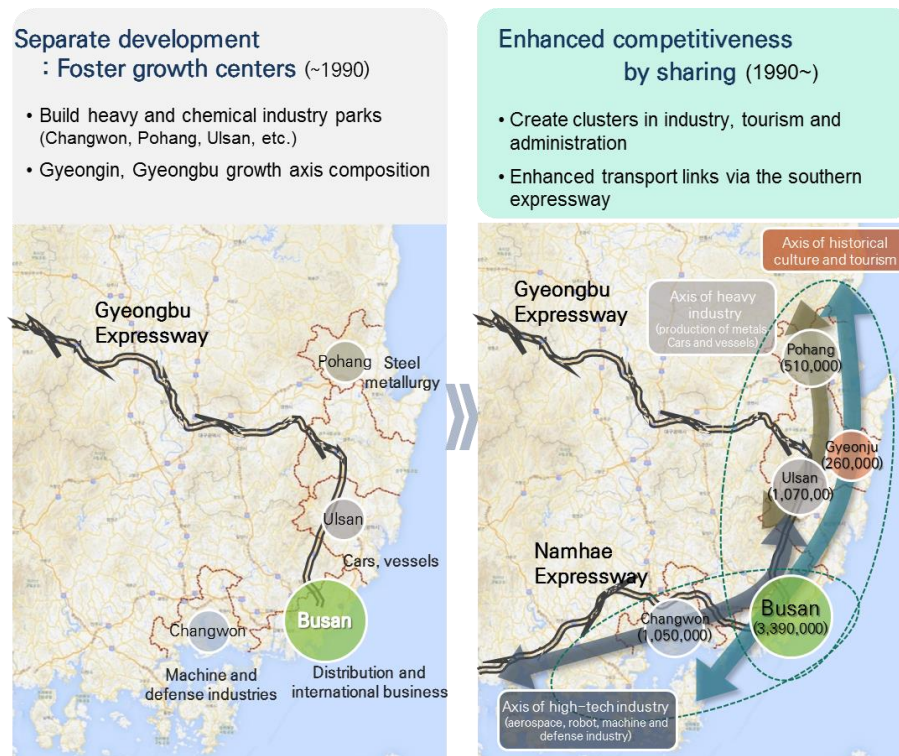
Korea’s southeast region consists of major cities such as Busan, Ulsan, and Changwon. Similar to Da Nang, these cities are located along the coastlines, and their regional competitiveness is strong in the fields of industry, logistics, history, culture, and tourism. Most of the cities in the southeast region were developed in the 1970s as industrial cities focusing on the heavy industry and chemical industry. The central government first developed large-scale industrial complexes in Pohang, Ulsan, and Changwon and then supplied housing complexes and infrastructure to each city as a part of the “Growth Pole Policy.” However, beginning in the 1990s, the development paradigm shifted to “balanced regional development” by implementing policies based on metropolitan transportation masterplans and metropolitan urban masterplans at the regional level. Accordingly, Korea’s southeast region became a metropolitan area with Busan as the central city.

Busan successfully developed logistics and international business based on Busan Harbor (the largest port in Korea) and Gimhae International Airport. It also provides central functions to nearby cities such as convention and recreational centers (mega facilities), advanced service industry, and highly skilled workers.

The heavy industries in the southeast region developed along Pohang, Ulsan, and Busan focused on the metal, automobile, and shipbuilding industries. The high-tech, aerospace, machinery, and defense industries were developed along Masan, Jinhae, Changwon, and Busan. The southeast region also has a great tourism industry

that developed along Gyeongju, Jinhae, and Busan. Gyeongju is an old city center with various historical and cultural resources, while Jinhae and Busan have great resources for marine tourism.

Figure 2-4 Development of Korea's Southeast Metropolitan Region



Today, the southeast region has been continuously expanding the metropolitan transportation system and infrastructure, such as the Namhae Expressway, to strengthen the network between cities. Since Busan has both an international airport and international harbor, it is also the regional transportation center acting as the gateway city to the southeast region. The southeast region is currently the second largest metropolitan region next to the Seoul Capital Area (SCA) in terms of both population and industrial production. Even today, the region's local governments are making various collaborative efforts continually to increase their regional competitiveness. For example, organizing the "Southeast Region Win-Win Committee" is currently in discussion to improve the communication network between different government bodies.

B. Step-by-Step Strategy for Forming the Da Nang Metropolitan Region

Based on Korea's experience, a step-by-step strategy was proposed for creating a Da Nang Metropolitan Region. The strategy's basic direction is to first strengthen the competitiveness of the key cities in the central region and then gradually increase the industrial and transportation network between these cities to develop a single economic block. In this regard, the first step would be to strengthen the economic competitiveness and improve the cities' transportation and communication facilities. The next step would be to develop an industrial ecosystem

that links similar and related industries between these cities. During this process, a metropolitan transportation system, including expressways, should be established to enhance the physical accessibility among these cities. Before 2030, Da Nang should expand its industrial, economic, and cultural network with Hanoi, Ho Chi Minh City, and other hub cities in the neighboring countries to become a global metropolitan city based on the increased competitiveness of the Da Nang Metropolitan Region.

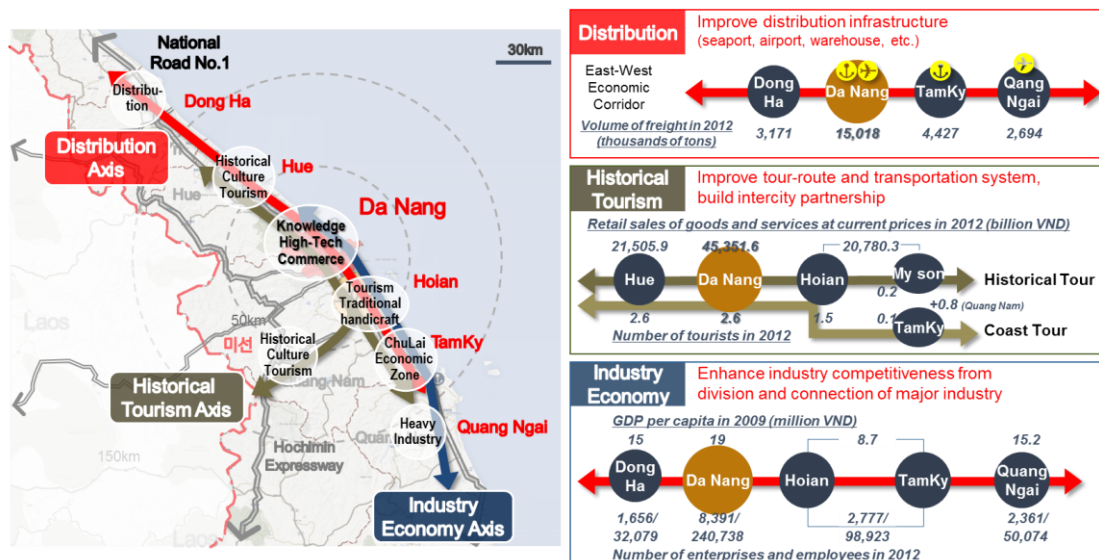
■ Industrial Link

Considering the current status and potential of Da Nang and the nearby cities in the central region, there is a high possibility that in the future, Da Nang Metropolitan Region will be developed as a central hub for logistics and distribution, historic tourism, and the high-tech industry.

The logistics and distribution industry must be developed by focusing on Dong Ha, where the East-West Corridor and Vietnam's National Route A1 intersect, and Da Nang, where the main international airports and harbors are located. Additionally, this network should be expanded farther south linking the industrial areas in Tamky and Quang Ngai to strengthen the regional competitiveness.

For the historic tourism industry, the World Cultural Heritage sites at Hue, Hoi An, and My Son can be linked to Da Nang and Tamky since both cities have potential in marine tourism. Lastly, for the high-tech industry, Da Nang, Tamky, and Quang Ngai (specifically, Da Nang High-Tech Park, Chu Lai Special Economic Zone, and the Dung Quat Economic Industrial Zone located in the respective cities) should be linked and developed collaboratively.

Figure 2-5 Strategy for Industrial Links between Da Nang and Surrounding Cities



Source: http://en.wikipedia.org/wiki/Da_Nang, http://en.wikipedia.org/wiki/Quang_Nam, http://en.wikipedia.org/wiki/Quang_Ngai, <http://mysonsanctuary.com/296/pressure-on-my-son-sanctuary>, <http://english.vietnamnet.vn/fms/travel/93310/hue-festival-2014-to-welcome-100-000-int-l-visitors.html>, <http://www.vietnamonline.com/news/hoi-an-welcomed-more-than-15-million-visitors-in-2011.html>.

■ Transportation Link

Increasing the mobility between cities is also an important precondition for developing a metropolitan region. Currently, the average travel speed between Da Nang and nearby cities is approximately 30 km/h, which is relatively poor compared to that of Korean cities. In Korea, Seoul and Busan are connected by Gyeongbu Expressway with an average speed of 100 km/h and an express railway with an average speed of 170 km/h to enable one-day travel from anywhere in the nation.

Figure 2-6 Direction on Improving Inter-Regional Transportation: Expressway and Express Railway

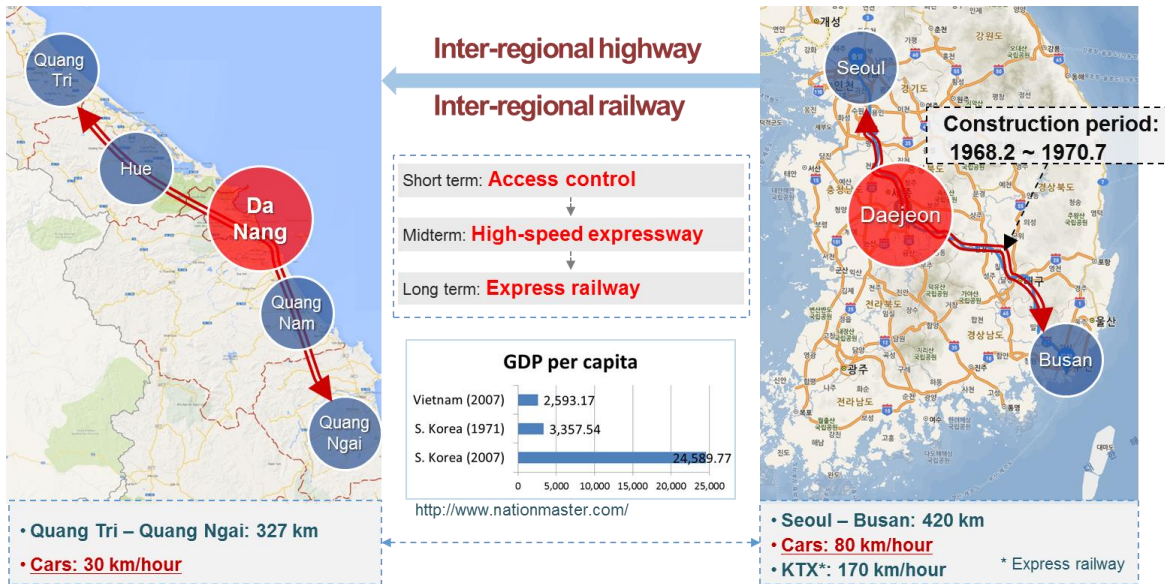


Figure 2-7 Strategies for Access Management and Increasing Inter-Regional Mobility



Thus, the best solution is to connect Da Nang and the nearby cities by expressways and express railways. However, considering the time and cost limits, an alternative strategy is to improve the existing roads in the short term through access control. Access control involves installing median strips, barriers, and pedestrian overpasses to minimize unnecessary conflicts between pedestrians and vehicles, and between vehicles. However, the access control strategy is limited in improving the road condition, so for a long-term strategy, it is essential to construct expressways and an express railway centered in Da Nang.

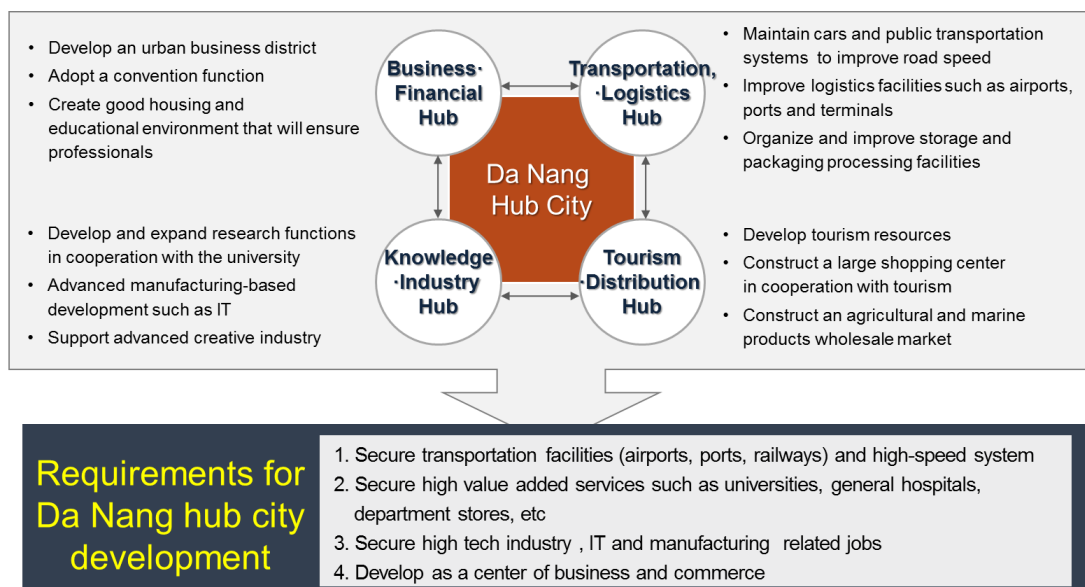
2-4 Creating the Da Nang Hub City

While reviewing the potential of Da Nang in terms of its geographical location, city size, transportation infrastructure, social and physical infrastructure, and conditions for investment and business, it was acknowledged that Da Nang has sufficient potential to become a major hub city in transportation, logistics, distribution, tourism, knowledge industry, business, and finance. However, to realize these potentials, it is essential to have a step-by-step strategy to reinforce the existing industries and to develop new industries gradually.

Since Da Nang already has geographical advantage and competitive transportation infrastructure, the first step should prioritize strengthening the existing transportation and logistics function by improving the existing transportation infrastructure such as the airport, harbor, and railroad, as well as introducing a high-speed transportation system. Then, megafacilities like agriculture and fishery wholesale markets and megascale shopping centers should be constructed and linked with these transportation and logistics facilities to advance the distribution and tourism industry. Lastly, new functions such as business, finance, and knowledge industries should be gradually developed in accordance with the city's growth.

Figure 2-8 Strategy for Developing the Da Nang Hub City

Develop a hub city of business, transportation, tourism and industry

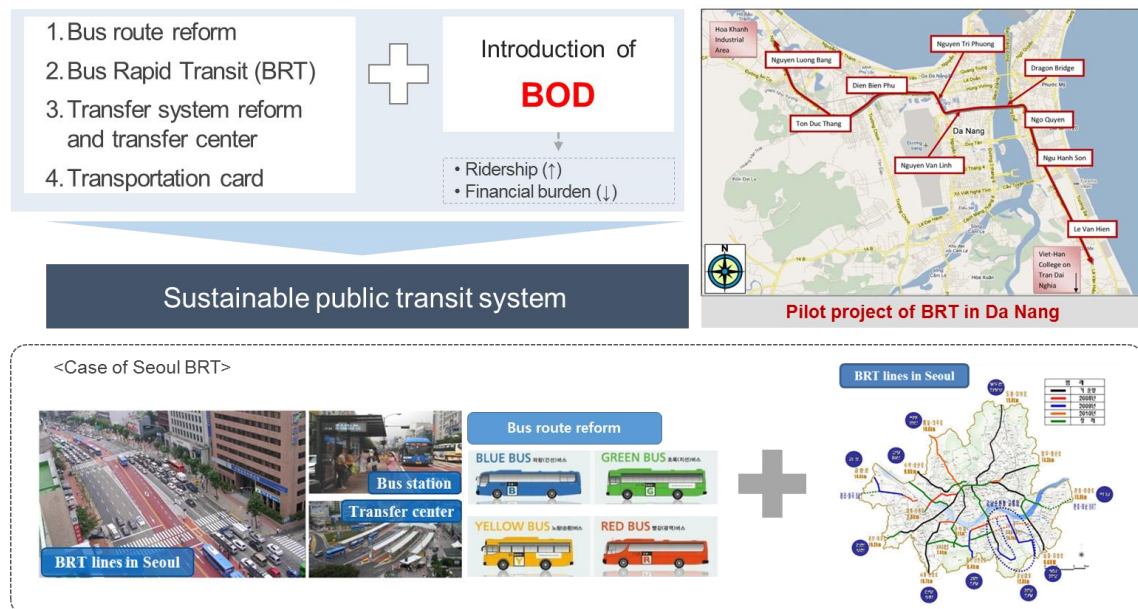


A. Strategies to Develop a Transportation and Logistics Hub

■ Improve Road Conditions and Advance the Public Transportation System

Da Nang has a relatively low road coverage ratio, which is the area of roadways in the whole city area expressed in percentage, compared to other major cities. Only a few intersections are equipped with traffic signals, all showing how much Da Nang's transportation system is underdeveloped. The fact that currently 98% of the trips in Da Nang are made by motorcycles adds to the concern about traffic congestion and air pollution in the future. Therefore, in order to make Da Nang a regional hub for transportation and logistics, the road conditions must be improved. In the short term, more traffic signals should be installed and an integrated transport information system should be applied. In the long term, public transportation and pedestrian-friendly transportation systems should be enhanced as well.

Figure 2-9 Methods to Advance the Public Transportation System



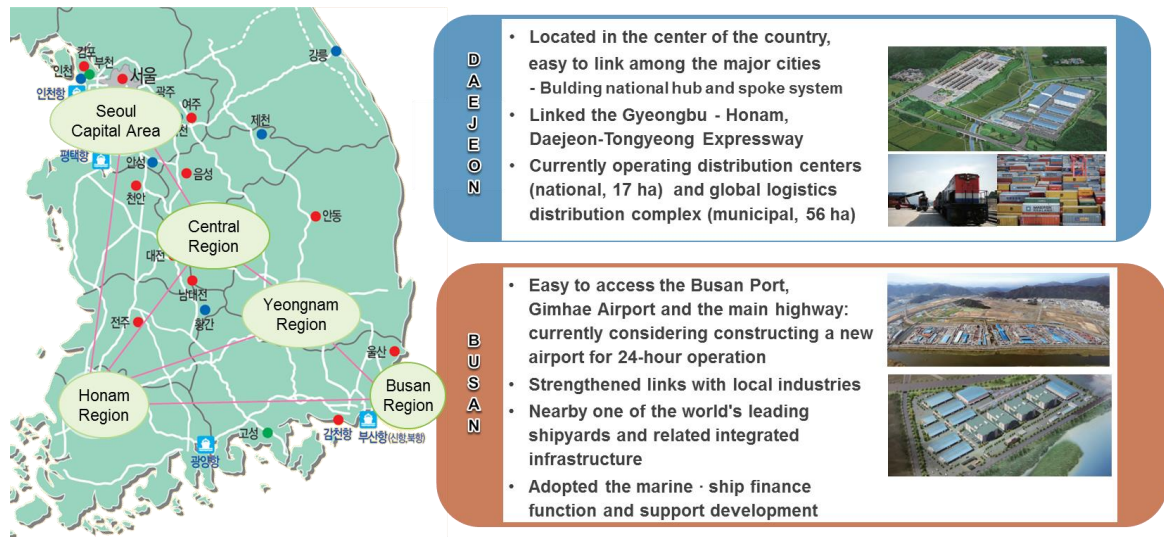
Seoul has extensively reorganized its bus system since 2004 by dividing the bus routes into metropolitan (red), main (blue), local (green), and circulation (yellow) lines. At the same time, the Bus Rapid Transit (BRT) system was introduced to improve bus travel speed. The fare system was also reformed to increase the mode share of buses. In addition, to improve the convenience of transfers, a transportation card system was introduced. If such systems can be implemented in Da Nang, the mode share of buses is expected to increase to 50%, and the mode share of motorcycles can reduce to 25%.

■ Reinforce the Logistics Function by linking with Surrounding Industries

Along with the transportation improvements, there are several more conditions to meet in order to strengthen the logistics functions in Da Nang. In Korea, for example, Daejeon is located in the center of the country, Busan is located in the southeast coastal area, and they are both major logistics cities with geographical resemblance and similar infrastructure as Da Nang. Daejeon developed its logistics

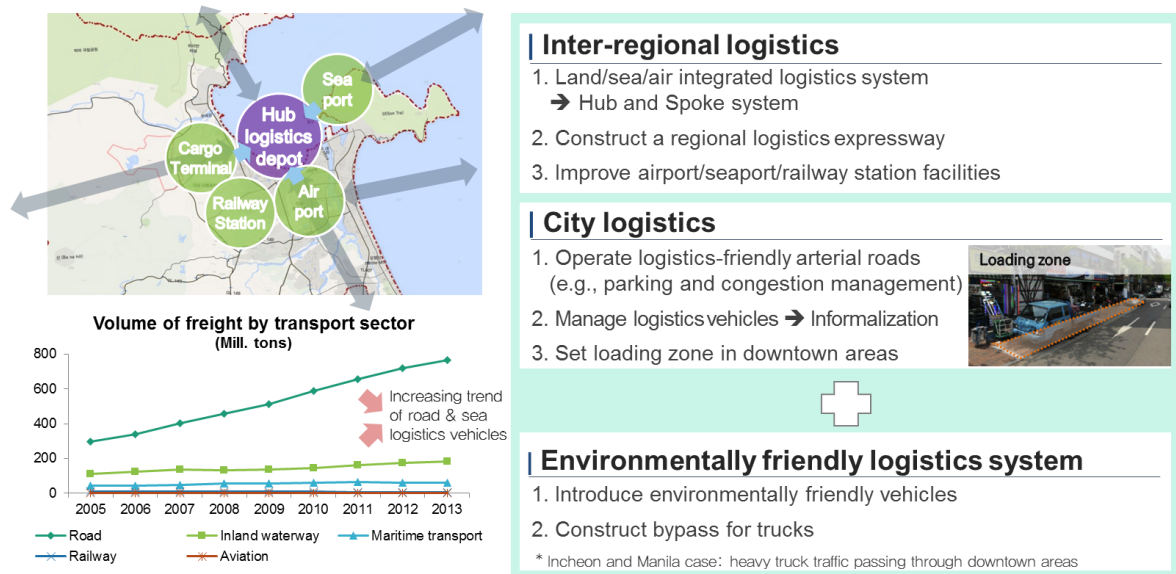
industry by taking advantage of its geographical location that facilitates gathering domestic goods in one place for batch classification and serving as the intermediary point for distribution. In other words, it serves as a hub-and-spoke point. On the other hand, Busan took advantage of its international airline and harbor, controlling the distribution of international freight. It also expanded its logistics function by creating strong links between the marine, shipping, and knowledge industries in the nearby area.

Figure 2-10 Major Korean Logistics Hubs



Da Nang should benchmark Busan and expand its logistics function using the advantage of its international connectivity by supplying urban logistics warehouses near major airports, railroad stations, and harbors, and applying an intelligent logistics information system to construct an integrated logistics system.

Figure 2-11 Method for Efficient and Environmentally Friendly Distribution System



B. Strategies to Develop a Tourism and Distribution Hub and a Business and Finance Hub

As Da Nang's industrial structure advances, the demand to locate in Da Nang is increasing for high-tech industries, such as IT, software, and electrical engineering. In 2012, Da Nang's per capita GDP reached \$2,294, which exceeded Vietnam's average per capita GDP of \$1,540. The number of foreign tourists also increased by 300,000 compared to 2011. This reveals that the purchasing power of Da Nang's citizens and the demand for tourism has grown significantly. However, Da Nang's old downtown area where business, tourism, and distribution are focused lacks the capacity to accommodate these new demands due to a high population density, muddled land-use patterns, deteriorated buildings, and lack of infrastructure. Therefore, it is necessary for Da Nang to regenerate the old central business district (CBD) and develop new urban centers adequately, considering the population growth and urban expansion so that it can accommodate and foster the new industries in business, tourism, and distribution.

■ Construct a Polycentric CBD Network through New Urban Development

In Seoul's case, Gangnam was developed in the 1970s to diversify the central functions of the overpopulated, old city center in the Gangbuk region. The Gangnam sub-center (Taeheranro) and the Jamsil sub-center were first built to diversify the central function. Then, the Sangam DMC was developed in the Sangam region in the 2000s, and currently the Magok area is under development.

Figure 2-12 Developing Central Business Districts in Seoul

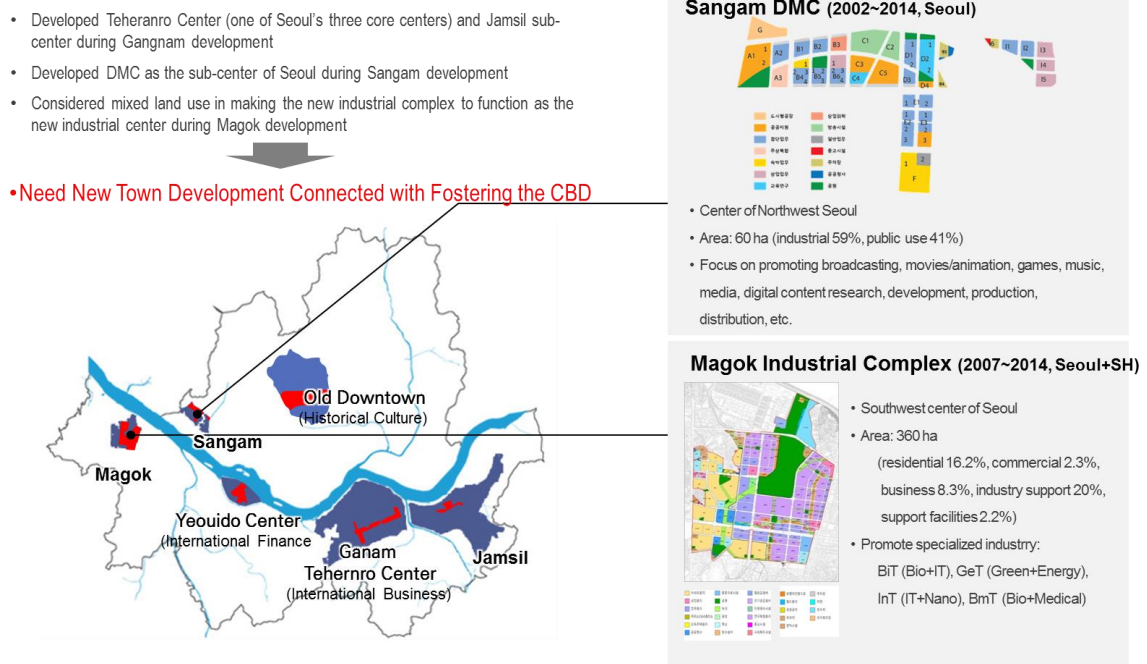
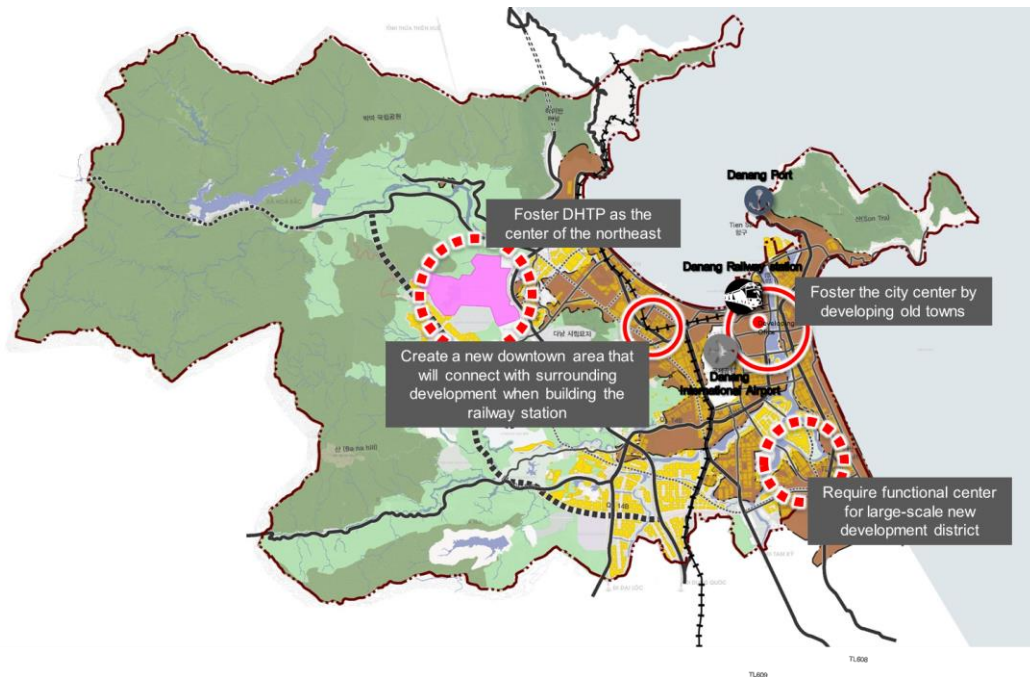


Figure 2-13 Method to Diversify Central Business Districts in Da Nang



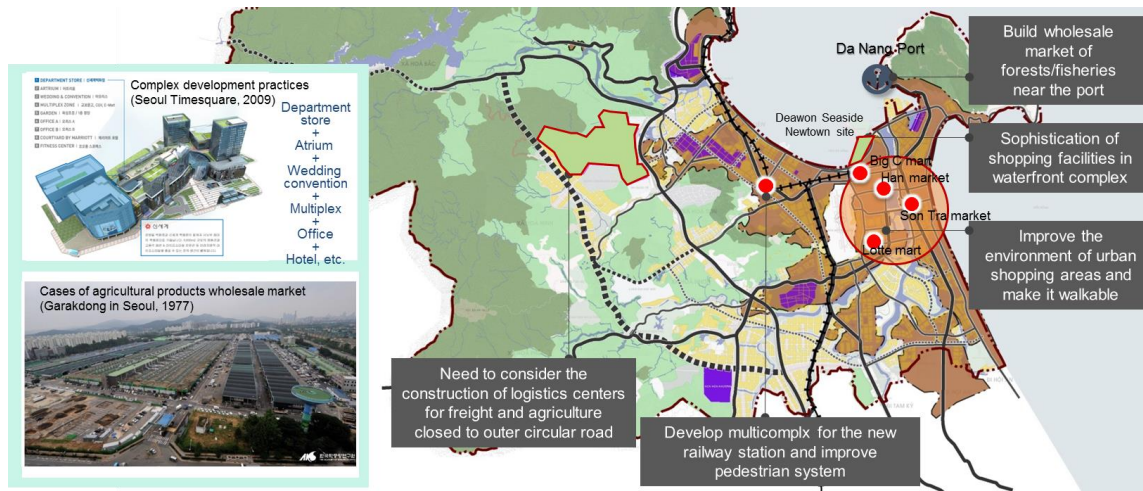
According to the Da Nang's 2030 Urban Master Plan, the business and commercial functions are planned to be expanded to the northern side of Da Nang, where a new railroad station is also planned to be located. In addition, Da Nang should consider making the new central business districts in the northeast and the southern side along with the ones proposed by existing development plans. In line with this, Da Nang High-Tech Park, which is a planned development site with high priority for Da Nang and the Da Nang Metropolitan Region, should be considered as the new central business district for the northeast side.

■ Develop Large-Scale Distribution and Shopping Centers in the New Central Business Areas

In the 1970s, Seoul constructed the Garak Agricultural & Marine Products Market in its suburbs as a way to provide a steady supply of daily necessities to the population and to create a modernized distribution service system. Da Nang should also install agricultural and marine products markets to develop a systematic distribution system for Da Nang and the nearby cities, one between Highway No. 1 and the outer ring road and another one near the harbor, since both are convenient locations to support the transportation and distribution function.

To respond to the increasing demand for tourism and shopping, the environment of the existing shopping centers in the old downtown area should first be improved. At the same time, new luxury shopping malls can be developed in the new major development areas, while duty-free shops and new department stores can be developed and linked with the new railroad station and the waterfront that is planned to be built at the northern area, in a manner of mixed-use development. Moreover, the pedestrian infrastructure should be improved near the main shopping centers so that shoppers are able to walk in a convenient environment.

Figure 2-14 Suggestions for Distribution Centers and Shopping Centers



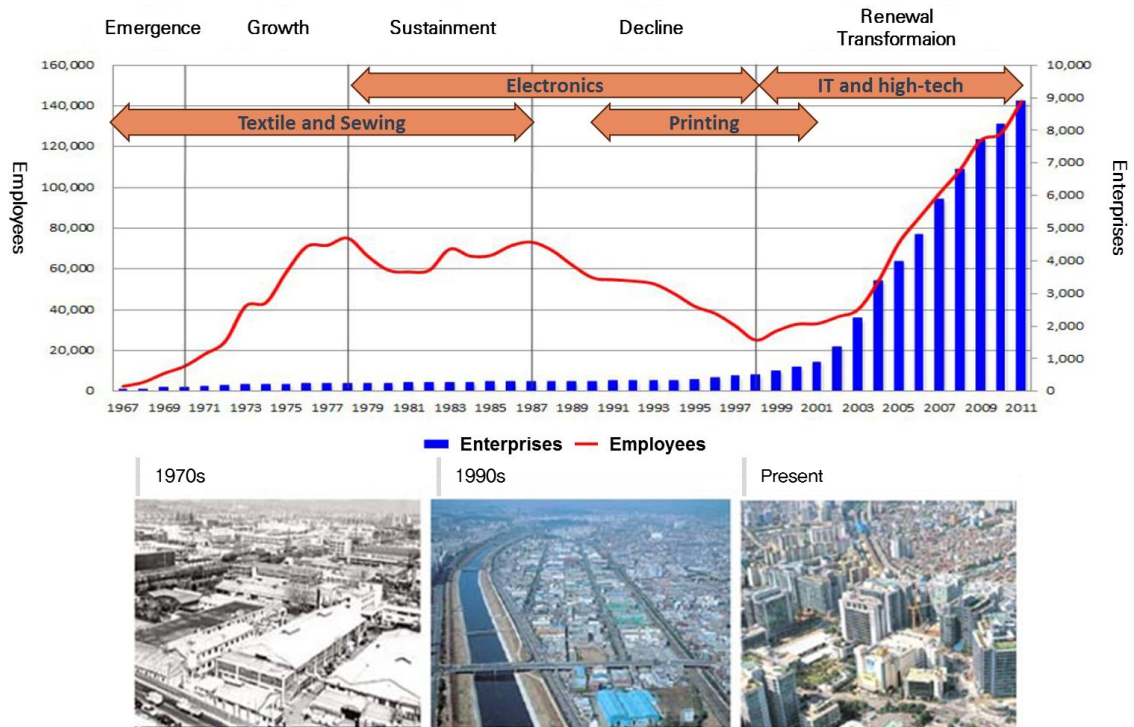
C. Development of a Knowledge and Industrial Hub

■ Supply Industrial Land Appropriately to Promote Industrial Conversion

Although Da Nang's service industry grew rapidly from 2008 to 2012; it still has a manufacturing-centered industrial structure where 47% of workers are in manufacturing. Among Da Nang's manufacturing industry, fabricated metal, clothing, computers, and electricity-related businesses make up the highest number, while other high-tech industries like vehicle assembly and repair and the pharmaceutical industry are seeing exponential increases in their number of workers: 5.7 and 2.3 times, respectively, between 2008 and 2012, evidencing the growth of new industries.

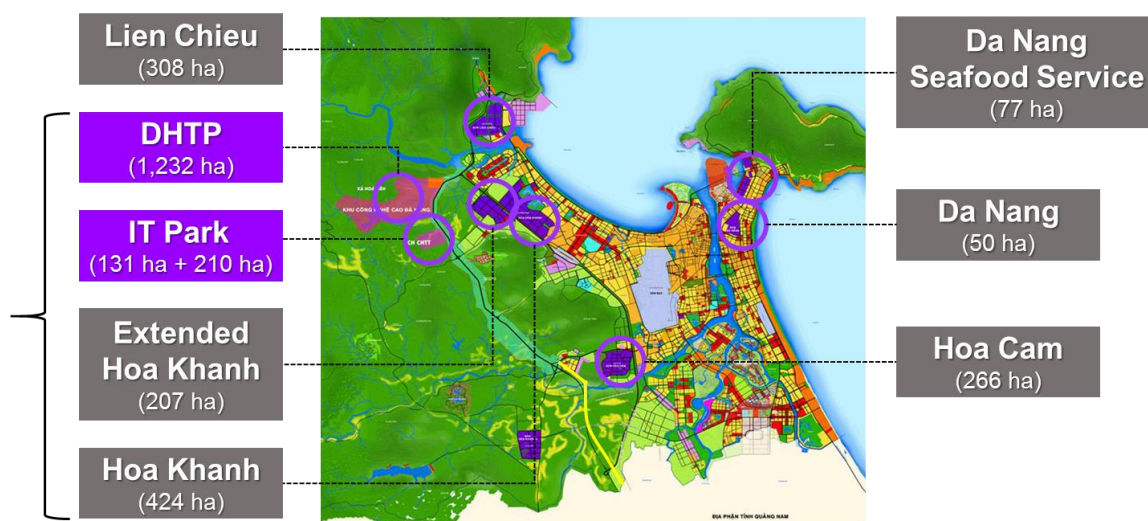
Seoul's Guro Industrial Complex changed its major industry from fabric and apparel to the IT-centered digital industry. The complex began with eight fabric and apparel companies in the 1960s, but during the period of national economic development, apartment-type factories were actively constructed. As a result, Guro was reborn as G-Valley with approximately 10,000 IT companies. The policy implication that Guro Industrial Complex has shown regarding the spatial transformation and the industrial evolution can apply to Da Nang High-Tech Park's strategy to transform gradually into a central business district of the knowledge industry.

Figure 2-15 Development Process of Guro Industrial Complex



Currently, Da Nag's six industrial complexes mostly house manufacturing companies in the machinery and electrical industries, and diverse business are jumbled together without any distinctive characteristics, which seems to limit their ability to accommodate the new demands of high-tech companies. Therefore, the additional parks in development, such as Da Nang High-Tech Park and the IT Park, should be differentiated from the existing ones by locating knowledge-intensive industries.

Figure 2-16 Industrial Complexes in Da Nang



2-5 Strategy for Da Nang High-Tech Park

■ Develop an Ecofriendly City Harmonizing Work, Life, and Recreation

The existing plan for Da Nang High-Tech Park focuses on increasing the production capacity (e.g., recruiting manufacturing industries) with lack of consideration for the urban environment such as support facilities, green belts, and open spaces. In addition, the land use plan and the block plan are too standard and simple to accommodate the future industrial changes or to locate various industries with different characteristics.

Therefore, Da Nang High-Tech Park needs to change its design to accommodate more knowledge-intensive industries to be consistent with the development stage and provide environments where these industries can converge, while maintaining the existing manufacturing industry base. The new plan focuses on making a creative environment where various industries and cultures coexist, and work, life, and recreation can harmonize. The strategy is to recruit a new direction for the industry structure to change from production only to combining various sectors including planning and research, production, and sales while adjusting the new land use plan and the block plan so that the park has the flexibility to adapt to the changing industrial conditions and characteristics.

Figure 2-17 Direction for the Structural Changes of the Manufacturing Industry

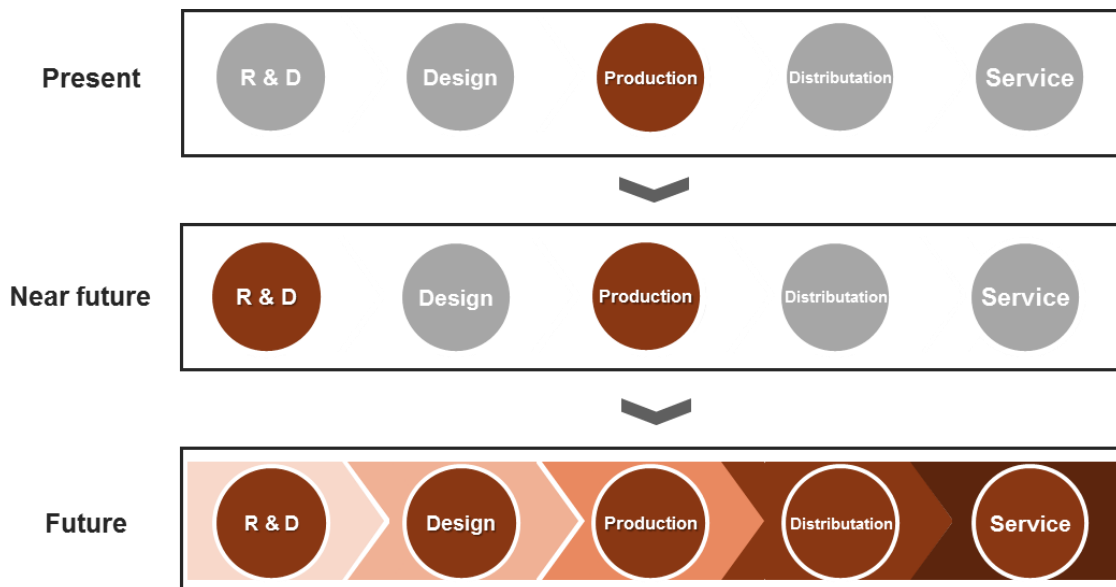
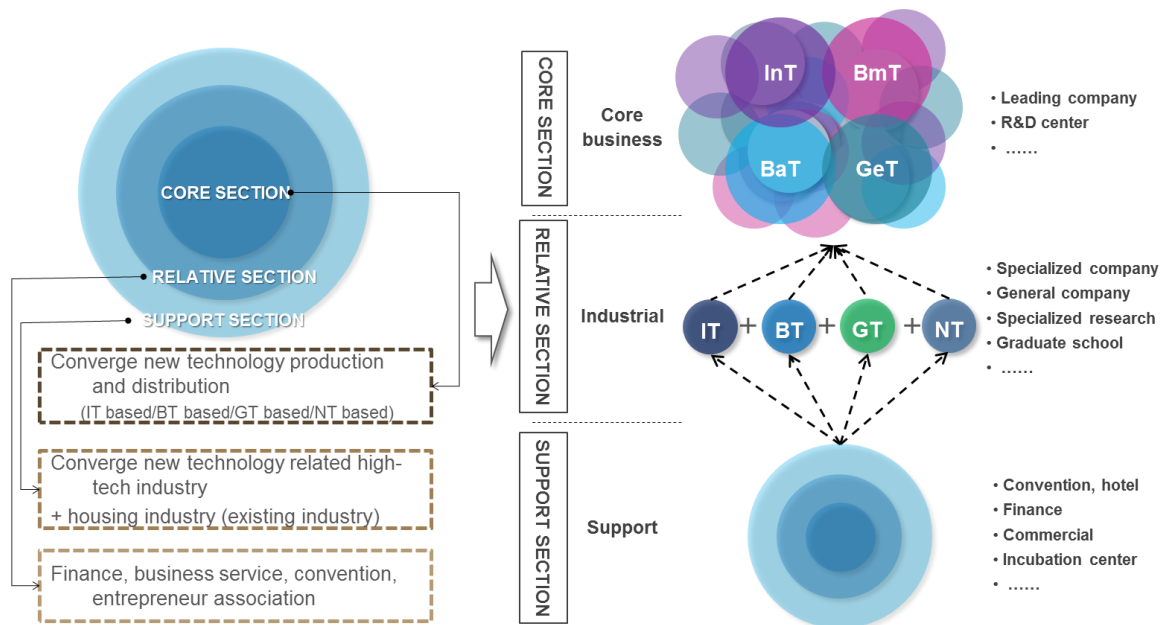


Figure 2-18 Concept of Cluster

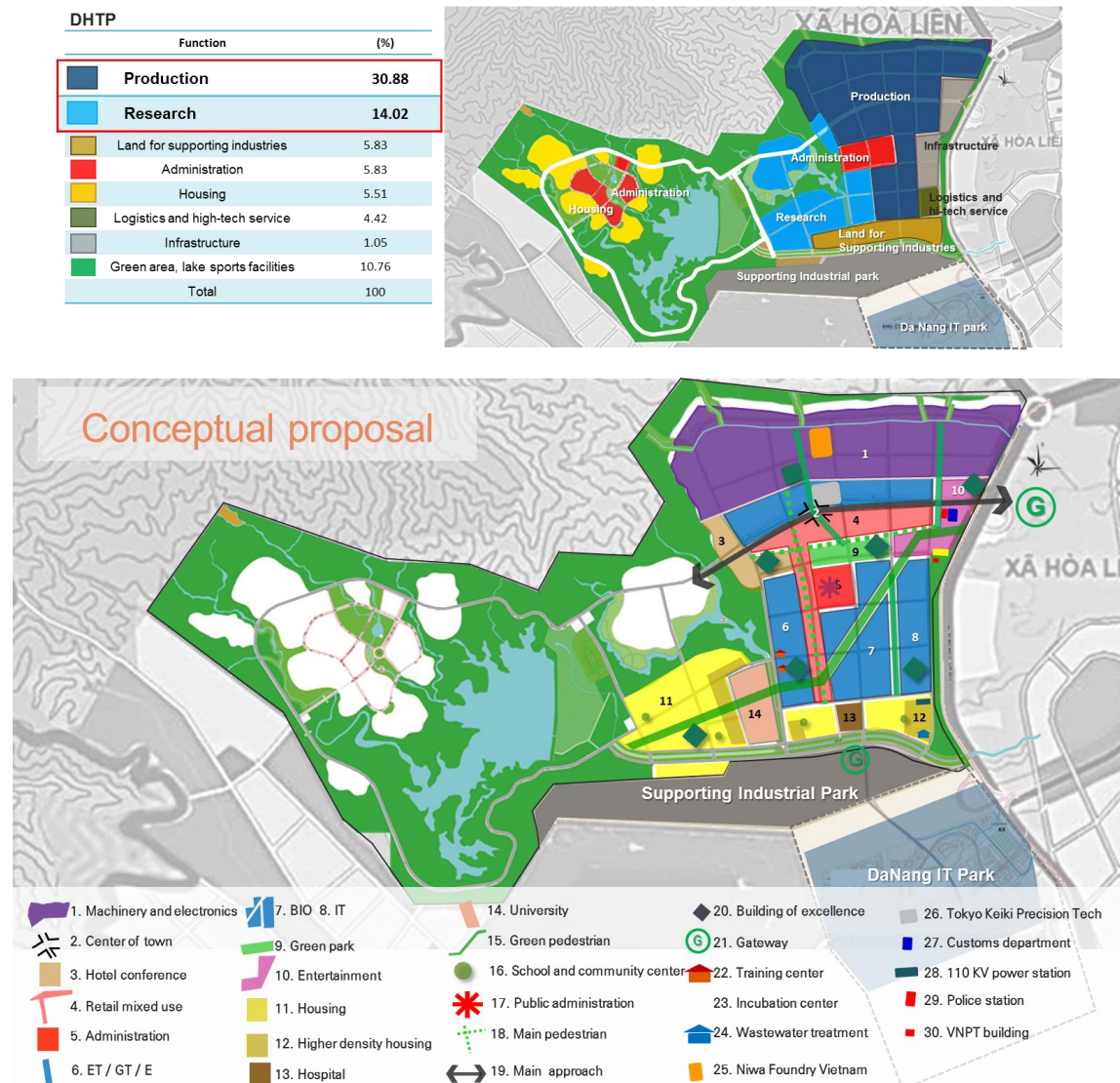


■ Adjust Land Use Considering the Industrial and Urban Function

In the new plan, the location of major industries was first appropriately determined by considering its relationship with the surrounding environments and functions. The manufacturing industry relocated to the outskirts area considering the environmental issues, and the IT industry moved to the south, closer to Da Nang IT Park. The research facilities were arranged in the center of the complex to be converged with various industries and urban functions.

To support the comfortable livelihood of the residents, medical, cultural, and educational facilities such as universities, hospitals, and hotels were linked to the industrial functions. These facilities were also designated as strategic hub facilities to act as anchors that promote the development of the surrounding area leading the development of the high-tech industrial complex and becoming representative landmarks that could upgrade Da Nang's overall urban image.

Figure 2-19 Old and New Land Use Plan for Da Nang High-Tech Park



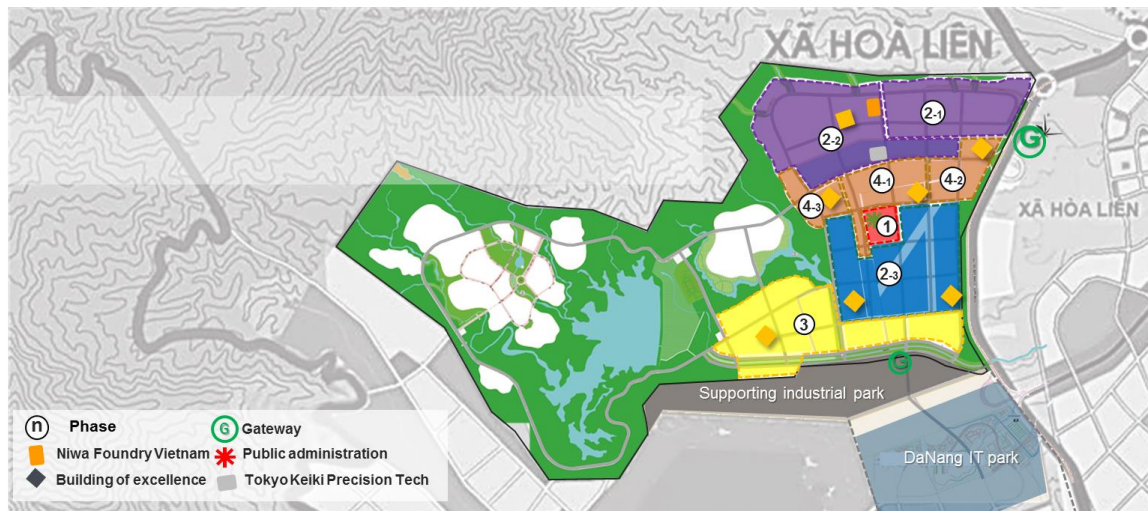
Lastly, the public transportation system must be facilitated to reinforce accessibility from the downtown area to Da Nang High-Tech Park, and the road hierarchy in the Park area should be distinguished more clearly. A circular transport system may be applied in the site, allowing smoother flows of both vehicle and pedestrian traffic. Additionally, a “green network” that links the green areas within the development site and the surrounding areas can become the base for creating an ecofriendly, green city.

■ Step-by-Step Action Plan and Strategic Plan to Attract Investment

Da Nang High-Tech Park requires a step-by-step development plan due to its large area size. In this case, the first priority should be to use public funds to develop the administrative area and public infrastructure such as transportation, green area, and parks. Then, the manufacturing industry, high-tech industry, and research facilities, which are the central function of the city, should be developed along with universities, hospitals, and residences linked to these industrial areas. Lastly, commercial facilities, urban recreational facilities, hotels, and conference facilities

should be developed using private investments to create synergy with the urban functions developed in advance.

Figure 2-20 Step-by-Step Development Plan for Da Nang High-Tech Park



To secure financing, an essential element for the successful development of Da Nang High-Tech Park, the tax increment financing technique (TIF) was suggested. TIF is a financing technique for urban development using the expected increase in the future land price as collateral. In addition, in the case of the Magok development, the leading companies that could attract other companies (anchors first) were first brought in to form the core cluster in order to create a ripple effect to other areas (snowballing). To promote investment from the leading companies, they were given the privilege to buy the land at a relatively low price (land price portfolio strategy). Promotional strategies appropriate for attracting domestic and foreign investment to Da Nang High-Tech Park should be studied more intensively, taking such examples into consideration.

2-6 Implications and Future Directions

Da Nang has great potential to become a major hub city of the Indochina Peninsula because of its various resources and geographical advantages. These advantages are very different from Hanoi, which is the central city of politics, or Ho Chi Minh, the central city of business. The urban foundation of Da Nang originated from its rich natural resources and cultural assets, which are important elements for the high-tech and financial industries to succeed. Moreover, the cities around Da Nang each have unique functions and resources. Together, it reveals the possibility to become a new major metropolitan region in Vietnam, meaning that achieving this goal should be the utmost priority for Da Nang. Da Nang has already taken the first steps and will continuously move in this direction.

The first phase of the joint research from 2013 to 2014 focused on verifying the potential of Da Nang and reviewing the direction and framework of Da Nang's urban development plan using Seoul's various experiences as examples. The main goal was to assist Da Nang's experts in making a reasonable urban development plan for Da Nang through cooperative discussions involving experts from both cities. In this process, specialized institutions from various fields including universities, research institutes, and public and international agencies played a role in

constructing a cooperative promotional system. In addition, decision-makers together with working groups who actually promote the policy in Da Nang participated in the discussion process to guide the research in the right direction.

The next part of the research conducted during 2015 will focus on making a more detailed plan for realizing metropolitan transportation systems and suggest a cooperative system between cities to form the backbone for Da Nang to become a metropolitan region.

Chapter 3

Implementation Plan for Developing Da Nang Metropolitan Region

Chapter 3. Implementation Plan for Developing Da Nang Metropolitan Region

3-1 Introduction

As the result of the 2014 joint research, the Seoul Institute, Da Nang Institute for Socio-Economic Development (DISED), and Sungkyunkwan University's Smart Green City Lab reestablished Da Nang's vision as the "International Center for Tourism, Distribution and Knowledge." To realize this vision, strategies were proposed to form Da Nang Metropolitan Region, develop the Da Nang Hub City, and reposition the development direction of Da Nang High-Tech Park.

Based on these research results, DISED and the SI agreed that developing Da Nang Metropolitan Region should start with improving the regional transportation infrastructures and governance system. Therefore, in this second stage of the 2015 joint research, the main goal was specified: make detailed improvement plans for the metropolitan transportation networks and metropolitan governance system among the nearby cities and provinces.

3-2 The Need for Clustering as a Metropolitan Region

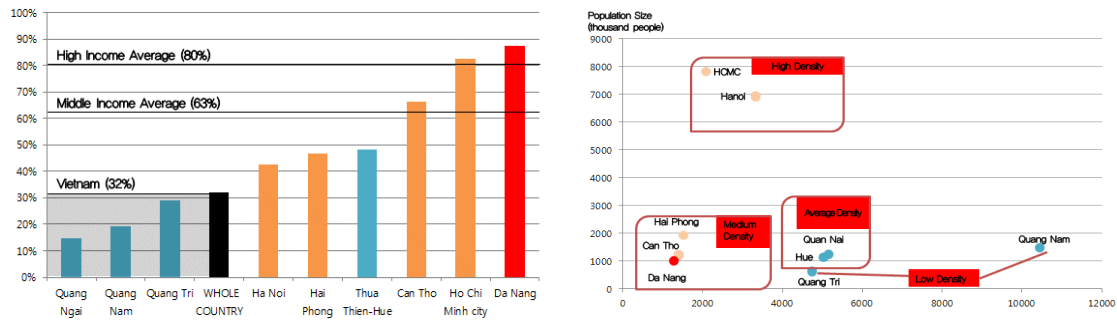
A. Socioeconomic Analysis Result of Da Nang Compared with Key Cities in Vietnam and Nearby Provinces in the Central Region

■ Area and Population

Da Nang is one of five centrally governed major cities in Vietnam. It is also a highly urbanized city with an 87% urbanization rate, which is highest among Vietnam's five major cities (Hanoi, Ho Chi Minh City, Hai Pong, Can Tho, and Da Nang) and the nearby provinces (Quang Ngai, Thua Thien Hue, Quang Tri, and Quang Nam). Da Nang's average population growth rate was 2.5% from 2005 to 2014, which was twice that of the entire country (1.1%).

However, Da Nang is still a young growing city where the total population and developed land area is the smallest of the five major cities. Da Nang's population was just over 1 million in 2014, which was only about 13% of Ho Chi Minh City. The total land size of Da Nang is 1,285.4 km², which is only about 40% of Hanoi. Da Nang's population density is 772/km², similar to Hai Pong and Can Tho but strikingly less than those of Hanoi and Ho Chi Minh City, which are 2,087/km² and 3,731/km², respectively.

Figure 3-1 Urbanization Rate and Population Density of Major Cities in Vietnam



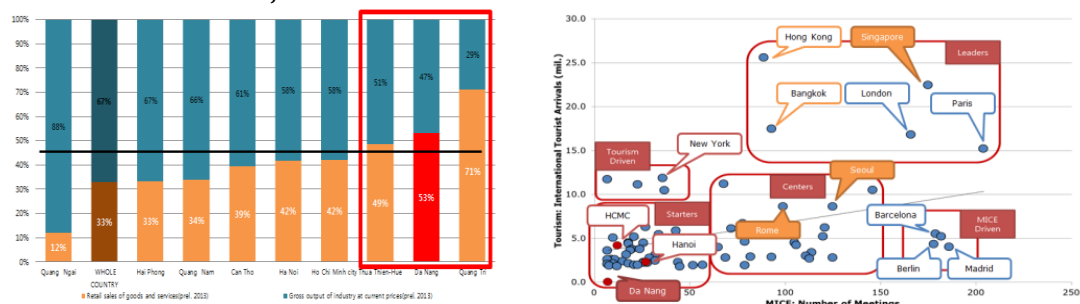
Source: General Statistics Office of Vietnam (<http://www.gso.gov.vn>).

■ Industry

In order to determine Da Nang's economic strength, the retail sales of goods and services and gross output of industry revenues were analyzed. The result shows that Da Nang has a service-oriented industry where the ratio of retail sales of goods and services⁴ reached 53%. This percentage is not only higher than Vietnam's average of 33%, but it is also higher than Hanoi and Ho Chi Minh City (both 42%). In fact, other provinces in the central region such as Thua Thien-Hue and Quang Tri also gained higher revenue from retail sales of goods and services, showing that in the central region, the service industry is stronger than manufacturing.

Therefore, Da Nang should maintain its existing logistics base service industry and expand tourism and MICE (meetings, incentive tours, conferences, and exhibitions) industry. However, tourism and MICE development are still in their infancy, and their competitiveness is lower than other major cities in Vietnam such as Hanoi and Ho Chi Minh City.

Figure 3-2 Retail Goods and Services Sales Revenue vs Gross Output of Industry/Tourism and MICE Industries in Major Cities around the World



Source: General Statistics Office of Vietnam (<http://www.gso.gov.vn>).

Number of MICEs held: 2013 ICCA Statistics Report (<http://www.iccaworld.com>).

Number of foreign tourists: <http://www.euromonitor.com/>.

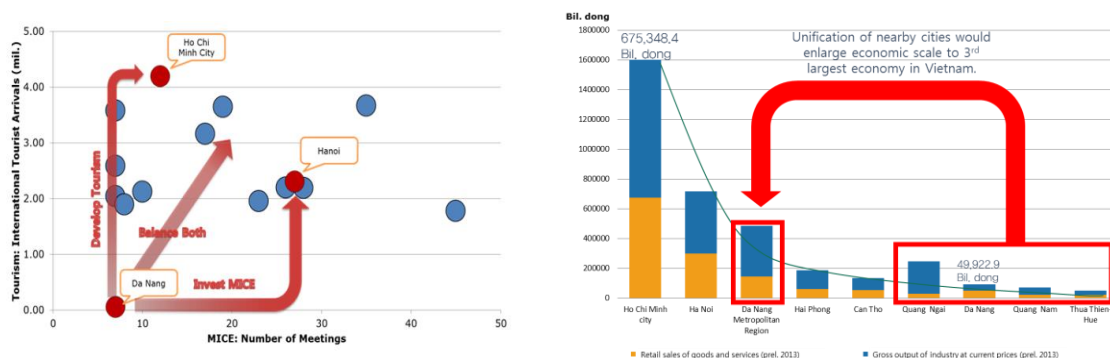
Number of foreign tourists to Da Nang: <http://www.vietnamtourism.com/en/>.

⁴Service includes trade, hotels, restaurants, tourism, and other services.

B. Clustering Da Nang and the Nearby Area as a Metropolitan Region

In order for Da Nang to advance its competitiveness in the tourism and MICE industries, the first step should focus on securing domestic competitiveness. There are several ways to achieve this goal. One way is to concentrate on building either a tourism industry, one of the major industries in Ho Chi Minh City, or MICE industries like Hanoi. The other way is to adopt a two-track strategy and develop both industries at the same time. Since Da Nang has more recognition and potential of the MICE industry rather than the tourism industry, it seems more effective to focus on advancing the MICE industry and let it drive the growth of tourism. If an economic block is formed between Da Nang and the surrounding provinces such as Quang Ngai, Quang Nam, and Hue, it can become the third largest economy in the nation. Thus, forming a regional cluster as one metropolitan region can rapidly raise Da Nang's economic status to one of Vietnam's top three economic areas.

Figure 3-3 Alternatives to Improve Da Nang's Domestic Competitiveness



A socioeconomic review of Da Nang and its surroundings indicates that in order for central Vietnam to advance its economic growth, it must increase the exchange of human and material resources at the metropolitan level. This cannot be done without convenient inter-regional mobility. Thus, it is necessary to prioritize a review of Da Nang Metropolitan Region's transportation status and identify the issues and improvement strategy.

3-3 Strategies to Develop Da Nang Metropolitan Transportation Network

A. Da Nang's Transportation Status in the Metropolitan Area

■ Total Traffic Volume and Mode Share

Every day, 1.26 million vehicles travel in and out of Da Nang. Internal trips account for 92.5% and inter-regional trips account for only 7.5%. This is significantly lower than Seoul's inter-regional trip ratio of 28.6%, demonstrating that most trips in Da Nang are confined within the city limits. In other words, Da Nang is much less interconnected with its neighbor cities than Seoul is.

A closer look at the destinations of the regional traffic between Da Nang and the surrounding provinces reveals that Da Nang is most interactive with Quang Nam,

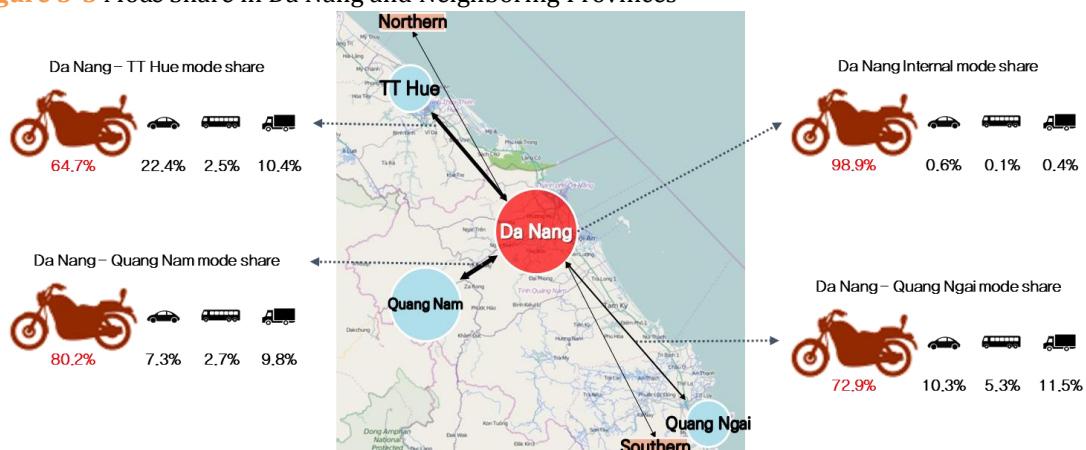
accounting for 76.1% of the total regional traffic, followed by Hue (9.4%) and Quang Ngai (3.0%). This shows an unbalanced regional trip distribution that mostly relies on only nearby areas.

The mode shares between Da Nang and the surrounding provinces are as follows: Da Nang and Quang Nam, motorcycles 80.2%, cars 7.3%, buses 2.7%, and trucks 9.8%; Da Nang and Hue, motorcycles 64.7%, cars 22.4%, buses 2.5%, and trucks 10.4%; Da Nang and Quang Ngai, motorcycles 72.9%, cars 10.3%, buses 5.3%, and trucks 11.5%. As expected, as the distance increases from Da Nang, the share of travel by motorcycles decreases and the share of cars increases.

Figure 3-4 Da Nang's Regional Traffic Status



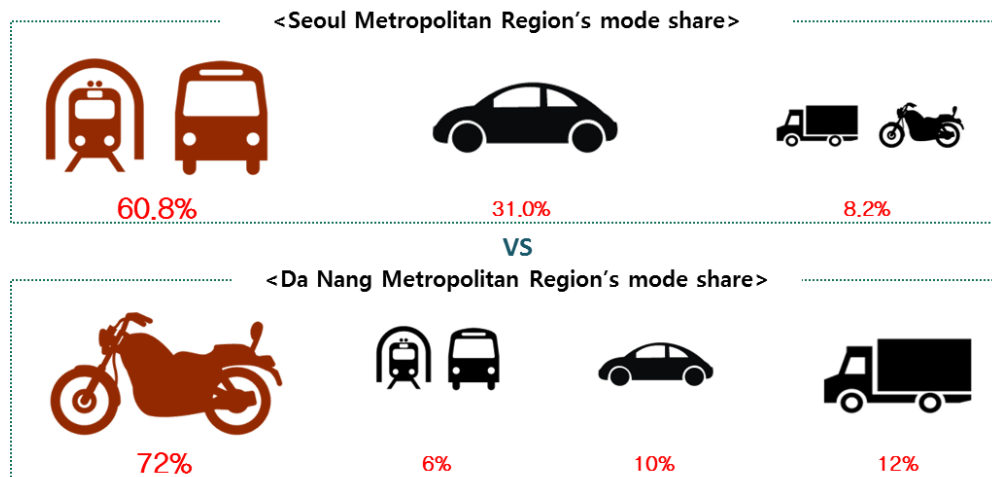
Figure 3-5 Mode Share in Da Nang and Neighboring Provinces



A notable characteristic of the inter-regional transportation for the Da Nang Metropolitan Region is that motorcycles are the most common travel mode. Contrary to the general phenomenon that cars and buses are the main means of transportation for inter-regional long trips, the mode share of motorcycles is substantially high (72%) even for long trips. Meanwhile, the proportions are only 6%, 10%, and 12% for public transportation, cars, and trucks, respectively, for the inter-regional trips in the Da Nang Metropolitan Region. Compared to Seoul's mode share (public

transportation 60.8%, cars 31%, and trucks and motorcycles 8.2%), the public transit mode share in Da Nang Metropolitan Region is noticeably low. Although motorcycles are a very common mode of travel in Vietnam, this result still implies that Da Nang's transportation system and infrastructure need an innovative change to accommodate the future vision of becoming a metropolitan region and hub city.

Figure 3-6 Mode Share of Inter-Regional Trips in the Metropolitan Area: Da Nang vs Seoul

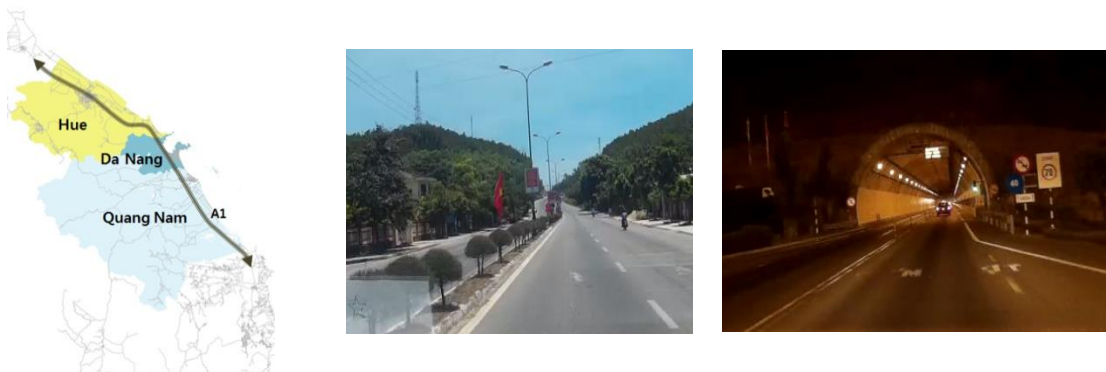


■ Transportation Infrastructure

The main road that serves car trips between Da Nang and the surrounding areas is National Route A1 that connects Ho Chi Minh City to Hanoi. Its total length is 2,300 km from the city bordering China at the north end all the way to Cambodia at the south end. It is the most important road that connects all of Vietnam, and it also connects Da Nang and its surrounding region (Hoi An, Hue, Tamky, Quang Ngai, etc.).

Because it is the main road between major Vietnamese cities, A1 is relatively well maintained. Most of the roads are equipped with either two or four lanes, and the surface is well paved. There have been continuous efforts to increase the travel speed on the road. For example, Hai Van Tunnel was constructed at the Hai Van Pass located at the north of Da Nang to shorten the travel distance from Da Nang to Hue and Quang Tri. In addition, many road expansion projects are also in progress.

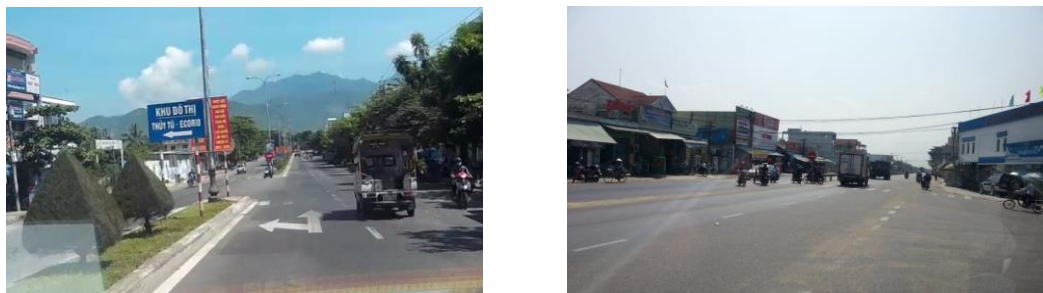
Figure 3-7 National Route A1



Source: Photo taken during a visit in 2015.

However, since there are no high-level expressways that link Da Nang to the surrounding areas, all vehicles must use A1 for both short- and long-distance trips, reducing the average speed on A1 to 40 km/h. Those who need to travel from region to region often complain about the low speed on the road. Indeed, Hue is located only 100 km from Da Nang, but it takes three hours to get there, which is twice the average travel time in Korea. In terms of safety, A1 should be much improved, as substantially mixed traffic composed of cars, buses, trucks, and motorcycles is prone to increase the accident risk.

Figure 3-8 Condition of National Route A1 in Da Nang



Source: Photo taken during a visit in 2015.

■ Forecasting the 2030 Da Nang Metropolitan Region Traffic Volume

The traffic volume trends of Da Nang, Thua Tien Hue, Quang Tri, Quang Nam, and Quang Ngai all show a rapid increase from 30.4 million persons per year in 2005 to 61.8 million persons per year in 2012 with an annual increase rate of 10.7%. Additionally, the economic and population growth of Da Nang and the surrounding area are expected to increase continuously. While the whole region's population growth rate is lower than the national average, Da Nang's population growth rate alone is twice the national average. Da Nang's per capita GDP is also twice the national average. As Da Nang drives the population and income growth of the central region, the traffic volume in Da Nang and nearby areas is expected to double by 2030.

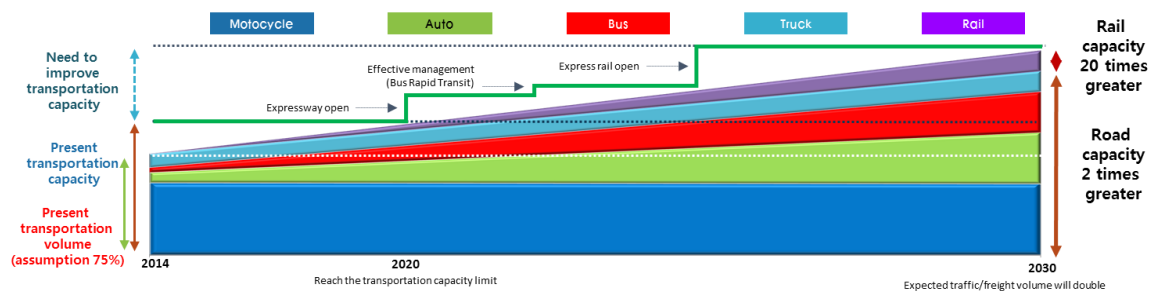
B. Suggestion for Developing Da Nang Metropolitan Transportation Network

The traffic volume is expected to rise drastically in Da Nang and the surrounding areas. If the mode share continues to grow at the current rate, the traffic demand will exceed the capacity of the current infrastructure. Therefore, it is necessary to take a preemptive measure to develop a Da Nang metropolitan transportation network to improve the inter-regional mobility between Da Nang and the key hub cities in the central region.

First of all, the transportation capacity should be increased. With the current infrastructure capacity, it is hard to cover the increasing travel demand. Indeed, it is expected that the travel demand in 2020 will reach the current capacity, requiring a provision of additional infrastructure such as expressways and urban railways. As the traffic volume in 2030 is expected to double, road capacity should be doubled accordingly. In the case of the railway, its capacity should be increased by 20 times

more considering the current low service level. This will help establish a transit-oriented system in Da Nang.

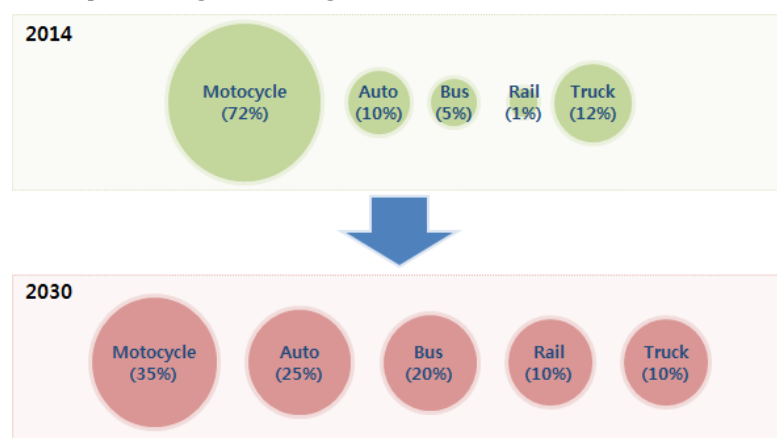
Figure 3-9 Strategy for Improving Da Nang Metropolitan Transportation Network



There have been numerous efforts by Da Nang and the central region governments to expand their regional infrastructures. For example, Hai Van Pass used to be a huge obstacle for travelers going from Da Nang to the northern area, but after the construction of Hai Van tunnel, the travel time and distance were drastically reduced. The Da Nang-Quang Ngai Highway was recently constructed to the south. In spite of these efforts, the current network is yet not sufficient to serve the future travel demand in the metropolitan area. Therefore, additional development of infrastructure is needed. For example, highways linking Da Nang, Hue, and Quang Tri should be constructed, which will complete the Quang Tri–Hue–Da Nang–Quang Ngai highway network. Developing an inter-regional railway network connecting Quang Tri, Hue, Da Nang, and Quang Ngai should be considered also.

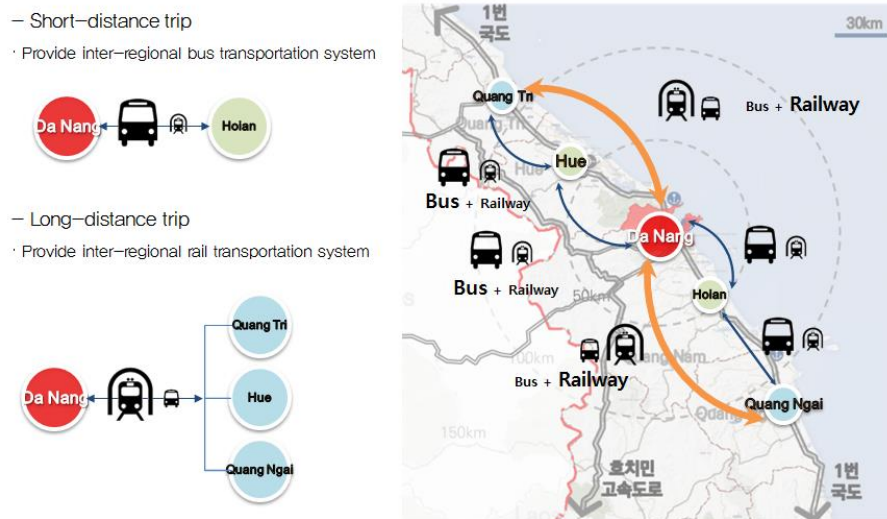
While improving the infrastructure, sustainable travel modes such as transit should be encouraged more. The current mode share (motorcycles 72%, cars 10%, buses 5%, rail 1%, and trucks 12%) indicates that travelers rely heavily on motorcycles. The heavy dependence on motorcycles is considered to be due to the lack of infrastructure that promotes alternative travel modes. The research team suggests that the future mode shares in 2030 should be more balanced: motorcycles 35%, cars 25%, buses 20%, rail 10%, and trucks 10%.

Figure 3-10 Goals for Adequate Change of Da Nang's Mode Share Structure



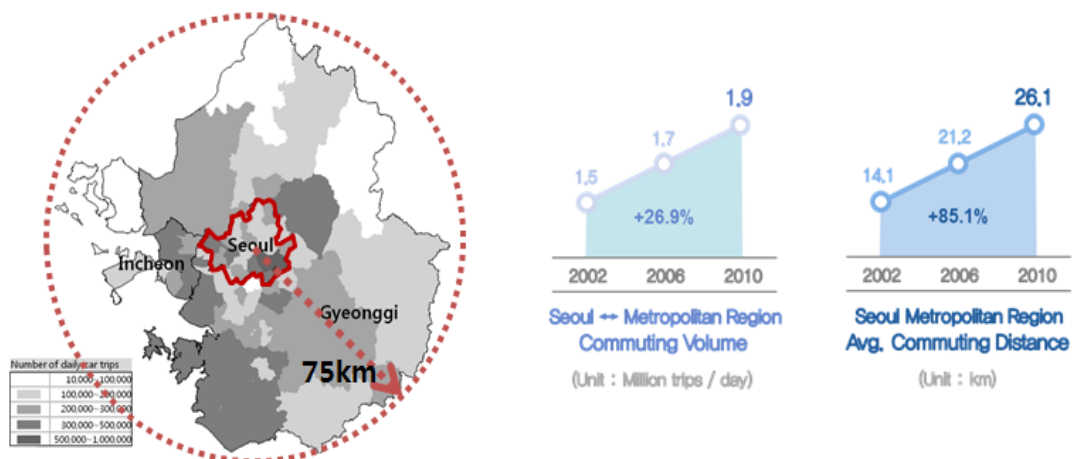
An improved transportation system should allow travelers to choose the most efficient transport mode considering their travel distance. Hoi An, fairly close to Da Nang, needs a bus-oriented transportation system. Meanwhile, for those cities that are distant from Da Nang, such as Quang Tri, Hue, and Quang Ngai, a regional transportation network based on a railway system should be warranted.

Figure 3-11 Strategies for the Transportation System According to Distance



Seoul expanded its infrastructure (road and rail) and public transportation systems in response to the increasing travel demand in the Seoul metropolitan area, so called the Seoul Capital Area (SCA). The SCA is approximately covered by a circle with a radius of 75 km, which is slightly smaller than Da Nang Metropolitan Region. With continued population growth in the SCA, commuter trips from Gyeonggi Province and Incheon to Seoul rose by 26.9% between 2002 and 2010: from 1.5 million to 1.9 million trips per day. During the same period, the commute distance also increased by 85.1%: from 14.1 to 26.1 km.

Figure 3-12 Commute Trips and Average Commute Distance in Seoul Capital Area



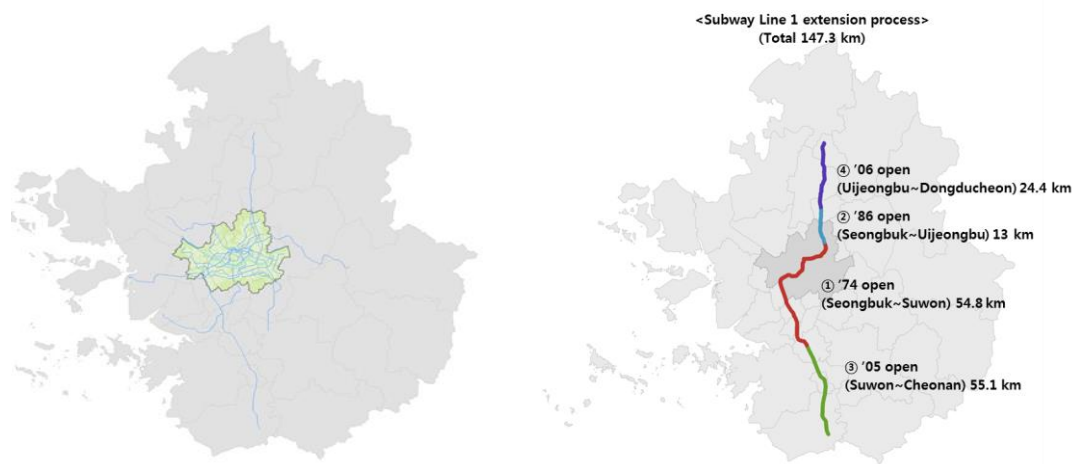
C. Strategies to Expand Infrastructure in the Da Nang Metropolitan Region

■ Railway

Of the five stations in the city of Da Nang, Da Nang Railway Station serves as the central station. The inter-regional railway that passes Da Nang is part of the railway network that connects Hanoi to Ho Chi Minh City. The total length of the

It takes a great amount of time and money to build the rail infrastructure. Knowing this, Seoul took several steps to expand its rail infrastructure gradually. For example, Subway Line 1 first opened with the 7.8 km section between Seoul Station and Cheongnyangni in 1974. Later that year, the extended line with a total length of 54.8 km was opened linking Seongbuk to Suwon. After that, a 13 km section between Seongbuk and Uijeongbu, a 55.1 km section between Suwon and Cheonan and a 24.4 km section between Uijeongbu and Dongducheon opened in 1986, 2005 and 2006, respectively. For 40 years, Line 1 had been extended step by step and now it serves citizens' travel needs over the total length of 147.3 km.

Figure 3-15 Subway Network and Subway Line 1 Extension Process in Seoul Capital Area



<Subway Network in the Seoul Capital Area>

<Phases for Expansion of Subway Line 1>

The current length of Line 1, which links Dongducheon to Cheonan, is longer than the distance between Da Nang and Hue. As seen in the case of the Seoul Capital Area, it will be difficult to build the entire rail network that covers Quang Tri, Da Nang, and Quang Ngai all at once. Therefore, a suggestion is to start with constructing a railway segment between Da Nang and Hoi An and then gradually extend the railway to Tamky to the South and Hue to the North, completing the Hue-Da Nang-Hoi An-Tamky railway network. After that, Da Nang should plan on making a metropolitan railway network centered on Da Nang, extending the line from Quang Ngai to Tamky and Hue to Quang Tri, which would complete the rail infrastructure linking Quang Ngai-Da Nang-Hue-Quang Tri.

■ Bus

Since 2007, the Central Bus Station in Da Nang has been the center of regional and intercity bus transportation service in the central region. There are 20 inter-regional routes to Quang Nam, 15 routes going to the northern area including Hanoi, and 29 routes going to southern area including Ho Chi Minh City. The major bus routes from Da Nang to nearby areas are the Da Nang-Hue route and the Da Nang-Hoi An route. The Da Nang-Hue route operates between 05:00 and 17:00 at an interval of 30 minutes. There are two types of buses in terms of seating capacity—16 seats and 33 seats—but mostly 16 seat buses are used in the operation. The Da Nang-

Hoi An route operates every hour until 19:00.

The number of inter-regional bus routes in Da Nang seems sufficient. However, frequent delays caused by the poor road conditions in the central Vietnam region, and low operation frequency of the bus services makes it hard for the passengers to use the buses at the time of their convenience. The buses are also too old and uncomfortable.

Figure 3-16 Inter-Regional Bus Routes and the Central Bus Terminal in Da Nang

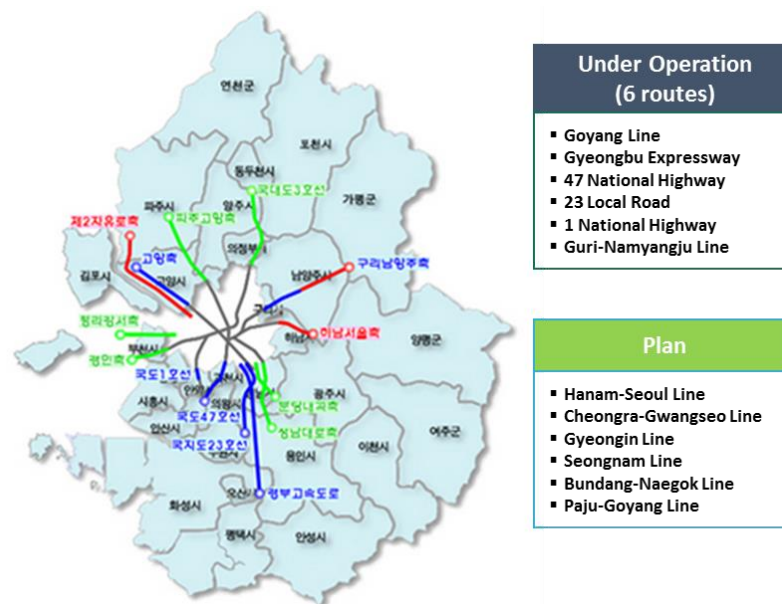


Source: Photo of Da Nang Central Bus Terminal taken during a visit in June 2015.

To promote the use of public transport in the Da Nang Metropolitan Region, the number of inter-regional bus routes needs to increase and the operational services needs to diversify enhancing the accessibility and area coverage by transit. In addition, the buses need to be modernized and diversified. Most buses covering short distances (e.g., traveling to Hue or Hoi An) have a seating capacity of only 16. These buses need to be replaced with newer buses with larger capacity.

Moreover, a BRT system should be considered in order to increase the bus speed. Seoul is now operating exclusive median bus lanes with a length of 117.5 km (as of November 2015) over its major arterials. Gyeonggi Province has six BRT axes that connect to the outskirts of Seoul and plans to add seven more routes. Reviewing Seoul's situation reveals that the BRT system plays a vital role in enhancing bus travel speeds and timeliness. If Da Nang and its metropolitan region adopt such BRT system, the quality of the bus services can be improved immensely.

Figure 3-17 Current and Planned BRT Routes in Gyeonggi Province



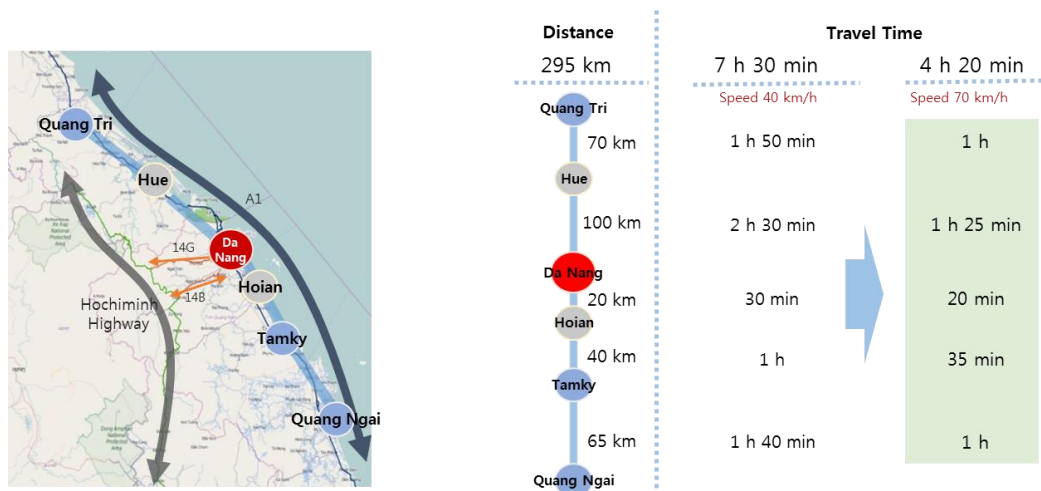
■ Operation

In addition to expanding the infrastructure, the operating system efficiency also needs to be enhanced. Installing a freeway traffic management system (FTMS) on existing roads allows drivers access to traffic information, which, in turn, could result in safer and faster travel. In addition, integrating exclusive bus lanes in the new expressways can enhance the bus travel speed and punctuality. Seoul and its metropolitan regions installed a FTMS to provide useful information to drivers in real time and also integrated exclusive bus lanes not just on the roads in the inner city but also on expressways linking the cities to improve the travel time of inter-regional buses.

D. Expected Effects

If the infrastructure in Da Nang Metropolitan Region is sufficiently provided, constructing highways and railways between Quang Tri, Hue, Da Nang, and Quang Ngai, the regional transportation infrastructure of central Vietnam would change greatly. Currently, the average travel speed on National Route A1 is 40 km/h. First, this is because cars, motorcycles, and trucks share the traffic lane without any adequate regulation, and second, because the roads have many curves which also reduces the average travel speed. This is why it takes three hours or more to travel approximately 100 km from Da Nang to Hue and eight hours to travel 300 km from Quang Tri to Quang Ngai. When the Da Nang Metropolitan Expressway is completed, the roads will be straightened, and different types of vehicles will use separate traffic lanes, which will increase the travel speeds of cars and buses. With the new expressway, our estimate is that the travel time between Da Nang and Hue would decrease to 1 hour and 25 minutes, and travel time between Quang Tri and Quang Ngai would decrease to four hours.

Figure 3-18 Travel Times Before and After Construction of the New Expressway



In order to understand the effect of expanding Da Nang's metropolitan infrastructure and changing the mode share structure, the research team conducted a travel demand analysis of the Da Nang Metropolitan Region. The target corridor was from Hue to Quang Ngai via Da Nang, Hoi An, and Tamky. In the analysis, an attempt was made to forecast changes when the traffic volume doubles compared to that of 2014.

The research team set up two scenarios by assuming two different mode share structures. Scenario 1 assumed an increased traffic volume while maintaining the current mode share. This scenario reflected the assumption that the traffic volume would increase with no improvement and expansion of the existing infrastructure. Scenario 2 looked at a situation where the public transportation mode share increased. In this case, the assumption was that the roads and railway infrastructures were expanded and improved in line with the increase in traffic volume and that the citizens effectively switched from motorcycles to public transportation and cars.

Table 3-1 Transportation Demand Analysis: Two Scenarios

Unit: %

Transport Mode		Public Transportation	Car	Motorcycle
Current Mode Share		6	22	72
Future (2030)	Scenario 1 (Current mode share maintained)	6	22	72
	Scenario 2 (Increased mode share of public transportation)	30	35	35

Note: Based on the assumption that traffic volume doubles by 2030.

The analysis showed that the ratio of v/c (volume/capacity) in these regions is 0.37 today. If the infrastructure is not expanded and improved and the traffic increases, the ratio is expected to rise to 0.94 by 2030 and capacity would soon be

overwhelmed. However, if the road infrastructure, such as highways and railways, are improved, more citizens are likely to switch to public transportation, keeping the ratio at around 0.65—slightly increased but acceptable.

Figure 3-19 Transportation Demand Analysis in the Da Nang Metropolitan Region

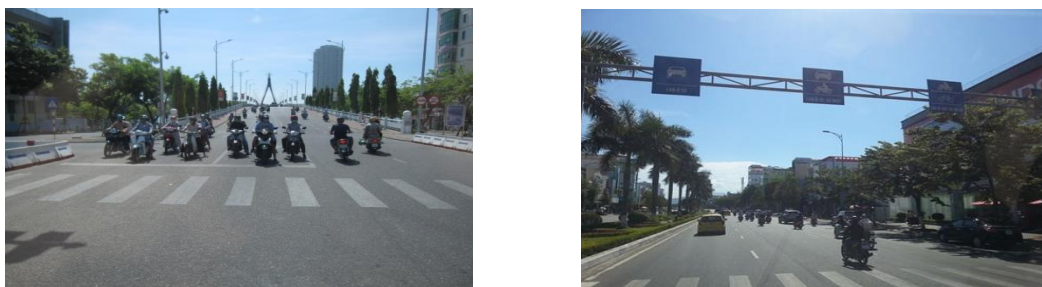


3-4 Advancing Da Nang's Transportation Management System

A. Status

Da Nang's road network is 480 km long, and it is comprised of National Route A1 (37 km), National Route 14B (32 km), regional roads (100 km), and urban roads (311 km). Da Nang's road coverage ratio (the share of land for roads) is 4.2%, appreciably lower than that of Seoul (22.3%) and Tokyo (21.9%). The percentage of properly paved roads is not high, standing at 65%. Da Nang's main roads are three lanes or wider (each direction), divided by a median strip. The first lane gives priority to cars, the second lane to cars and motorcycles, and the third lane to motorcycles and bicycles. Such priority for different vehicle types is designed to make travel safer on the road. In the meantime, only 27 out of 2,700 intersections have traffic signals, leaving Da Nang's transportation system rather ineffective.

Figure 3-20 Downtown Road Conditions in Da Nang



Source: Photo taken during a visit in June 2015.

The transportation demand in Da Nang is estimated as 1.9 million trips/day, or 2.3 million trips/day including the pedestrians. The most popular choice for transport is motorcycles at nearly 98%, while the mode share of buses is estimated to be less than 1%. In Da Nang, 90% of all households own a motorcycle, while 58% own more than two. On the other hand, public transportation use is extremely low.

Da Nang citizens rarely use public transportation because it has only five bus routes with unreliable operating hours.

B. Methods to Improve Da Nang's Transportation Management System

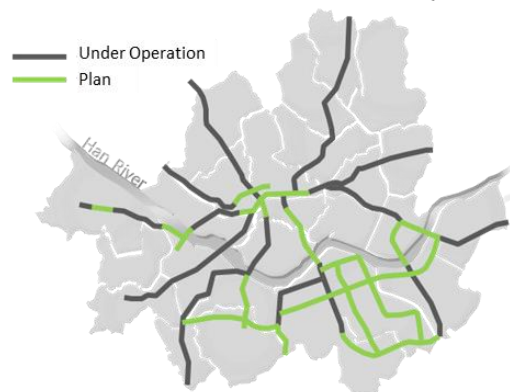
■ Methods to Improve Efficiency

Da Nang's mode share of motorcycles is particularly high, while that of public transportation is substantially low. As income levels increase in the future, car ownership is also expected to increase, leading to severe road congestion. This is why Da Nang should establish a public-transportation-centered transportation network.

Da Nang should increase the mode share of buses, which is now less than 1%, to 50% by 2030, so that motorcycle use would decrease to 25%. This requires expanding the bus infrastructure. Along with the BRT routes included in the current plan, other bus routes need to be added, while the operating hours and bus frequency also needs to be increased for more convenient service.

As of July 2015, Seoul serviced 390 bus routes and operated 7,322 buses. Beginning in 2004, the Seoul Metropolitan Government started reforming Seoul's public transport system by readjusting the bus routes and introducing exclusive bus lanes for more accessibility and easier use. Starting with a pilot of four sections of exclusive bus lanes (36.1 km) in 2004, by 2014 the exclusive bus lanes were installed in 12 sections with a total length of 117.5 km. The number of bus users, which was 4.8 million persons/day in 2004, rose to 5.8 million persons/day in 2014, increasing by 21%. The Seoul Metropolitan Government is still continuously expanding the exclusive bus lanes. Their current goal is to increase the total length to 210 km.

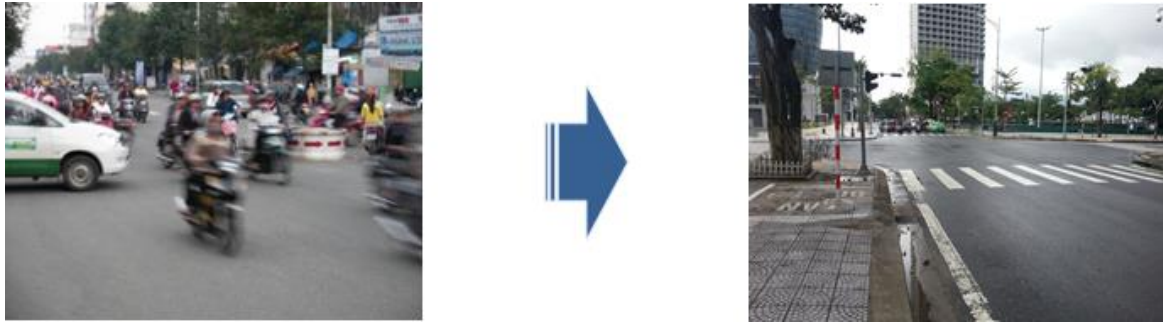
Figure 3-21 Current and Planned Exclusive Bus Lanes in Seoul (as of January 2015)



Source: Internal data, the City of Seoul.

Furthermore, more signals should be installed in Da Nang's intersections. Currently, there are 2,700 intersections in the city, but only 28 have signals and 27 have roundabouts, meaning that only 2% of the intersections are equipped with some kind of traffic control facility. If the traffic increases in the current condition, this will worsen the traffic congestion and increase safety issues. To prevent these issues, efforts should be devoted to installing traffic signals. Our suggestion is to add signals to half of all intersections in Da Nang by 2030 to systemize the control of traffic flow effectively.

Figure 3-22 Da Nang: Intersection without Traffic Signals (R); Intersection with Traffic Signals (L)



An intelligent transportation system (ITS) also should be introduced to provide traffic information readily to the citizens. Seoul has a system called TOPIS (Traffic Operation Information Service), which has effectively increased service convenience by actively providing traffic-related information via various types of media such as variable message signs on roadway. Beginning in 2010, Seoul adopted U-Shelter, which is a smart bus stop system that grants citizens access to real-time travel data on the servicing buses and bus card balances. The smart card was also very actively promoted to the citizens, so as of 2013, approximately 97.4% of Seoul citizens use the smart cards for public transportation.

■ Effect

To appraise the expected benefits of restructuring Da Nang's traffic system, a simulation analysis was carried out on the major downtown traffic axis. For the purpose of the analysis, three scenarios were constructed to chart the changes in the mode share in line with the increase in future traffic volume. Scenario 1 assumes that traffic volume grows in the future while the current mode share remains the same. In this scenario, the city's traffic operating system will not be improved, and the current mode share will remain, despite the increase in traffic volume, and most of the traffic demands will be absorbed by motorcycles. Scenario 2 is where the mode share is 50% for motorcycles, 20% for cars, and 30% for buses, which results from the growth of passenger car use, but the number of motorcycles decreases and more people use public transportation. As for Scenario 3, the mode share is 25% for motorcycles, 25% for cars, and 50% for buses, and assumes that Da Nang's downtown transportation system transforms to have a greater reliance on public transportation.

Table 3-2 Travel Demand Analysis: Mode Share Structures by Scenario

Unit: %

Transport Mode		Motorcycle	Car	Bus
Current Mode Share		98	1	1
Future (2030)	Scenario 1	98	1	1
	Scenario 2	50	20	30
	Scenario 3	25	25	50

Note: Based on the assumption that traffic volume doubles in the future.

According to our analysis, the current traffic flow seems to be fairly good, with the average delay per vehicle of 5.8 seconds and the average travel speed of 42.2 km/h. But in Scenario 1, where the current mode share is maintained, the average delay per vehicle substantially increases 348.4 seconds and the average travel speed decreases to 18.1 km/h, which is an extremely congested level. On the other hand, Scenario 3, with a higher mode share of buses, reveals that the average delay per vehicle is only 9.1 seconds and the average travel speed is 44.0 km/h—a case where current traffic levels can be sustained. Despite the assumption that traffic volume doubles in the future, Scenario 3 sustains the current levels because of the mode shifts from motorcycles to buses. Nonetheless, the average delay per vehicle is higher than the current level due to the increased number of buses and cars, resulting in delays at and near intersections.

Table 3-3 Average Delay Per Vehicle and Average Travel Speed by Scenario

		Average Delay Per Vehicle (Seconds/Vehicle)	Average Travel Speed (km/h)
Current		5.8	42.2
Future (2030)	Scenario 1	348.4	18.1
	Scenario 2	166.4	26.8
	Scenario 3	9.1	44.0

Note: Based on the assumption that traffic volume doubles in the future.

3-5 Implementation Plan for Constructing Regional Infrastructure

A. Constructing Infrastructure

The expansion of the infrastructure suggested by the research team requires a substantial amount of time and money, so the successful implementation of the infrastructure expansion needs a careful planning considering details including project scales and timing to initiate the plan. It should be noted that the research team cannot provide practically perfect plans for the expansion since the research team does not have a complete understanding of the whole institutional systems relevant to infrastructure constructions in Vietnam. Under this circumstance, it is expected that the understanding of the development experience in Korea is useful to identify the options that can be applicable to Vietnam regarding road and railway constructions. In Korea, every SOC (social overhead capital) project is required to pass through a preliminary feasibility review before any decisions are made for further steps. Da Nang is also advised to conduct such a preliminary feasibility study for constructing the regional infrastructures in the central region to verify if those projects are highly necessary and/or economic benefits exist. The feasibility study results can also be used in requesting assistance from the central government. In addition, a policy analysis should be carried out to appeal to the central government on how much the infrastructure in central Vietnam is outdated and the urgency for their improvement.

B. Financing

Korea's central government fully finances national road and highway constructions. Similarly, if Da Nang Metropolitan Region should expand National Route A1 or construct national highways to improve the infrastructure of Da Nang Metropolitan Region, these projects could also receive financial assistance from the central government. In addition, various measures need to be reviewed by both the central and local governments to finance the transportation infrastructure investment. In Korea, as a way to organize and manage transportation investment more stably and efficiently, the "transportation, energy, and environment tax" was introduced. Pursuant to the law, the tax imposed on petrol and diesel is KRW 529/ℓ and KRW 375/ℓ, respectively.

Table 3-4 Petrol and Diesel Tax Ratios (South Korea)

Unit: KRW/ℓ

Fuel Type	Price	Taxes			
		Transportation, Energy, and Environment Tax	Education Tax	Mileage-Based Tax	Total
Petrol	1,534	529	79.35	137.54	745.89
Diesel	1,324	375	56.25	97.50	528.75

Note: As of December 5, 2015.

Then, 80% of the collected transportation, environment, and energy tax is transferred to the Special Account for Transport Facilities to be used in expanding SOC infrastructure such as roads, urban railways, express rails, airports, and seaports. Today, Vietnam's economic growth rate is very high. To accelerate this growth, SOC infrastructure must be expanded. Therefore, as a way to find stable financial sources for SOC projects, it is suggested that local governments appeal to the central government for the necessity of creating a transportation tax.

3-6 Organizing Da Nang Metropolitan Regional Governance

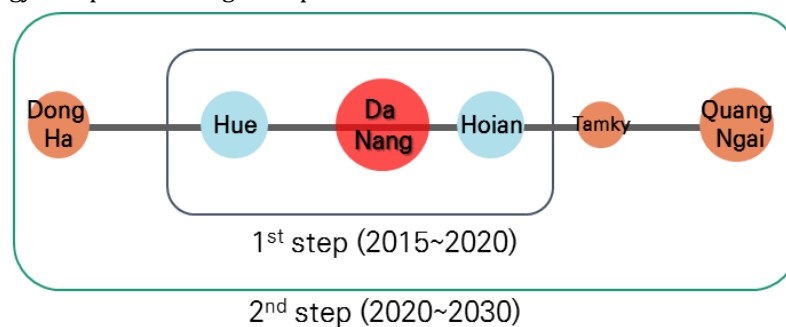
A. Necessity for a Collaborative Governance System

The central region is significantly underdeveloped socially and economically compared to the southern region where Ho Chi Minh City is located and the northern region where Hanoi is located. Therefore, in this present state, all the local governments in this region, not just Da Nang, but also Quang Nam, Hue, Quang Ngai, and Quang Tri provinces and Hoi An, Tamky, and Hue cities, need to work strongly together to develop the central region and increase its competitiveness. In that regard, forming a metropolitan regional Council can be an effective governance system to discuss the development policy agenda and solutions among various local governments. In the Seoul Capital Area (metropolitan area of Seoul), the Sudokwon Landfill Site Management Corporation and Metropolitan Transport Authority are such governance bodies in the transportation and environment sector.

B. Methods to Organize Da Nang Metropolitan Governance

Currently, there is a regional council consisting of provinces in the central coastal region that discusses emerging policy issues, but its decision-making power is limited due to the strong interventions by the central government. As seen in Korea's case study, this kind of governance works only when the participating local governments have shared interests and/or have a very clear task at hand. Therefore, in order to promote the regional governance at the initial stage, it is more effective to limit the fields of cooperation and the regional boundaries so that only entities (i.e., local governments and government institutions) with direct interests and needs for participation become the active members of the governance system. In that sense, a suggested strategy is to expand the participation of cities and provinces considering the evolution steps of the regional development. In the first phase, Da Nang should first form a small-size council with the neighboring provinces Hue and Quang Nam. This will result in a council consisting of Da Nang, Hue Province (Hue City), and Quang Nam (Hoi An and Tamky). By 2020, when the council is expected to be stable, the council should invite Quang Tri and Quang Ngai.

Figure 3-23 Strategy to Expand Da Nang Metropolitan Governance Network



For the council to work effectively, selecting the field of cooperation is also important. One of the greatest obstacles in the central region development is the poor inter-regional transportation infrastructure. Therefore, improving the regional transportation should be the priority agenda for the first stage of the cooperation. As the council grows larger and the participating members increase probably after 2020, the field of cooperation can be expanded to cover environmental issues, which are likely to be common agendas and concerns for the region.

Figure 3-24 Priority Agenda for Each Stage

1 st step (2015~2020)	<ul style="list-style-type: none"> Form a governance for metropolitan transportation between Da Nang, Hue and Hoian
2 nd step (2020~2030)	<ul style="list-style-type: none"> Expand metropolitan transportation network (Quang Tri–Da Nang–Hue–Hoian–Quang Ngai) Expand cooperative areas (e.g., environment)

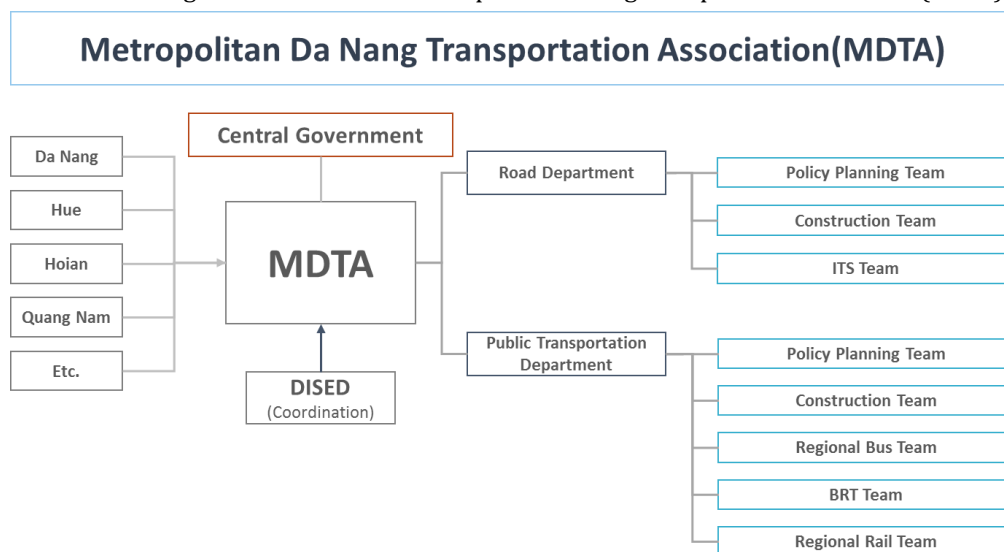
To conceive proper solutions and draw inter-governmental cooperation in the transportation field, the Da Nang Metropolitan Transportation Council (tentatively MDTA, the Metropolitan Da Nang Transportation Association) can be

formed consisting of members from Da Nang, Hue (city of Hue), Quang Nam (Hoi An and Tamky), Quang Tri, and Quang Ngai. Additionally, the central government's participation is essential since in Vietnam's administration system, such council cannot be formed or operated without the approval and support of the central government. In all this, DISED can play an advisory role in operating the council, such as leading the policy agenda, and also a mediating role between the participating government members.

MDTA should be comprised of government departments such as road department and public transportation department. The road department can be in charge of planning and constructing the roads and operating systems, and the public transportation department can work on improving the convenience of public transportation for the citizens based on the expanded and improved infrastructures which can be achieved by introducing the BRT system, and improving regional bus routes and their operation.

The next step after establishing the MDTA is finding financing to operate the organization effectively. The methods to secure the budget include obtaining contributions from the central government, allocating financial responsibility to member local governments and combining the supports from the central government with local governments' responsibility. This financing issue is one of important agendas that need to be discussed in depth after establishing the MDTA.

Figure 3-25 Tentative Organization Structure of Metropolitan Da Nang Transportation Association (MDTA)



3-7 Implications and Future Directions for Further Study

In the past year, DISED and the Seoul Institute conducted joint research to develop implementation strategies to create Da Nang Metropolitan Region and hub city. Starting with the first workshop in June 2015, the two institutes gathered three times to share what had been studied and discuss what to do for the next steps. Additionally, the researchers visited Hue City to meet with the mayor and listen to his opinions on forming a metropolitan area in the central region. Interested parties of Hue and Quang Nam were invited to workshops held in Da Nang to share the joint research results and form a consensus on the necessity of building a metropolitan

region in Vietnam's central area.

There are still many issues to be resolved in order to expand the regional infrastructure and to form governance as suggested in this research. The cost of expanding the infrastructure will be very high, and a financial plan needs to be reviewed more in depth in the actual planning stage. It is also important to propose to both the central government and the People's Committee that a governance system to develop a metropolitan region in the central region be formed. In addition, Da Nang should proactively prepare for the expected increased traffic congestion in its inner city as the metropolitan region formed in the future will attract more activities and trips in Da Nang.

The significance of this collaborative research is that the research team tried to derive the future direction of the central region's development and form a consensus among local governments surrounding Da Nang. This study was initiated as part of the effort to share knowledge between megacities and to share the experiences of Seoul with Southeast Asian cities now undergoing rapid economic growth. This research is, therefore, meaningful in the sense that it offers a new model of collaboration between international cities. The research team also hopes that the result of this study serve as a useful baseline in developing the vision for the central region of Vietnam centered on Da Nang.

References

- Yul-Sung Kim, 2010, Challenges and Opportunities for International Logistic City Busan, Busan Development Institute.
- Doyun Kim, 2013, Research on Seoul-Da Nang Knowledge Sharing Method: Focused on Da Nang High-Tech Park, Seoul Institute.
- Joonho Ko and Sunwung Kim, 2014, Research on Constructing the Asian Megacity Think-Tank Cooperative System & Hosting the Forum, The Seoul Institute.
- Sungkyunkwan University Green Smart City Lab, 2014, Proposal for Eco-friendly Da Nang High-Tech Park, Seoul Institute.
- CBRE, 2013, Da Nang City Market View.
- DHTP MB, 2014, Danang – The Attractive Destination for Investors.
- Da Nang City, 2012, Adjustment of Master Plan for Development of Da Nang City to 2030, Vision to 2050.
- Quang Nam Provincial People’s Committee, 2014, Quang Nam Provincial Socio-Economic Development Orientation to 2020 and Vision to 2025.
- Statistical Yearbook of Vietnam (2005–2013).
- UN-Habitat Vietnam, 2014, Assessment of Relevant Institutional Frameworks and Regional Planning Cases in Vietnam.
- UN-Habitat Vietnam, 2014, Assessment of Relevant Institutional Frameworks and Initiatives in Regard to Industrial Development of Da Nang Metropolitan Region.

Appendix

Research Timeline



Major Events

<p>May 2014 (Signing of MOU between SI & DISED)</p>	
<p>July 2014 (1st Workshop)</p>	
<p>July 2014 (Meeting with DHTP Management Board)</p>	

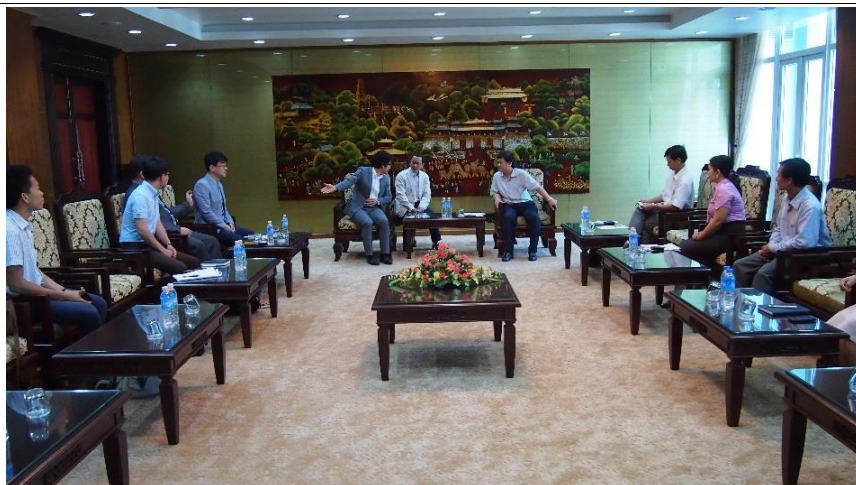
August 2014
(2nd Workshop)



December 2014
(3rd Workshop)



June 2015
(Meeting with Mayor of
Hue City)



June 2015
(4th Workshop)



June 2015
(Field Tour)



October 2015
(5th Workshop)



December 2015
(6th Workshop)

