USING A TRANSPORT ORIENTED DEVLOPMENT FOR THE LONG TERM DEVELOPMENT OF AN INDUSTRIAL CITY

THE CASE OF BATAM SEZ

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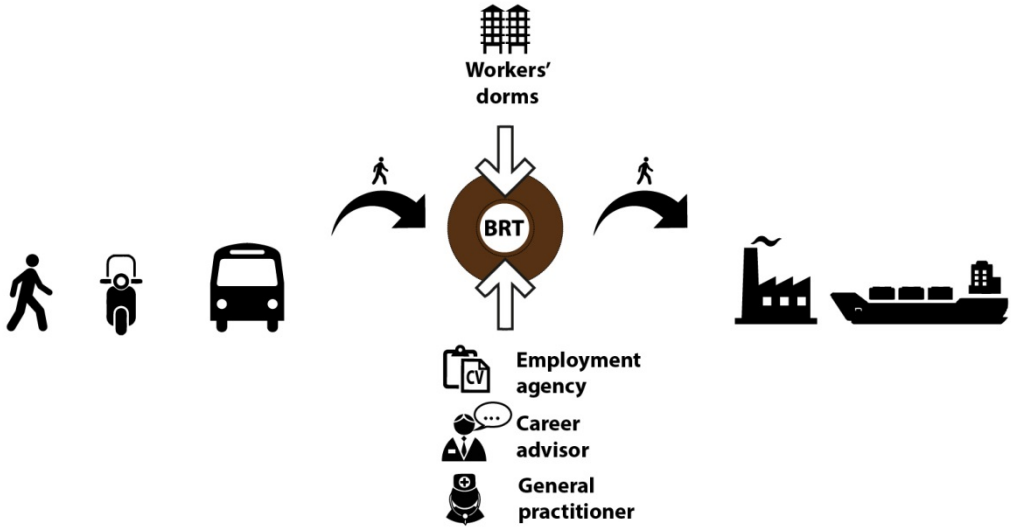

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ABSTRACT:

Similar to thousands other SEZ cities around the world, Batam was developed to attract foreign investors and develop its industrial basis. Its strategic position, nearby Singapore, made it an excellent location for manufacturing industries in the region. But such companies are inclined to leave these cities in case the economic conditions worsen such as it was the case in 2008.

In the years after the financial crisis, foreign companies have begun leaving Batam, in favor of other similar but cheaper, cities in the region.

In the frame of the dual master track of real estate and urbanism, the project hereby is also dealing both with the economic as well with the spatial problems that Batam is currently experiencing. The project addresses the poor housing conditions, reduced public mobility, the degrading ecological balance of the island, the loss of competitiveness and the inefficient governance.

At the base of the final solution stays a Transit Oriented Development (TOD) plan that uses a Bus Rapid Transit (BRT) system as main public transportation means. In solving the problems the project uses the transfer stations to create destination activities (such as social and commercial services) and more affordable housing. In addition, the new public transportation system creates new investment opportunities, along the main BRT lines and around the transfer stations. In dealing particularly with the loss of competitiveness the project proposes a cluster development based on the shipbuilding and oil&gas industry in the island.

Through this intervention the living conditions in the city improves and new opportunities have been created for larger private investments to take place, in order to recover the competitiveness of the city. This way Batam can better achieve its vision and continue developing and growing on the long –term.

TERMS AND ABBREVIATIONS:

Bappeda - Badan Pembangunan Daerah or Regional City Planning

BBK SEZ – Batam–Bintan–Karimun Special Economic Zone

BIDA – Batam Investment Development Agency (previously *Otorita Batam*)

BIFZA - Batam Indonesia Free Zone Authority (previously *BIDA*)

EPZ - Export Processing zones

FDI - Foreign Direct Investment

GDD - Guangzhou Development District (GDD)

ILO – International Labour organization

'kampung' – village (in Indonesian in original);

'kampung tua' – old village (in Indonesian in original), denominating the original villages of the island

'kecamatan' - district (in Indonesian in original) it is a sub-division of the '*kota'*

'kelurahan' – sub-district (in Indonesian in original) the sub-division of 'kecamatan'

'kota' – municipality (in Indonesian in original) such as in *Kota Batam*, the *Municipality of Batam*

KSB – 'ready-to-build' plots (from 'kavling siap bangun', in Indonesian in original)

Pemko – the elected Local government led by a mayor (from *Pemerintah Kota,* in Indonesian in original)

PRD – Pearl River Delta

R&D – Research and Design

'ruko'- shop houses (from 'rumah toko' in Indonesian in original),

'ruli' – illegal housing or squatting settlements (from 'rumah liar' in Indonesian in original)

'rusun' – social housing (from 'rumah susun', meaning vertical house, in Indonesian in original)

SEZ - Special Economic Zones

TOD – Transit Oriented Development

WTO – World Trade Organization

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I. INTRODUCTION

1.1 RESEARCH MOTIVATION

At the end of the 19th century and the beginning of the 20th century, an important number of private entrepreneurs from Europe and North America, were building housing quarters and other facilities, such as health dispensaries, kindergartens, sports clubs, shops, for the use of their workers. Even then, it was rather unusual that private companies would build such costly facilities, which were, indirectly related to their main production purpose. Nonetheless, this attention paid to the workers and their living conditions generated important changes to the spatial, legislative and economic situation, which had an important impact on the development of some of the cities and communities nowadays.

This is the case of Philips' light bulbs' factory and the city of Eindhoven in the Netherlands. In 1891, the year the factory was established, Eindhoven counted 4,500 inhabitants, without considering the population of the surrounding villages (Heerding, 1988, p.278). In 1910, in less than two decades, Philips arrives to hire more than 2,000 workers, making it the single largest employer of the Netherlands, and inaugurates the core of, "Philipsdorp" (Philips' Village), an housing project that will help transform the living and working conditions in Eindhoven once for all.

The housing units in this residential complex, outside the factory's premises, were designed "beyond the minimum standard", considered then, with bathrooms and toilets inside the house, gardens behind the house and ceramic tiles and parquet finishes. The houses were rented at rent levels considered affordable for the workers in the company, in time they becoming owners.

In present Eindhoven population is 400,000 and it is recognized as an international technology and innovation center. The spatial and social effects Philips had on this city can still be easily traced back in the names of streets, football stadium, and other public buildings and monuments.

What made this private corporation, profit oriented, to dedicate its time and money for the development of Eindhoven? Was it unintentional, as an side-effect of their expansion, which dragged the development of the city, or at some point in time this become a strategy on its own, alongside with the internationalization of the company beyond the borders of Europe, in order to benefit its own image and reputation? And more important, can the lessons learned from this win-win situation help other industrial cities developing nowadays in other parts of the world?

Similar situations take place nowadays in other cities around the globe, such as in Special Economic Zone cities like Batam, a small Indonesian city-island at the border with Singapore. Since the early '90s the city passed through an intense industrialization process that attracted more than 1 million people, currently. Yet the economic success has not been replicated at the social level, the city suffering from poor housing conditions, restricted mobility and even competition loss. The example of Philips and Eindhoven proved to be a win – win case, could it be replicated again nowadays in Batam's conditions?

1.2 THE SPECIAL ECONOMIC ZONES (SEZ) CASE

The project looks into the 21st century relation between cities and industry in the rapidly industrializing areas of developing countries and how these can keep developing on the long-term. Located in the Riau Archipelago province, NW Indonesia, the city of Batam a fast industrializing area. It is located on the largest (412 km2) and the most developed island from a group of around 400 islands, at only 30 minutes away by ferry from Singapore. As such it is strategically located along the busiest sea trade route of the world, which connects Asia to Europe.

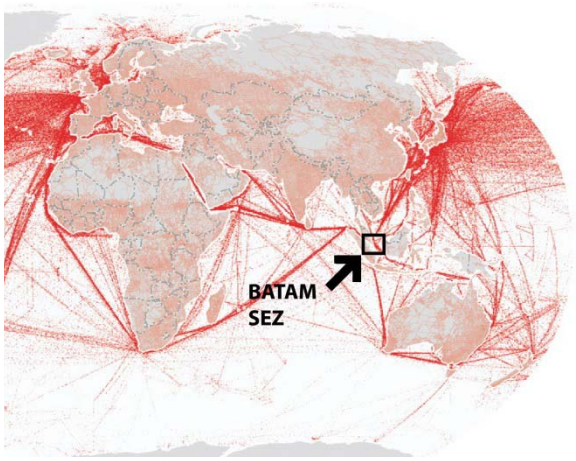


Figure 1: Batam SEZ location on the globe and with respect the international sea-trade routes (source: Wikimedia Commons)

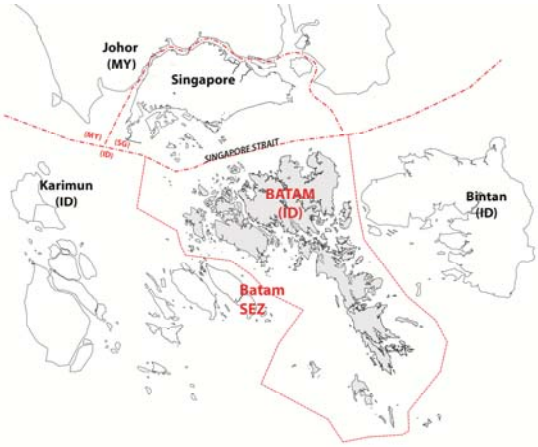


Figure 2: The position of Batam island and Batam SEZ in the regional context (source: Bappeda, 2010)

Because of its location, the island was conceived as a deregulated economic zone since 1970 and later on as a Special Economic Zone SEZ (Regional City Planning Department of Batam, 2010), in order to attract foreign corporations, in particular those having their headquarter in Singapore.

TEXT BOX 1 SPECIAL ECONOMIC ZONES (SEZ) DEFINITION

Special Economic Zones (SEZ) or Export Processing Zones (EPZ), areas appeared in response to the globalization process and the consequent exodus of production facilities, from the developed countries to the rest of the world. Though a generic term that can describe various organization structures, function of the benefits or specialties each offers, SEZ are defined as "*geographically delimited areas administrated by a single body, offering certain business incentives to business which physically locate within the zone*" (FIAS, 2008, p. 2).

The difference between the SEZ and EPZ is that SEZ can include whole provinces, such as it is the case in the Pearl River delta in China, where Shenzhen SEZ is located, while the EPZ refers to smaller and better delimitated, most of the time totally fenced-in, areas that can be reduced to just one factory, such as it is the case in Mexico or Malaysia (Milberg and Amengual, 2008, p.1).

SEZs developments proved a popular strategy implemented by many developing economies, and not only, in order to attract foreign direct investments (FDI), create jobs, develop exports and generate government revenues. Other benefits created by these areas, are skills upgrading, female employment and indirectly empowerment, technology transfer and regional development (FIAS, 2008, p.32).

In 2008, FIAS estimated the total number of SEZs at over 3,000, located in 135 countries around the globe and accounting for over 68 million direct jobs. Hence, the economic and social contribution of these areas cannot be underestimated. Most of these zones, 38%, are located in the region of Asia and the Pacific, areas where Batam is also located, and they have several specializations or development objectives (table 1). (FIAS,2008)

Table 1: Example of specialized SEZs (after FIAS, 2008)

Type of SEZ	Development objective	Size (ha)	Typical location	Activities	Markets	Example
Technology or Science Parks	Promote high-tech and science-based industries	<50	Adjacent to universities, institutes	High technology activities	Domestic and Export	Singapore Science Park, Singapore
Petrochemical Zones	Promote energy industries	100 – 300	Petrochemical hubs; efficient energy sources	Petrochemicals and other heavy industry	Domestic and export	Laem Chabang Industrial Estate, Thailand
Financial Services	Development of offshore financial	<50	None	Offshore financial and non-financial	Export	Labuan Offshore Financial Centre,

	services			services		Malaysia
Software and internet	Development of software and IT services	<20	Adjacent to universities and urban centres	Software and other IT services	Export	Dubai Internet City, United Arab Emirates
Airport-based	Air cargo trade and transhipment	<20	Airports	Warehousing, transhipment	Re-export and domestic	Kuala Lumpur Airport Free Zone, Malaysia
Tourism	Integrated tourism development	200 – 1,000	Tourism areas	Resorts and other tourism facilities	Export and domestic	Baru Island, Colombia
Logistics Parks or Cargo Villages	Support logistics	<50	Airports, ports, transport hubs	Warehousing, transhipment	Re-export	D 1 Logistics Park, Czech Republic

There are few general characteristics for all SEZ areas around the globe according to FIAS:

- concentration in a few countries - China and Mexico hosting the largest amount of zones in the world;
- concentration in a few product areas – such as electronics, garments and sports apparel; and,
- reliance on female workforce – 60 to 70 % of the total workforce worldwide in these zones is made up by women (2008, p.23-25).

Some experts however doubt the beneficial effect of SEZ on the long term, pointing to issues such as unsafe and unhealthy working conditions, underpayment and abuse of the workers, poor housing, among others. (Jauch, 2002; Aggarwal, 2007; Brown, 2007; Duhigg and Barboza, 2012)

This is also the case of Batam island. Started in the early '70s, Batam begun with several, access restricted, duty-free areas and warehouses, in time, the status extending to other 400 islands surrounding it, today being declared a SEZ. The free-trade status, brought foreign investors and created jobs, which contributed to the radical development of the area, especially after 1990, the year when the Indonesian and Singapore governments would sign an economic cooperation agreement, known as the SIJORI agreement. (Royle, 1997; Grundy - Warr et al., 1999; Colombijn, 2003; Sparke et al., 2004). Nowadays the island is not anymore a simple spot on the map, but the "*economic growth locomotive*" and "*gate of foreign investment*" for the whole Indonesia. (Regional City Planning Department of Batam, 2010, p.XXXi)

With the signing of the SIJORI[1] agreement, international companies begun relocating their factories across the Singapore Strait to Batam. This determined a large immigration process that continues even today, and which started to put a lot of strain on the living conditions in the island, which were still underdeveloped. Poor housing conditions and limited mobility for many of the residents, especially the disadvantaged, being the most urgent to address and evident. In addition to these, the natural ecosystem of the island began declining in the past several years, and the economic and administration conditions have been increasingly challenging for the private investors taking its toll on the overall competitiveness of the island.

1.3 PROBLEM STATEMENT, RESEARCH QUESTIONS AND FINAL PRODUCT

The main factors contributing to the spatial problems of Batam are: (1) the low quality and insufficiency of affordable housing; (2) an insufficiently developed road system, designed mostly for industry's and not people's need which restricts the mobility of the residents; and, (3) the constant city expansion, or urban sprawl, which

[1] The acronym stands for Singapore, Johor province, south Malaysia, and Riau province where Batam SEZ is located.

threats the ecological balance of the island and is putting at risk the island's fresh water resources and sea life. These problems are essential to address because they directly affects the living conditions and the development of the residents, while restraining the socio - economic potential of the island.

In addition to these spatial problems, research shows that Batam is also dealing with (4) loss of competitiveness, in part due to the rising competition in the last decade coming from other cheaper locations in the region, and (5) land use administration issues, as a result of an inefficient, two government bodies administration. These issues contribute in an important part to the long-term development of the island and concomitantly needs to be addressed also in this project.

The problem statement, results from the incompatibility between the problems the city confronts and its vision. According to the local government, Batam is to become "*the City with rapid growth of development, and be parallel with other metropolis in the future*" economically, administratively and socially. (Regional City Planning Department of Batam, 2010, p. xxx-i)

The problem statement can be hence formulated:

BATAM ASPIRES TO BECOME A LEADING INDONESIAN CITY BUT ITS POOR HOUSING CONDITIONS, REDUCED MOBILITY AND ENVIRONMENTAL PROBLEMS COMBINED WITH THE LOSS OF COMPETITIVENESS AND ADMINISTRATION ISSUES FROM THE PAST DECADE ARE PUTTING AT RISK ITS LONG-TERM DEVELOPMENT GOALS.

The vision of this project is:

THROUGH ITS EFFICIENT ADMINISTRATION OF LAND USE, TRANSPORTATION AND ENVIRONMENT, BATAM WILL BECOME THE MODEL CITY IN TERMS OF LIFE QUALITY AND INVESTMENT OPPORTUNITIES IN INDONESIA, AND A LEADING INNOVATION AND COMPETITION CENTER AT THE REGIONAL AND GLOBAL LEVEL.

The main question of this project can be formulated as:

HOW CAN BATAM MAKE BETTER USE OF ITS LAND AVAILABILITY TO IMPROVE THE LIVING CONDITIONS AND DEVELOPMENT CHANCES OF ITS RESIDENTS, WHILE ALSO CREATING NEW INVESTMENT OPPORTUNITIES TO BENEFIT BOTH THE CITY AND THE INDUSTRY?

By 'living conditions' it is meant the affordability, availability and quality of the housing, the public transportation quality and the natural and surrounding environment conditions. The term refers also to the social balance and personal development opportunities existing in the communities around the island.

The final product of this thesis will be:

A TRANSPORT ORIENTED DEVELOPMENT PLAN USING A BUS RAPID TRANSIT (BRT) SYSTEM FOR THE NEXT 30 YEARS, AIMING AT IMPROVING THE HOUSING CONDITIONS AND MOBILITY WITHIN THE CITY; RESTORING THE ECOLOGICAL BALANCE OF THE ISLAND, WHILE, CREATING THE CONDITIONS FOR PERSONAL DEVELOPMENT AND PRIVATE INVESTMENT TO HAPPEN, FOR THE LONG-TERM.

By 'conditions for personal development' is meant creating space for higher education facilities, vocational schools and other similar venues, where residents can train and improve themselves in order to purchase a long-term professional career. This means also providing additional services such as career advice, employment offices and special accommodation (e.g. student dorms), in order to facilitate the choice for a career path for the students or trainees.

By 'conditions for private investment' is meant creating spaces attractive for companies and developers to invest and develop. This means also providing professional assistance services (e.g. governmental, legal counseling, etc.) or cooperation incentives and

In answering to the main question, several secondary questions will be researched on the way:

1. *HOW INDUSTRY CONTRIBUTES TO THE DEVELOPMENT OF CITIES AND WHAT MOTIVATES PRIVATE CORPORATIONS TO DEVELOP WITHIN A CITY? WHAT MODELS CAN ILLUSTRATE THE INDUSTRY – CITY RELATION?*

2. *HOW DID PRIVATE CORPORATIONS CONTRIBUTED TO BATAM SEZ UNTIL NOW AND WHERE BATAM CASE CAN BE LOCATED AMONG OTHER INDUSTRIAL CITIES EXAMPLES, FROM THE PAST (I.E. EINDHOVEN) AND MORE RECENT DEVELOPMENT (I.E. SHENZHEN SEZ)?*

3. *HOW IS THE CITY CURRENTLY ORGANISED, ITS MAIN ACTIVITY CENTRES, STRENGTHS, CHALLENGES AND DETERMINANT DRIVERS?*

4. *WHAT LESSONS CAN BE LEARNED FROM THE CASE OF CURITIBA AND HOW CAN A TRANSPORT ORIENTED DEVELOPMENT (TOD) CAN BE IMPLEMENTED IN BATAM?*

1.4 RESEARCH APPROACH

The project was developed over the span of two years along six stages (fig. 1). From a research point of view, the solution of this project results is based on the analysis and observations coming from several case studies, theoretical framework and present context analysis.

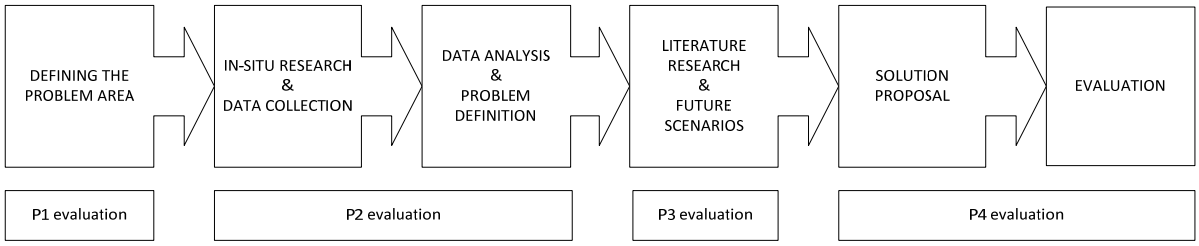


Figure 3: Research steps.

The literature research of this project is divided in three parts.

Part A, which works as a research background of the whole project, tries to understand the relation between industry and the city. This part uses the cases of Eindhoven and Shenzhen to portray the relation private corporations - cities, in the conditions of the last century and in the present socio-economic conditions, respectively.

Part B and C are explaining the principles that stay at the base of the final solution for this project. Specifically Part B is explaining the strategy of Transit Oriented Development which will be used for addressing in particular the spatial problems of the central case, while part C, is explaining Michael Porter's concept of competitive clusters, which will be used to address the economic issues identified in Batam.

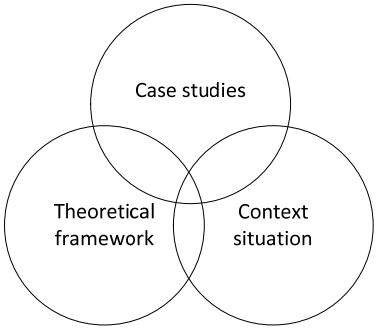


Figure 4: Research methodology.

II. LITERATURE RESEARCH

PART A - THE INDUSTRY - CITY RELATION

This part of the report explains the relation between the industry and the city, and how it can be interpreted from the point of view of private corporations and the city authorities. In part B and C of this research the transit oriented development strategy and the competitive cluster concept, which will be used for the final strategy of the central case, will also be described

2.1 DEFINITIONS

According to Encyclopædia Britannica 'industry' is:

"*(a) a systematic labour especially for some useful purpose or the creation of something of value; (b) a department or branch of a craft, art, business, or manufacture; especially one that employs a large personnel and capital like in manufacturing; (c) a distinct group of productive or profit-making enterprises ‹the banking; (d) manufacturing activity as a whole […]"* (Encyclopædia Britannica, 2011)

Industry can be classified as primary, secondary and tertiary. A forth type and even a fifth type of industry are also considered. These involves innovation and knowledge for generating higher margins or return on investment (Kenessey, 1987). The distinction between these generalizations could be: (1) the type of inputs and outputs they use or produce; (2) the type of labour employed; (3) the type of consumers or clients each has; (4) the type of producers or capital owners (governmental or non-governmental owners or a combination of these) and size.

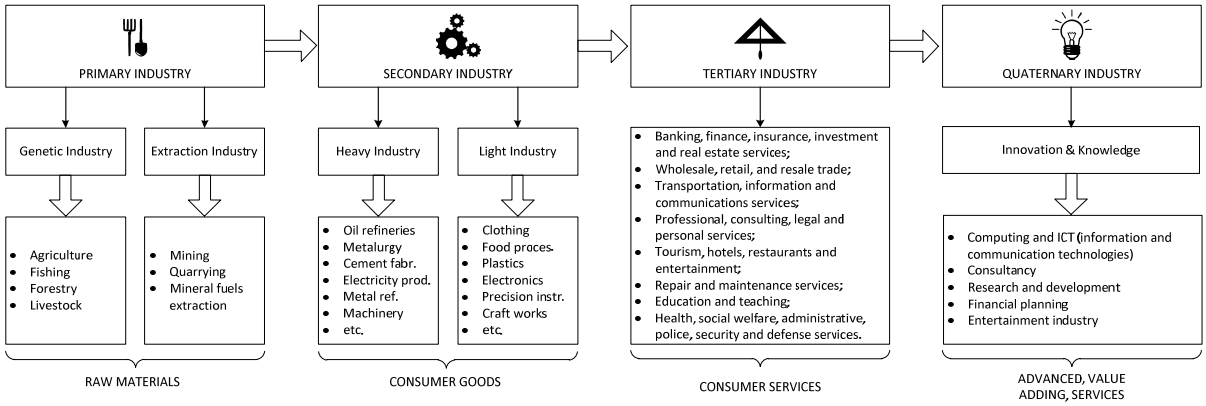


Figure 5: Industries' classification (after Encyclopædia Britannica Student and Home Edition, 2011)

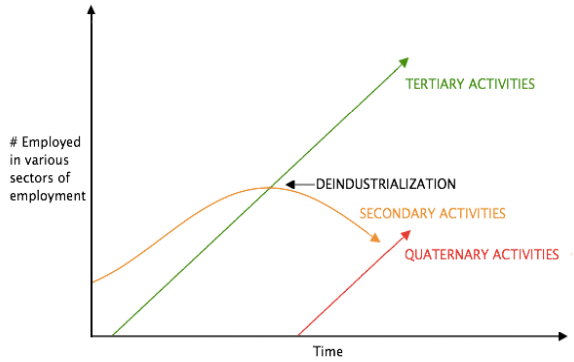


Figure 6: Clark's sector model (1950) (source: Wikimedia 2007)

According to Clark's sector model (1950), in time a nation would develop from a primary and secondary industry, in principle agriculture and manufacturing, to a tertiary and quaternary industry, in essence services. The turning point between these economic profiles marks the 'deindustrialization phase' – i.e. when the tertiary activities begin employing a larger number of population than the secondary industry (manufacturing or industrial sector).

A robust economy would have a good proportion of jobs in all the various sectors of the industry in order to be able to adapt more easily to the market changes and provide sufficient innovation potential for new economic activities to be created (van Winden and van den Berg, 2004). Despite this, it can be observed that in the past centuries, as the population grew more urbanized and moved to the city, the percent of the people working in the primary - agriculture, and secondary - industry, activities, has been constantly reduced, this trend being predicted to continue as well in the future (UN-Habitat, 2010).

According to UN Habitat:

"Cities are the centres of knowledge, innovation and specialization of production and services. Cities facilitate creative thinking and innovation. High concentration of people in cities generates more opportunities for interaction and communication, promotes creative thinking, creates knowledge spillovers and develops new ideas and technologies. Cities provide more opportunities for learning and sharing. Cities facilitate trade and commerce by providing super market places. Cities serve as production and services centers because the production of many goods and services is more efficient in a high-density urban environment. Cities provide consumers with more choices of goods and services. Cities are the agents of social, cultural, economic, technologic and political changes and advancement." (UN-Habitat, 2010)

Scholars such as Richard Sennett (1996), Hannah Arendt (1958), Jane Jacobs (1992) and others, are defining the city through its 'public life', the presence or lack of it creating the conditions for the city to be more or less attractive, or more or less of a city. Lewis Mumford, in his famous essay 'What is a City?' (1937), writes that the city is "*a theatre of social action*", where arts, politics, education, commerce and everything else that can define a city, contributes to the enrichment of the social life.

UN Habitat remarks that cities are, "*vehicles of social change*", promoting rights and opportunities for all members of the society. In the end a city promoting the concept of 'inclusiveness', is standing better chances for upgrading and developing both the social and economic conditions. (UN-Habitat, 2010)

Their high urban densities makes them more efficient, by reducing transaction costs, making public spending on infrastructure and services more economically viable, and facilitating generation and diffusion of knowledge, resulting in "*unprecedented gains in productivity and competitiveness.*" (UN-Habitat, 2011)

Experts agree that from the earliest examples, around 5,000 years ago, the evolution of cities and industry has been closely related. (Amzallag, 2009; Smith, 2009) But the overdeveloping of only one type of industry, without innovating, is putting the development of the city at risk. In 'The economy of the cities' Jacobs argues that the growth of the city essentially depends on its innovation capacity, in creating new products and economic activities (Jacobs, 1969, p. 120). She gives as example the city of Detroit, which, becoming too dependent on the auto industry it started declining after the large car manufacturers closed the factories in the city. 2.2 The case of Eindhoven: the bottom-up city development

The present project started from the case of Philips and Eindhoven, which illustrate a win-win case between the industry and the city, or between the private and the public parties.

The establishment of the Philips factory in Eindhoven marks a turning point in the evolution of the city, which until then counted only 4,500 inhabitants, without considering the population of the surrounding villages, merely a town. After the first Philips factory opened in 1891, the demographic evolution of the city marks 46,000 inhabitants in 1920.

But the influx of workers made for the housing conditions in Eindhoven to worsen. Not only that the majority of the housing conditions were deemed poor, but there was also an acute lack of it, most of the residents having to live in overcrowded, unhygienic and unsafe conditions. (Otten and Kleijn, 1991, p.38)

The authorities responded to this situation initially by inaugurating in 1897 the first steam-powered tramline, which connected the municipalities of Veghel, Eindhoven and Reusel, to Liege, in Belgium. This way Philips could easily use workers from the Eindhoven surroundings, without being necessary to provide housing inside the city itself. Another tramline soon opened after that, connecting the Philips factory with the Eindhoven expansion areas. (Otten and Klein, 1991, p.27).

However efficient this solution, the housing problems continue to persist, given the fast expansion rate of the Philips company. By 1910 it employed more than 2,000 people, becoming the largest employer of the Netherlands[2] at that time.

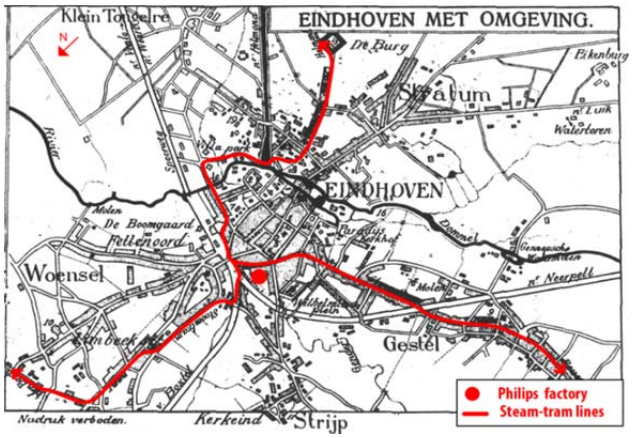


Figure 7: Eindhoven around 1900, with the surrounding villages and the steam train lines. (source: modified map from Otten and Klein, 1991)

Figure 8: The housing conditions in Eindhoven around the beginning of the 20t. Photo from 1913. (source: Eindhoveninbeeld.nl)

But the attraction of better skilled workers, such as metalworkers and glassblowers, became more difficult, determining Philips to look for skilled labor, outside the North Brabant province , in Drenthe, Overijssel, Gelderland, where they recruited skilled workers directly from the competition (Otten and Kleijn, 1991, p.40; Kalb, 1997, p.115). In this situation, only a better payment incentive was insufficient to convince these workers to come to Eindhoven, because these were already paid above the average in the region. Other incentives had to be found. This is how, Philips founders decide in 1909 to start building, at their own expenses, a residential neighborhood for their own workers and in order to attract and retain these skilled and specialized workers which were harder to get (idem, p.43). The first units will be ready before Christmas 1910 forming the core of the 21 ha "Philipsdorp"[3], part of which exists even today.

TEXT BOX 2: PHILIPSDORP AND ITS IMPACT ON EINDHOVEN

It is interesting to describe the impact Philips had on Eindhoven growth, along the years because it created the premises for the city to expand, develop and reach its international reputation as a centre of innovation and technology that it has today. More important, it helped developing the human capital of the city, through its deeply socially declared mission.

Eindhoven of today has developed from a medieval city and its five surrounding villages: Woensel, Gestel,

2 Source philips.com (link: http://www.philips.com/about/company/history/ourheritage/index.page) [accessed 09-09-2012]

3 Meaning 'Philip's Village' in Dutch in original.

Stratum, Strijp and Tongelre. Despite of its 'city status' dating all the way from early 13th century and which conferred the city the right for holding a market and set its own rules, the city had a slow growth over the centuries. In 1815, the city counted in total only 2,3104 people, around double the population of six centuries earlier.

The city's development path begun to change after Philips moved open its first factory in 1891, which began attracting more and more workers causes a housing crisis in Eindhoven that persisted over time despite the authorities' efforts.

This determines Anton Philips, one of the founding fathers of the Philips company, to decide building its own hosuing for the workers through "Eindhoven Vooruit". In 1909 the association buys a piece of land, of 21ha west of the factory, in the Strijp village that would become the core of the Philipsdorp. From 1910 to 1923, the 'village' will develop in three phases, in total reaching a surface of 43ha. The first houses will be ready in 1910 before Christmas

The initial plans of the village, will be drawn by the urban planner G.J de Jongh and Rotterdam's director of public works. De Jongh's design is based on the 'garden city' principles, with large green open spaces and tree lined streets. The plan was conceived as a stand-alone, self-contained neighbourhood, nearby the production areas of Philips, yet outside their premises. It is also well integrated with the rest of Eindhoven via Frederiklaan, which forms the 'backbone' of the development and connects the Strijp village with city.

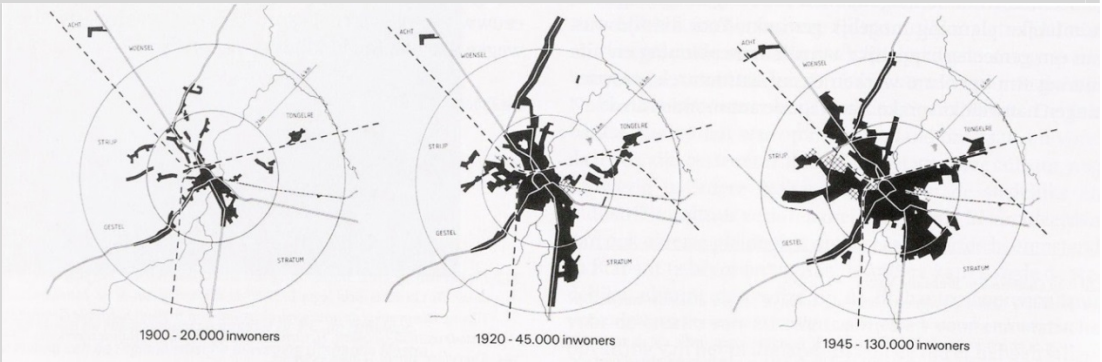


Figure 9: The growth of the Eindhoven city, in time. In 1920 the city annexes the surrounding villages becoming the larger city of today. (source: zandstad.nl)

Between the houses and the train lines a large park with various public amenities is located (such as a football field which will become Philips stadium of today, a playground for kids and a school). By 1912 other basic amenities can be found in the rest of the development, such as shops, but also a bathhouse and a community centre where music and theatre associations were meeting and different cultural activities were taking place. (idem, p.47)

The houses are close to the city centre, but they have a backside garden and a modern and spacious layout, considered way ahead of their time (with bathrooms and kitchens inside the same premises and with ceramic tiles and parquet finishes).

They are being leased out at price levels established function of the position of the worker in the company, in the end the worker arriving to own them, via a finance scheme guaranteed by the company and run by Stichting Philipsdorp. Philips was not drawing any profits from their renting or selling, the only objective being to improve the overall living quality of the residents and incentivizing them to remain working in the same company.

As an example of the quality of the plan are the streets, which were planted with elm trees and had paved sidewalks in front of the houses. The main road (Frederiklaan) had in the middle a green strip planted with trees, and the company was trying to organize competitions and celebration events for all their workers and residents alike, in the end Philipsdorp being not only about living and working, but also about creating a community and building up social relations.

[4] Source: http://www.eindhoven.nl/stad/historie-1/Groei-van-Eindhoven-1.htm [accessed 09-09-2012]

In time, more and more public amenities and services, which began serving the whole city, were created under the multiple public associations the Philips company helped established. Such as the Philips Stadium (the sport club established in 1913), the Etos chain shops (established in 1918 which included all sort of shops, not only the present drugstores but also groceries, bakeries and even fuel pumps), the Philips Bedrijfschool (established in 1929 and providing vocational training and education) and many others. This paternalistic attitude to people lead to the saying "Philips is Eindhoven and Eindhoven is Philips"[5]. In parallel with the expansion of Philipsdorp, in 1920 Eindhoven annexes the surrounding villages creating the city of today.

Figure 10: The elevation and plan of two typical houses built between 1910 - 1912 (source: Otten and Kleijn, 1991)

Figure 11: Main street view from around 1911 (Frederikslaan). All the houses have back garden. (source: www.eindhoven-in-beeld.nl)

In 1997, the company decided to relocate in Amsterdam and the process is finalized in 2001. Apart of some research facilities, in Eindhoven remains the housing, the communities and the human capital built by the company along the years. Nowadays Eindhoven enjoys an international reputation as an innovation and technology center, having its own university and design academy, its own international airport and continues to attract many companies in the hi-tech field. For this reason the relation between Philips and Eindhoven can be considered a win-win case.

Though partially started from pragmatic reasons, it can be concluded that Philipsdorp went a long way from providing only good living conditions, to creating the conditions for the socio – economic development of Eindhoven of today. The project contributed to the improvement of the living conditions and the rising of the human capital, for the whole city, since the spatial quality of the plan, the amenities and the spin-offs resulted from them (such as the various associations) were available to everyone in the city, and not only Philips' workers. As one of the later founders stated, about Philipsdorp:

"*[…] rarely is the minimum good enough. Always, it is necessary, in order to increase the prosperity and well-being, to think ahead. Therefore we must set the standard higher and higher and step ahead of our time*."[6]

This was also stated in the mission of the "Eindhoven Vooruit"[7], the association which developed the Philipsdorp, as "*promoting the interests of trade, industry, popular welfare, health and leisure*" (Kalb, 1997, p.114). Hence, not only a mono-functional project meant to fulfill basic housing needs, but a multi-functional program that would contribute to the enjoyment and development of the people that used them.

Little by little, the evolution of Eindhoven, from just a small provincial town in 1891 to the current situation, when it is recognized as an important technical and innovation center in the Netherlands but also abroad, has been influenced by the presence of Philips, which despite of being profit oriented, placed social responsibility high on the agenda as well.

[5] From Wikipedia.com (link: http://nl.wikipedia.org/wiki/Koninklijke_Philips_Electronics#Sociale_dimensie) [accessed 06-05-2013].

[6] From F.J. Philips forward letter to "50 jaar woningbouw Philips. Bouwen als sociale daad" (Vriend, 1961).

[7] In translation 'Eindhoven forward' or 'Eindhoven progressing' after other authors such as Kalb (1997).

It is nevertheless true, that this social commitment can be partially explained by that particular moment in the history of Europe, second half of the 19th century, after the apparition and development of the Industrial revolution in England. The apparition and popularization of "The condition of the working class in England" by Friedrich Engels in 1844, brought to the attention of most of the Europe the negative effects the industrialization and the capitalism system, paving the way into a more socially committed 20th century (Kalb, 1997).

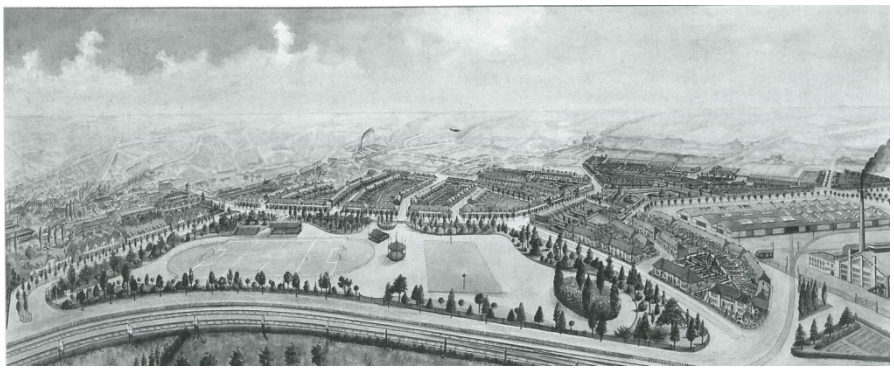


Figure 12: Perspective view over "Philipsdorp" around 1920, with the park and the recreational amenities in the foreground and the factories on the right side of the drawing. (source, Otten and Kleijn, 1991)

The founders of the light bulb factory, the brothers Gerard and Anton Philips and Jan Reese, were familiarized with these currents, being members of the 'Association for the Promotion of Manufacturing and Craft Industries' (APMCI). This association "had a reputation for being more inclined towards social reforms — notably aiming at improving the lot of the working class and the weakest in the society", aside of promoting the interests of industrialists (1988a, p. 241).

But nowadays socio-economic conditions have changed dramatically. Can the industrialists of the 21st century lead to similar urban developments as it did in Eindhoven at the beginning of the last century? To answer this question the project hereby looks into the example of SEZ cities and Shenzhen in particular.

2.3 THE CASE OF SHENZHEN SEZ: THE TOP-DOWN CITY DEVELOPMENT

If the case of Philips and Eindhoven was illustrating a success situation more than a century ago, the city of Shenzhen, like most other cities in the Pearl River Delta (PRD) region, illustrate a similar situation nowadays, in the present socio-economic conditions of SEZ areas. This city is considered a win-win situation because they managed to retain important manufacturing companies contributing to the growth of the city even nowadays.

Shenzhen is the first SEZ area in China set up in 1978 by Deng Xiaoping. It was meant to be a model following Hong Kong example, for the industrialization of other Chinese cities. Apart of its strategic location, near Hong Kong, the city raised from a fishermen village in 1979, to the most connected production center of the world[8], with a population of over 15 million (including migrant workers not considered residents) and ranked no. 1 as best living quality city in China (according to Liu Junde, after Wuttke and Waibel 2008, p.233).

According to Liauw (2012) and Burton et al. (2003) Shenzhen experienced three development phases. In the first phase (1980 – 1991) the authorities focused on the attraction of the FDI and the development of the industry. In the second phase (1992 – 2001) attention was given to the improving of the land use and solving the spatial problems. In the third, and current, phase that started in 2001, the city begun investing in improving the living conditions of the people, in order to develop and diversify their economic base in addition to the

[8] In 2011 according to UNCTAD – United Nations Conference on Trade and Development.

manufacturing to more services (R&D). During this last period, the city authorities actively tried to create an international image of the city in order to continue attracting new investors. This evolution path of the city seems to be following Milberg and Amengual's recommendation of "*transforming industrial upgrading into social upgrading.*" (2008, p.62)

TEXT BOX 3: THE DEVELOPMENT OF SHENZHEN

Shenzhen city is a success case because it maintained its growth over the years, becoming the best living quality city in China. For this reason it is interesting to understand how the evolution of this city took place. Largely there were three development phases, starting from 1980 to present times.

- 1st development phase: the industrial town (1980 – 1991)

In the early phase of development, Shenzhen was offering a combination of special tax regulations, cheap labour and land like most other SEZ cities around the world. As in other cases, these incentives proved attractive to the Hong Kong based companies, many deciding to move their manufacturing facilities in Shenzhen, while maintaining their headquarters, research & design and sales & marketing departments in Hong Kong.

At the spatial level, the authorities' priority was to develop the infrastructure necessary to attracting the FDI and the industry, without considering the needs of the citizens. Urban development at this stage was random and mainly took the form of standard industrial estates, most of the housing being located in purposely built dormitories adjacent to the factories in order to make the commuting of the workers easy and efficient. There were few leisure or commercial amenities in the city, and the city suffered from overpopulation, illegal housing, illicit economic activities, traffic congestion and land speculation.

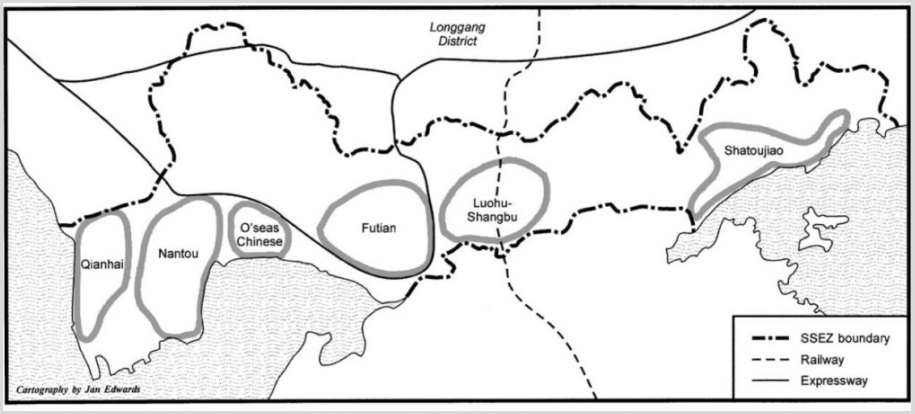


Figure 13: Shenzhen SEZ - Proposed urban clusters (after Bruton et al. 2003)

The most important change took place in in 1986, when Shenzhen Municipality Authorities broke away from the traditional masterplan approach, under the central government, and completed its first comprehensive plan, which defined in detail the land uses for 6 'clusters' along the main transportation lines. This transportation corridor, connecting Shenzhen to the main cities in the region, was was largely finished in 1991 with the opening of two ports and an airport.

- 2nd development phase: making better use of the land (1992 – 2000)

In 1992 the first stock market in China is opened in the city, making Shenzhen a major economic corridor for South China, and connecting it at the global level. This makes the authorities to begin dealing more efficiently with the land use of the city. The phase started by dealing with the land speculation problems, first by dealing with the overheated economy and second by integrating some of the smaller districts under the direct administration of the Municipality so that the land use could be better controlled. In principle, it focused on the retention of a compact urban form based on the 6 clusters already defined, along the main transportation lines and the protection of the environment by enforcing the intensive use of already developed urban land.

The new plan was restricting the development to the clusters' area, which were focused on the three transportation axes leaving the SEZ restricted area. The residual problems created by speculative and uncoordinated development have been addressed by creating green wedges and major open public spaces between the growth clusters, removing temporary or illegal buildings, de-centralising overcrowded housing areas and giving priority to the construction of public service facilities. The plan also put a freeze on the conversion of agricultural land to urban use and introduced a basic zoning system identifying zones for transport

use, building/development, agricultural reserves, water reserves and landscape and natural environment protection zones.

- 3rd development stage: the global city (2001– present)

In this stage, the authorities begun transforming and consolidating Shenzhen into an attractive and comfortable city to live in, offering a large range of specialized services and connecting better at the metropolitan level with other cities in the PRD region, such as Guangzhou, Dongguan.

Some changes predicting this development more towards the people's needs, could be observed already since the mid-1990s when the manufacturing industry began moving out of the SEZ into the adjoining local authority areas such as Dongguan, where land and labour costs are lower. Currently the authorities had adapted to the changed conditions and they are experimenting with new policies that are designed to attract high-tech and R&D job to Shenzhen, (for example by providing high-quality high-tech industrial estates, by developing an environmentally high-quality new town, etc.).

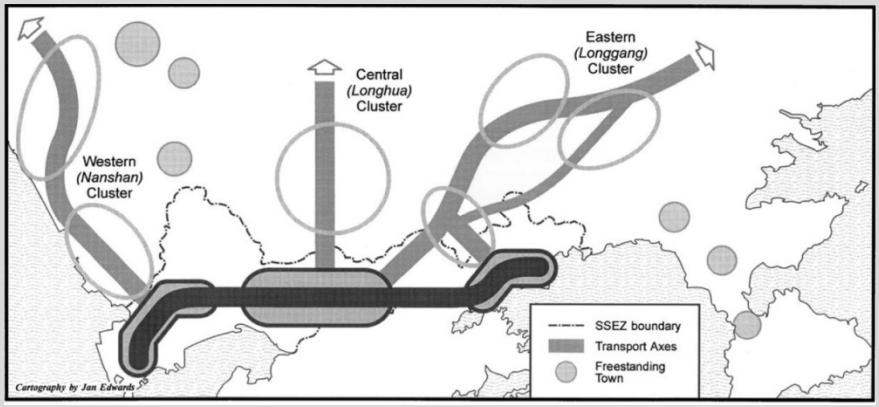


Figure 14: Shenzhen municipality strategy for development post 1996 (after Bruton et al., 2003)

Many leisure facilities, such as theme parks, sport facilities, cultural amenities, convention and meeting spaces have opened in this period of time. Many other services have been added to the manufacturing activities such as finance, commerce and trade, information technology, transportation and tourism. Shenzhen also tried to improve its international image by organising architecture competition in which world known architects, such as Rem Koolhaas, are invited. Pollution, a key problem in the Pearl River Delta because of its industrialisation, will also be addressed with a united policy, and the price of petrol and electricity could also be unified.

Finally, the city is working with the nearby municipalities (Guangzhou, Bongguan, Foshan and other 6) in establishing a new metropolis, well connected through a dense transportation infrastructure – especially public - in order "for people to move around more freely and make better use of the existing services, amenities and find easier employment."[9]

(after Bruton et. al., 2003, and Liauw, 2012)

But the overall city evolution is not always reflected at its micro-scale, especially in the many production areas that raised the city to its fame nowadays. In many of the industrial parks where the majority of the city workers are concentrated, the living and working conditions are most of the time severe, workers having to live in meager dorms (small, overcrowded, unhygienic, etc.) and work in dangerous and unhealthy conditions. (Barboza and Bradsher, 2012; Duhigg and Bradsher, 2012)

TEXT BOX 4: THE INDUSTRIAL PARKS OF SHENZHEN

[9] Chief planner of the Guangdong Rural and Urban Planning Institute according to Moore, M. & Foster, P., 2011. "China to create largest mega city in the world with 42 million people." The Telegraph, [online] 12:21PM GMT 24 Jan 2011. (link: http://www.telegraph.co.uk/news/worldnews/asia/china/8278315/China-to-create-largest-mega-city-in-the-world-with-42-million-people.html) [Accessed 27-10-2012].

The conventional industrial buildings in SEZ are organized in large complexes called 'industrial parks'. These buildings are supposed to provide the basic requirements to suit the needs of the most common industries and providing a basic range of materials to keep the construction cost low. Aside of the production buildings industrial parks also offers dormitories for the workers, canteens and other amenities (e.g. fire brigade, banks, hospital, shops, etc.) restricted to the use of the factories' personnel.

A good example is 'Foxconn City', the industrial park where most of Apple's (an US hi-tech company based in California) products are being assembled. This park is run by a Taiwanese operator which offers third party services to Apple and other similar companies from around the world (such as Hewlett Packard, Dell, Samsung, etc.) .

Al describes it as "*a self-contained city with its own fire brigade, hospital, bank, television broadcasting station and even Foxconn-stamped manhole covers*" and where "*420,000 people live and work*" (Al, 2012). In Foxconn City living and working belong to each-other.

The situation begun to change after a series of incidents (such as suicides) were strongly mediated in the western media and also because the labor shortage become acute. (Lin, 2012) Giving the example of the Adwin Dongguan Factory, a textile factory nearby Shenzhen, Lin describes how the owners improved its working and living environment in order to attract and retain their workers. Apart from salary, the factories in the region need to provide a "*comfortable environment to attract and retain their staff*." (idem).

Figure 15: An entrance gate in Foxconn City, early in the morning . (photo credits: Daily Mail)

Figure 16: A typical sleeping room in a Foxconn dormitory. (photo credits: Daily mail)

In doing so the owners provides generous and landscaped open spaces that are richly planted with shrubs and trees, to give an green feeling and create an pleasant environment to the entire factory. Throughout the factory, attention is being paid to improving the living and working experience by creating higher ceilings and good ventilated and lighted working spaces; allowing garden views and coffee corners; and equipping dormitories with roof top terraces with gardens for the enjoyment of the workers.

Nevertheless some industrial complexes or districts, begun morphing, from predominantly manufacturing industrial activities to more hi-tech or service oriented functions. According to Liauw districts like Shangbu, became today's 'Huaqiangbei Electronics Center'; the Overseas Chinese Town district evolved from manufacturing to tourism and creative industries; Guangming District is developing sustainable high-tech industries; and Bao'an plans to transform itself from a polluting industries district to an ecological CBD 'water city' with a population

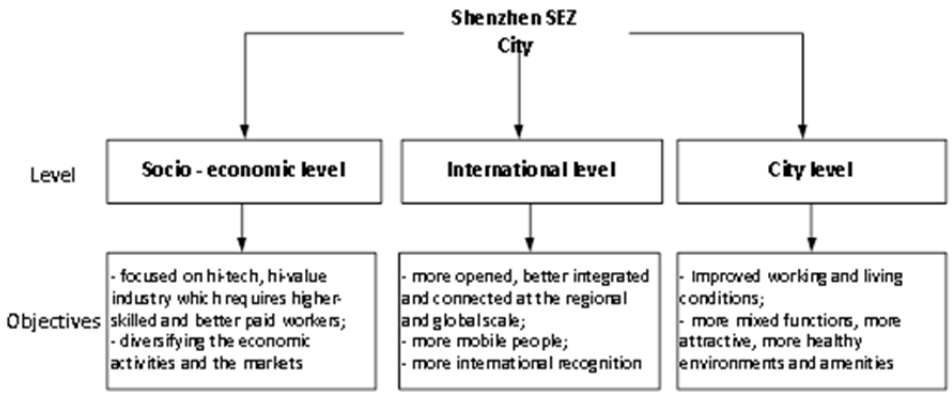


Figure 17: Shenzhen's three strategy levels and objectives.

of 1.5 million (2012). The researcher explains that most of these changes were possible because of the "*highly mobile and adaptive*" population, which could "*upgraded their skills easily and display an entrepreneurial attitude.*"

Three strategies can be observed in the case of Shenzhen, function of the level they operate. At the socio-economic level the city is focused on attracting more hi-tech, hi-value industry, and is looking for diversifying its economic activities and its markets (Yang, 2012).. At the international level the city tires to be better integrated and have a better and more easily recognizable image. At the city level, the city tries to provide improved living and working conditions and provide more mixed, cleaner and better serviced spaces.

2.4 COMPARING EINDHOVEN AND SHENZHEN CASES

Though both Eindhoven and Shenzhen cities started developing based on their industry, there are three important observations that needs to be made. Three

1st. About the drivers that lead the development of the city

In the case of Eindhoven these were the Philips' founders and hence one can call this development 'bottom-up' since it started from among the users / residents of the city. They began developing Philipsdorp initially having in mind the interest of the company and that of their workers. In the process, the association between the company and Philipsdorp on one side and the citizens and the city as a whole become inevitable, almost leading to the assimilation of the two, fact which lead to the saying "*Philips is Eindhoven en Eindhoven is Philips*". In part, this was unintentionally, through the spin-offs resulted from the community projects initiated by Philips, such as the football team and stadium, the ETOS shops chain, the technical university, and others. In this situation the city's authorities having more the role of facilitators than that of initiators.

In the case of Shenzhen, the situation is the opposite, the city appearing as a result of a 'top-down' process. In here, it was the authorities that initiated the development of the city, right from the start. This has happened also because when Shenzhen was selected as an example of the free-trade policies, the city was no more than a fishermen village. Even nowadays, Shenzhen is in a particular position with respect other cities in the PRD region, since the central government continues to support its development with public funds money, like for example in the case of the metro transportation system. The advantage of this being that the city can afford large scale projects without too much financing problems.

2nd. About the working and living relation

In the case of the Philips, one can notice a paternalistic approach to the workers and their families. For example the housing and living conditions in Philipsdorp, considered way above the minimum standard at that time. The workers' time after work was dedicated to social activities, in the parks and the associations founded by the company, and outside the factories premises. Living and working were two separate things and were performed as such.

In the case of the industrial parks of Shenzhen this distinction disappears: workers sleep, eat, shop and spend time inside the same production grounds where they work. The whole life of factory workers in a SEZ area takes place on the premises of the factory as long as their contract lasts. This is true especially if it is about migrant workerers, coming from the rural side of the country, having little life experience, few or no relations in the rest of the city and having no other place to sleep than the dorm provided by the company. (Chang, 2008; Lindquist, 2009)

3rd. About the position of the private companies with respect the city development

One can notice that in the case of Eindhoven, Philips continued to develop in the city a long time until it moved its headquarters and production facilities in the late '90s early 2000s. This commitment and responsibility from the corporation made for the Philipsdorp and other amenities to appear and develop in the city. By the time Philips have closed the factories and moved its headquarter in Amstedam the city becoming sufficiently developed to continue progressing on its own.

Not the same thing can be said with regards the companies in SEZ areas in general. As in the case of Apple (see text box 5), most of the companies activating in SEZ areas, are using third parties to deliver their products. This means that, the premises and the working conditions do not concerns the company itself, but to a third party. (Barboza and Bradsher, 2012; Duhigg and Bradsher, 2012) Having a far less responsibility towards the workers, as compared with Philips in Eindhoven last century, companies found much easier to relocate when faced with hardship conditions. This behavior, named 'footloose' (FIAS, 2008, p.33) makes them unlikely partners for the long-term growth development of the city where they are located.

2.5 TWO MODELS FOR INTERPRETING THE RELATION INDUSTRY - CITY

It is important to understand what would make a private corporation decide to invest and develop within a city and what are the conditions in general for a city to develop. In this part of the report two models for interpreting the relation city – corporation / industry will be explained: (a) the 'onion' model explain the relation from the perspective of the private corporations; and (b) the 'tree' model explain the city development from the authorities point of view.

(A) THE 'ONION' MODEL – EXPLAINING THE CITY DEVELOPMENT FROM THE PRIVATE CORPORATIONS' POINT OF VIEW

In order to explain the city development from the private corporation point of view, this project used Bansal and Roth (2000), research in explaining private corporations relation to environment. The researchers conclude that there are three major factors - competitiveness, legitimacy and environmental responsibility – that would convince companies to act in an environmentally friendly way. By 'competitiveness' is understood the potential for the ecological response from the company to improve its long-term profitability of the company, such as, for example, reducing the fossil fuel consumption. By 'legitimation' is understood the desire of a firm "*to improve the appropriateness of its actions within the guidelines of an established set of regulations, norms, values, or beliefs*" (Suchman, 1995, after Bansal and Roth, 2000). The 'environmental responsibility' was linked to the corporate values with regards the environment, for example if the company considered itself as a 'green' company then acting in such an environmentally friendly way.

If one compares a private company to an onion (the onion layers representing various chain value activities), we can imagine that the more care would be given to it (i.e. the more drivers are acting on it), it will make it grow bigger (i.e. starting performing activities outside the core value chain activities influencing more the city where it works) and deeper into the soil.

Following the 'onion' model a typical company in the SEZ area can be described as an 'spring onion' (it grows fast, but slim being easily removable because it has only a part of the value chain activities in the city), while a company such as Philips a century ago, can be described as an 'autumn onion' (it grows slow but broad, making it harder to be removed from the city, because all the key value chain activities are located in the same place). A 'spring onion' company would bring little contribution to the city on the long-term, being more easily inclined to abandon the city when time comes. An 'autumn onion' type of company would bring more significant contributions to the city and would be less inclined to abandon the city even in hardship, proving to be a long-term development partner.

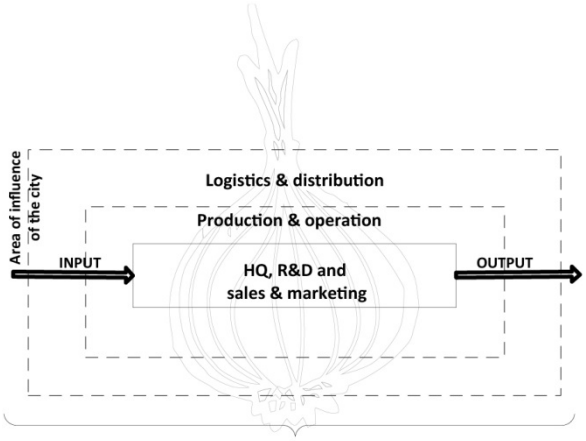


Figure 18: A corporation can be imagined to an onion. At the central part of the onion will stay the core value activities (e.g. board of directors, R&D, marketing, etc.), while at the outside layers will stay activities that can be outsourced, but which have the largest chance to influence the development of a city (e.g. production, operation, logistics, etc.)

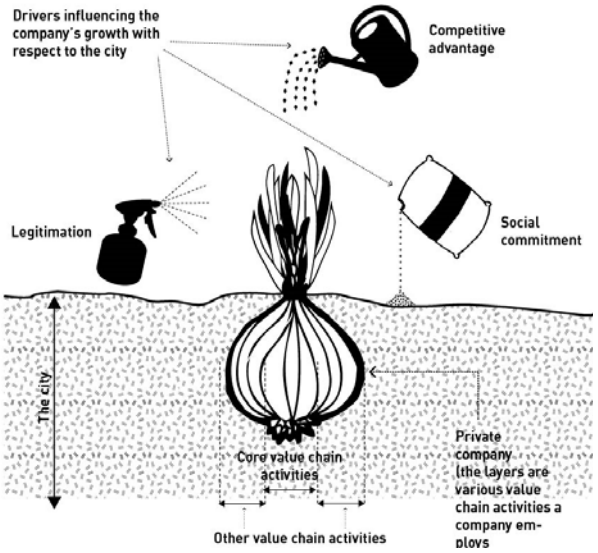
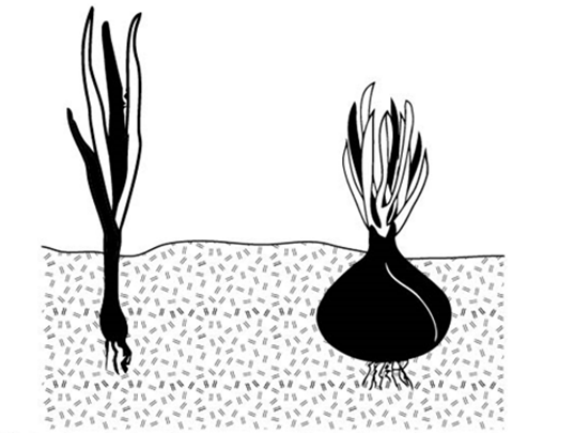


Figure 19:The various drivers that can influence the growth of a company.



The 'spring onion' model, grows fast but slim (it has only a part of the key value chain activities in the city) so it's easy to pull out and lasts little

- no, to little legitimation for its actions;

- no, to little commitment to society;

- follows cost minimization strategies in principal (no lateral growth)

The 'autumn onion' model, grows slow but wide (it has all the key value chain activities in the city) so it's harder to pull out and lasts long (over the winter)

- it is legitimate - meaning its responsible to its action

- it is committed to the society

- follows other strategies as well (such as product differentiation) - meaning it is interested in developing additionally apart of the core activities

Figure 20: The comparison between the typical SEZ companies, 'the spring onions', and the paternalistic companies such as Philips last century in Eindhoven, 'the autumn onions'.

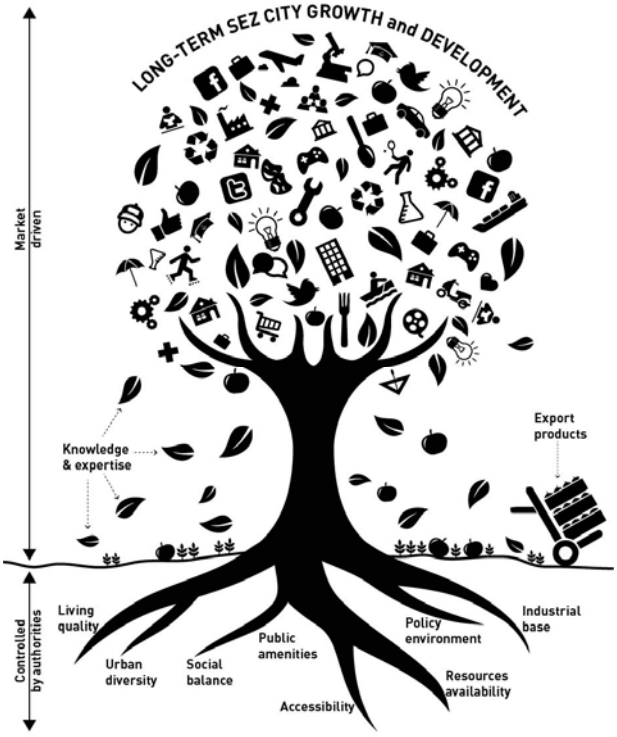


Figure 21: The 'tree model' explaining the long-term development of a SEZ industrial city from the perspective of the authorities. (adapted after van Winden and van den Berg, 2004)

(B) THE 'TREE' MODEL – EXPLAINING THE CITY DEVELOPMENT FROM THE PUBLIC AUTHORITIES POINT OF VIEW

Van Winden and van den Berg (2004) proposes 8 spatial and policy drivers that the public authorities can use in order to help a city develop and grow on the long term. If one can imagine the development of a city as a tree, than these drivers would stay at its roots, below the soil line where the authorities have full control, while the city with all its "*theatre for social interaction*" (Mumford, 1937) will be the crown, that grows under the influence of the market conditions (hard to be controlled by anyone). (fig. 21)

These drivers can be appropriated to the particular case of SEZ cities as explained in the table below.

Table 2: The drivers that authorities can use in order to influence the development of a SEZ area (adapted after van Winden and van den Berg, 2004)

THE DRIVERS THAT AUTHORITIES CAN USE TO INFLUENCE THE LONG-TERM S.E.Z. CITY GROWTH & DEVELOPMENT							
Living quality	Social balance	Urban diversity	Public amenities	Accessibility	Resources availability	Policy environment	Industrial base
- good to very good housing and working conditions; - easy access to various cultural, sport and recreational facilities; - easy access to specialized health care services and higher education facilities - including academic; - a healthy, safe and green environment	- people of various ethnicities, social classes and economic power are share the same living and working spaces, public amenities and social services; - the rate of discrimination is low; - the system strives for equal opportunities for everyone; - there is a welfare system providing for those in need	- there is a broad range of living and working environments; - a broad range of urban environments and scales as well as natural landscapes are easily available; - specialized urban areas – focused on a predominant economic activity – are encouraged to form	- a broad range of public amenities and social services needs to be provided from basic health care and education to specialized education and cultural facilities; - they need to be affordable, easily accessible and suitable for all needs and ages, - parks, gardens, public squares, monuments needs to be present as well	- a large range of public & private transportation means, should be made available for the use of both people and businesses; - the car use has to be limited, and people have to be able to reach all basic amenities in walking range; - a broad, fast and reliable ICT network, including Wi-Fi, should be made available for everyone	- cities need to manage rationally all natural resources as thesea re becoming more scarce in the future; - cities should orientate to become self-sufficient and provide their own food, energy, water, etc.	- aiming at creating a healthy, competitive and innovative environment for companies and people to move in, work and stay; - a democratic, transparent and open political system helps attracting new talents and skills on the long-term; - authorities need pursuing a larger range of international cooperation and trade agreements	- the city should include a well- balanced ratio of all types of industries, from primary (agriculture) and secondary (manufacturing) to tertiary and quaternary (services, R&D); - education should provide basic training for all the industrial branches and sufficient specialized education and research in the strategic economic activities direction

PART B – THE TRANSIT ORIENTED DEVELOPMENT STRATEGY

This part of the report explains the tools used to solve Batams' problems. As it will be better explained in the next chapter, Batam SEZ is facing both spatial problems and economic issues. Below it will be explained the transit oriented development strategy, which will be used later on to deal with the spatial problems, and the concept of competitive clusters, that will be used in addressing the economic issues the city confronts.

2.6 GENERAL CONSIDERATIONS

A transit oriented development, or TOD, is generally defined as:

"A high density, *mixed-use development designed to maximize access to, and promote use of, public transportation, with an emphasis on pedestrian circulation and accessibility"* (Greater Cleveland Regional Transit Authority, 2007)

According to the Greater Cleveland Regional Transit Authority the typical elements of TOD design strategy include:

- Elevated densities – Increased population and employment densities place more potential riders within walking distance of transit stations/stops, in general in the range of 400 to 800m, corresponding to 5 to 10min walking;
- Mixed-uses – Retail, office / work, residential, and public space promote concentrations of public activity around transit station/stops, increasing the physical and cultural prominence of transit in the community, as well as facilitating trip chaining linked to transit (i.e., stopping at a day care facility on the way to the bus during a morning commute to work, instead of making separate trips); and
- Pedestrian orientation – Placing daily goods and services, as well as recreational destinations, within walking distance of residents and orienting building entrances toward transit stops.

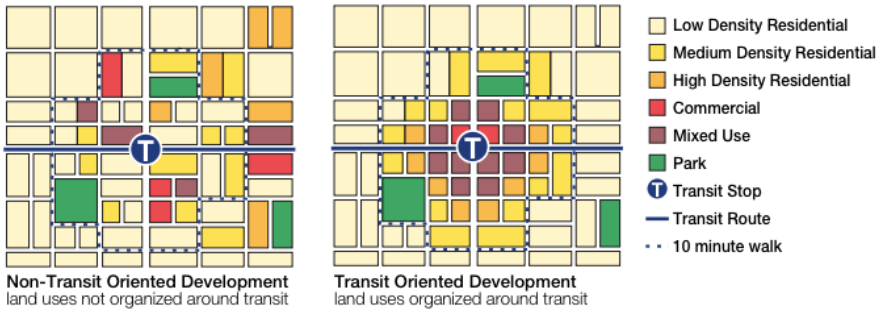


Figure 22: The comparison between a non-TOD and a TOD design strategy. (source: GTZ, 2011)

According to the same source, the TOD strategy can bring many benefits for the communities, public authorities, citizens, private enterprises (developers or employers alike) and environment (table 3). Among these benefits several appears to be particularly important for the central case of this project, such as: reduced transportation costs, better opportunities for personal development, increased homeownership rates especially among lower income groups, enhanced community environment, reduced spending on roads' infrastructure, higher returns on investment for developers, preservation of farmland and open spaces, and enhanced regional identity.

Table 3: Benefits of the TOD strategy (after Greater Cleveland Regional Transit Authority, 2007)

Benefits to citizens of the region	• Reduced household transportation costs, and increased mobility choices, including walking; • Improved access to various amenities and social services (such as shopping, services, and recreational, educational and cultural opportunities) and creating better the opportunities for personal development; • Increased homeownership rates or more adequate housing, especially among lower income groups; • Better public health and safety, including reduced pollution-related illnesses, increased physical

	activity and reduced traffic accidents; • Ability to live, work and shop within the same neighbourhood this increasing the productivity of employees through reduced stress factors and useable commute time.
Benefits to public authorities and public transportation agency	• Increased transit ridership and reduced auto use and auto ownership, resulting in lower demand for parking and roadway expansions and less burden on the public budget • Higher tax revenues from increased retail sales and property values; • Increased ground lease and/or joint development revenue; • Enhanced local community environment; • Station areas that can serve as destinations as well as origins, thereby balancing peak loads; • Spatial and financial efficiencies of shared facilities
Benefits to private entities (e.g. employers, developers)	• Shorter and more predictable commute times, increasing the attractiveness of a work site to employees and improving employee morale; • Decreased congestion; • Better economic health related to employment and income generated at TODs; • Higher return on investment for developers; • Lower development risk and costs resulting from mix of uses and variety of housing types (affordable housing, rental units etc.); and • Improved housing availability attracts wider range of employees
Benefits to the regional and global environment	• Improved air quality and reduced gasoline consumption • Preservation of farmland and open space; • More suitable regional and sub-regional balance between jobs and housing; • Enhanced regional identity.

At the core of a TOD strategy stay the integration of the public transportation system, such as metro, train, or rapid bus transit, that will form the 'backbone' of the development, with the land use planning. Key to determining the development pattern of a TOD is the type of transportation system used as the backbone transportation.

Frequent transit services with limited stops, spaced every 1-1.5km, (such as metro, train or BRT – Bus Rapid Transit) tend to have faster journey times but have less convenient local access. Frequent transit services with many local stops, spaced every 250-400m, have more convenient local access but have slower journey times (it can be also BRT, tram or regular bus). (Trans Link, 2011) A more frequent stop transit service will create more of a 'corridor' development pattern, while a more sporadic stop transit system, will create more of a nodal development pattern, with the highest concentrations of density focused around the stations. (idem.)

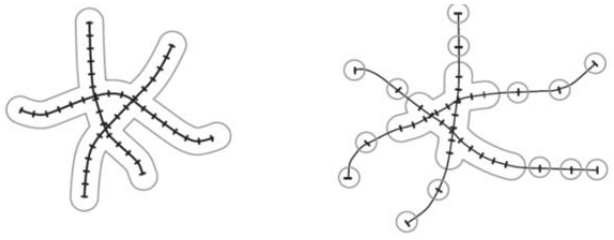


Figure 23: The development pattern of a frequent stop transit service, the 'corridor' type left, and a more sporadic stop transit system, the nodal development. (source: Ranhagen & Trobeck, 1998, after GTZ, 2004)

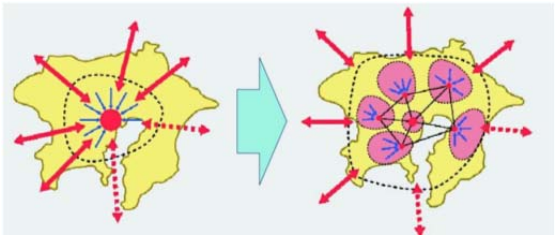


Figure 24: 'Decentralizing - concentration', or creating sub-centers on the lines of sustainable growth of the city. (Mori, 2000 after GTZ, 2004)

According to GTZ (2004a), the concentrating functions and services in the city centres, can lead to various spatial problems, such as urban sprawl on the fringes, high commuting needs, roads congestions and increased maintenance and transportation costs. Their recommendation is to create local sub-centres to serve the needs of the residents (referred to as '*decentralized concentration*'). This will lead to more homogenous distribution of activities, thus reducing the average trip distances and mitigating the traffic increase, while maintaining a compact city form along the lines of the transit system thus creating a more sustainable development. (p.35)

2.7 THE CASE OF CURITIBA: AN EXAMPLE OF HOW TO MITIGATING SOCIAL, ENVIRONMENTAL AND FINANCE PROBLEMS VIA LAND USE AND PUBLIC TRANSPORTATION

A good example of such practices is Curitiba, which is considered the first TOD in the world and in general also one of the most successful. (GTZ, 2004, 2005) In part this is because of its high modal share of public transport (85% of the total population uses its bus system) and in part because the system is financially viable without the support from the government. (World Bank, 2010) Curitiba uses a BRT system integrated with the land-use planning and roads infrastructure in order to control the city growth, mitigate illegal housing and environmental problems, create a better image for the city and authorities, and attract investors. (Lindau et al., 2011)

THE PLANNING PRINCIPLES

The present situation is the result of a process that started in 1966, when the city planners developed a master plan to restructure the city's development and accommodate urban expansion. The Curitiba Master Plan, adopted in 1968, focused on strict controls on urban sprawl, a reduction of downtown traffic, preservation of the city's historic district and a convenient and affordable public transit system. (World Bank, 2010) In 1974 the first bus line started to operate in the direction north-south, along the south and north structural axes

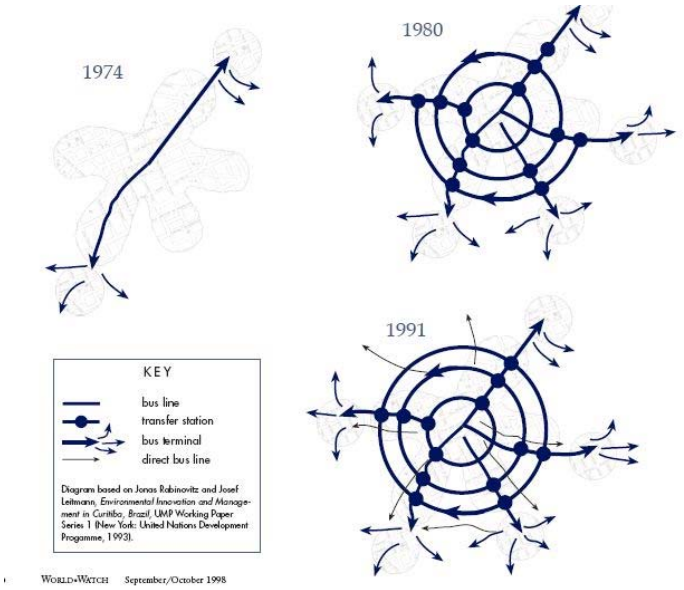


Figure 25: The development of the BRT network in Curitiba over time. (Source:

The masterplan was developed and implemented by the Curitiba Research and Urban Planning Institute (IPPUC), which still monitors and runs the system even nowadays, ensuring the continuity of the project and its constant improvement. (Karis et al., 2006)

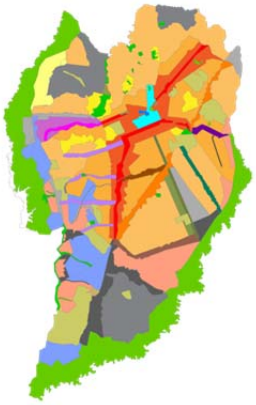


Figure 26: The zoning plan of Curitiba (source: modified map after IPPUC)

Figure 27: The road network of Curitiba (source: modified map after IPPUC)

Figure 28: The transportation system of Curitiba (source: modified map after IPPUC)

The IPPUC masterplan gave priority to the public transit instead to vehicles, using a triaxial road system (called structural axis): in the middle the BRT dedicated lines and slow car traffic and parking are located, while on the sides are located fast, one-way roads. In between these axes, are located the high density, mixed use developments (called special sectors), while at the edges are concentrated medium density developments (ZR4), gradually decreasing to low density mainly residential use developments (Z3 to Z1).

The effects of this strategy can be observed well in practice (i.e. high density, commercial functions located along the special sector corridors), though the changes did not happened over night and even nowadays there are still high density areas located outside the main development lines (fig. 25 and 31). The authorities had to incentivize the developers (e.g. allowing to build higher or giving tax deductions in certain areas to lure the investments) or change the land use coefficients (e.g. reducing or increasing the occupancy rate or utilization coefficient of the land) in order to stir the development. (Smith and Raemaekers, 1998)

Citing IPPUC, the density along the South Structural Zone, will be in between 50 to 70 units/ha by the years 2020 and in the long-term stabilizing to 300 – 400 units/ha (idem. p.239)

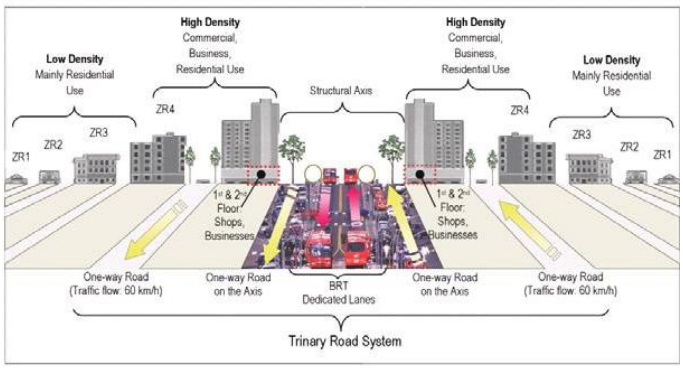


Figure 29: The structural axis principles of Curitiba. (source, IPPUC)

Figure 30: The effects of the structural axes in practice. (source: IPPUC)

Development incentives are also use in order to preserve the green areas in the city and help alleviating the social housing conditions for the lower income groups. For example, if the building plot is in an area that limits the height of the building, the developer is able to build higher if it pays a tax to the social housing fond.

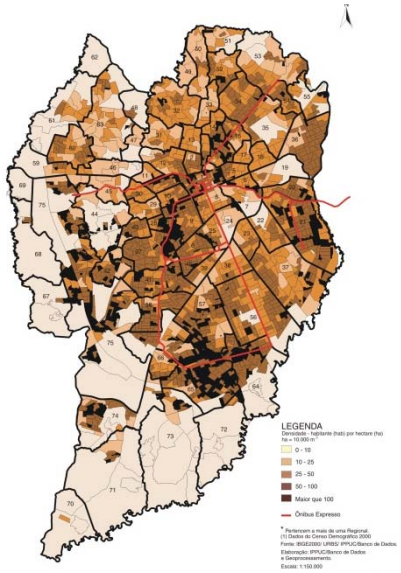


Figure 31: The present densities in Curitiba. (source, IPPUC)

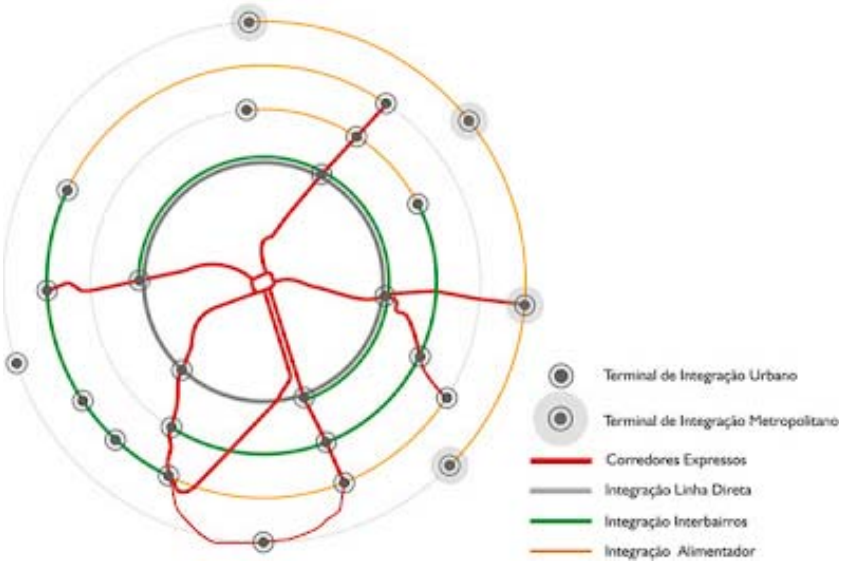


Figure 32: The simplified transportation scheme of Curitiba. (source: IPPUC)

THE BRT SYSTEM OF CURITIBA

The success of Curitiba is linked to success of the transit system used, the BRT. Curitiba's transportation system is made up of three complementary levels of service that include feeder lines (*alimentador* in Portuguese), express lines (*expresso)* and inter-district routes (*interbairros*) (fig. 32). The feeder lines pass through outlying neighborhoods, making the system easily accessible to lower- density areas. The feeder lines connect with the express system along the structural corridors. The express system operates like a surface subway system, transporting large numbers of passengers to locations along the structural corridors. Finally, the inter-district routes allow passengers to connect to the axis of the express lines without going into the city. (Karis et al., 2006)

Important parts of the system are the transit stations, or 'integration terminals', which insures the transfer from the feeder lines to the express BRT lines. (fig. 32) Function of their location, these stations can integrate the system at the local (transfer is done from local roads) or regional level (transfer can be done from regionally connecting roads). Apart of ensuring easy and fast transfer from one service to another, these terminals are fitted with diverse amenities for the passengers (such as: mini-markets, post office, public services, libraries, cafes, etc.), providing an enhanced environment attractive to businesses and developers.

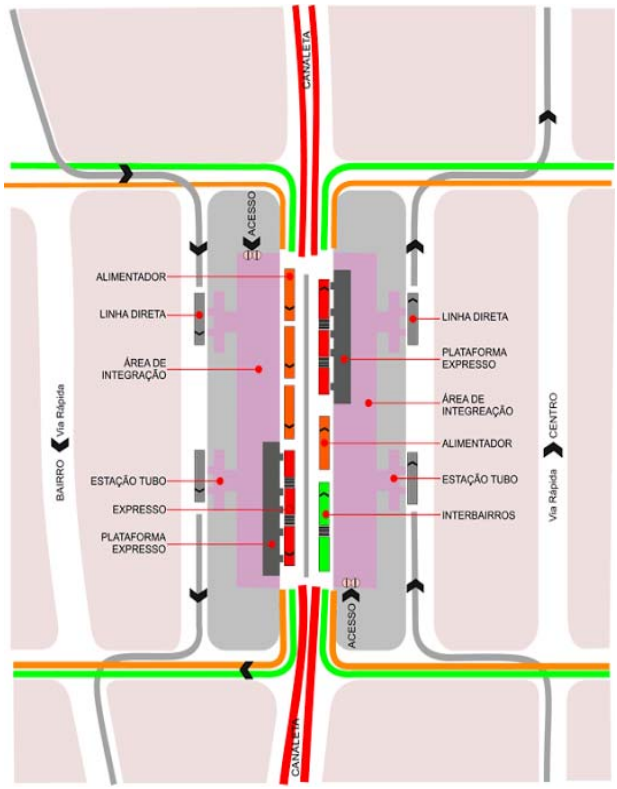


Figure 33: The design principles of a transfer station (source, IPPUC)

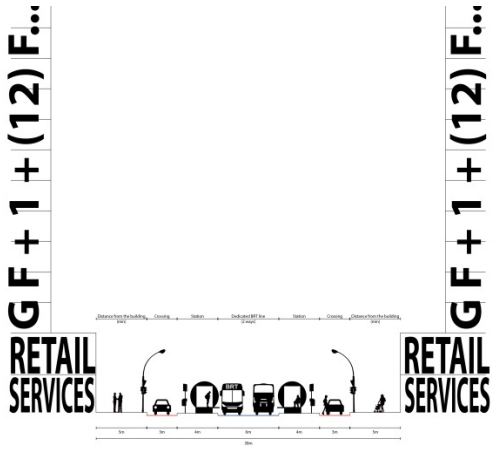


Figure 34: Cross section of a structural axis with an express BRT station in Curitiba.

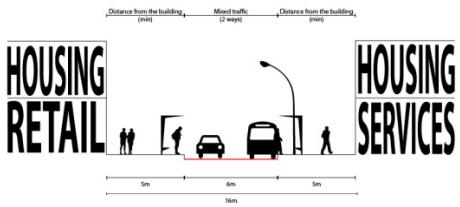


Figure 35 Cross section of a street with a feeder bus station in Curitiba

In addition, each city district, of which there are twelve, also has a transfer terminal called a "*Citizenship Street*" (*rua da cidadania* in Portuguese in original) which provide a range of municipal services in addition to the usual commercial operations, including health centres, vocational training, community centres, legal assistance offices and social service centres. (Gustafsson and Kelly, 2012)

Each bus route is also served by a number of smaller bus stops (fig. 34). These appear at 500m intervals along the Express route and somewhat less frequently in lower-density areas. Most of the bus stops along the Express and Direct routes are equipped with GPS displays that indicate in real time when the next bus will arrive. The bus stops share a characteristic tubular design and offer protection from outdoor elements.

Furthermore, bus stops are raised, so that when boarding a bus, passengers are already at the appropriate level to climb on-board. (idem)

FINANCING AND OPERATING THE BRT SYSTEM

In order to help the lower income residents in the city and improve the social equity the transportation system uses only one fare system, i.e. a single fare covers the whole city, on all public transportation means. This measure also helps incentivize the public to use the public transportation (GTZ, 2005)

Curitiba BRT system receives no government subsidy and is completely self-supporting. The services are provided by 16 bus companies which are regulated by a government company named URBS. (Lindau et al., 2011) URBS is also responsible for regulating taxi services and public parking in the city. URBS collects all fares and distributes payment to the bus companies based on the distances they travel. Previously, the companies were paid based on the number of passengers they carried, but this led the companies to all focus their services on the busiest commercial areas, where the greatest passenger demand existed. By paying the companies based on the distances they travel, URBS is able to ensure that the companies have an incentive to provide services in less dense areas as well. (Gustafsson and Kelly, 2012)

The bus companies are responsible for purchasing all of their own vehicles, for which URBS reimburses their capital costs at a rate of 1 percent per month. The guarantee of a twelve percent annual rate of return incentivizes the bus companies to invest in new vehicles, and generally, buses in Curitiba are only used for 3-4 years, in an effort to make sure that the fleet remains clean, safe and comfortable. (idem.)

TEXT BOX 5: THE PRINCIPLES OF A BRT SYSTEM

Unable to afford a rail system, and struggling to deal with rapid population growth, Curitiba developed the BRT system in order to offer its citizens high-quality transportation services at a fraction of the cost of rail-based systems, in addition to mitigating the urban sprawl. The BRT system has simply been described as "*think rail, use busses*". (Gustafsson and Kelly, 2012)

Several features are found in some of the most successful BRT systems around the world (after GTZ, 2005):

- Exclusive right-of-way lanes with median stations
- Pre-board fare collection and fare verification
- Rapid boarding and aligning
- Free transfers between corridors
- High frequency service and low station dwell times
- Enclosed stations that are safe and comfortable
- Clear route maps, signage and real-time information displays
- Automatic vehicle location technology to manage vehicle movement
- Modal integration, at stations and terminals
- Competitively bid concessions for operations
- Effective reform of the existing institutional structure for public transit
- Clean bus technologies;
- Excellence in marketing and customer service

A BRT system can generally be trunk-feeder services or direct services. (GTZ, 2005)

The trunk-feeder services utilises smaller vehicles in the lower density areas and then facilitate passengers to transfer to higher-capacity vehicles at terminal stations. Thus this operates relatively efficiently by matching the vehicles capacity to the demand. The disadvantage of this system is that passengers might need to transfer to other buses in order to reach their destinations, process that can be seen as an undesirable burden for some.

Direct services avoid the need for customers to transfer since the same vehicle serves both the feeder area and the trunk-line corridor. However, direct services incur a substantial cost penalty for operating vehicles that do not closely match the actual demand. Direct services might still necessitate transfer if the destination of the passenger is other than that of the trunk line used.

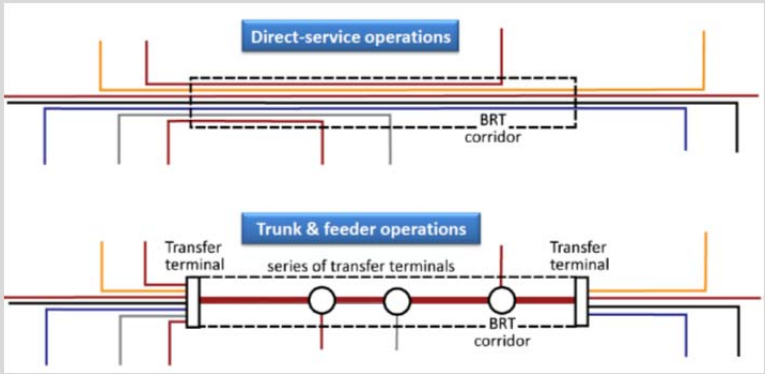


Figure 36:Comparison between a trunk-feeder services and direct services system (source: the Institute for Transportation and Development Policy, 2012)

GTZ remarks that the most successful BRT systems, among others Curitiba, Bogota, Quito, are operating in a trunk-feeder system. Nevertheless, the city of Guangzhou in China, for example, operates a direct BRT system to great success according to the Institute for Transportation and Development Policy.

The average distance between the BRT stations varies between 600m, in the case of Curitiba, and 880m, in the case of Guangzhou. The system capacity depends on the busses and the station designs. For example in Bogotoa the TransMilenio reached a capacity of 30,000 passenger an hour per direction, at an speed of 27 km/h. (GTZ, 2005)

ENVIRONMENTAL PLANNING

In addition to mitigating the social and economic issues, Curitiba is also a leading city in what concerns environment preservation and creating green spaces to improve the quality of life of its citizens. Nearly one-fits of the city is parkland, by comparison to only 8.1 percent parkland in the average American cities. (Gustafsson and Kelly, 2012) Besides its obvious aesthetic and recreational value, the park system is vital for controlling increased flooding and protecting Curitiba's biodiversity and water quality. (idem.)

In creating the park system Curitiba subsequently designated four environmental preservation areas restricted or prohibited development in the respective areas. Currently the Curitiba Environmental Secretariat plans to designate another ten environmental preservation areas in the next decade. (idem.)

The city also developed a recycling program that combines sustainability, social inclusion, and good fiscal stewardship. Over seventy percent of the Curitiba's trash is recycled through its recycling programs. (Gustafsson and Kelly, 2012)

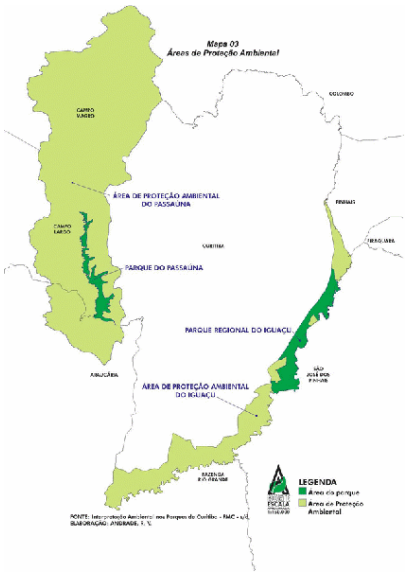


Figure 37: Protected ecological areas in Curitiba. (source: Curitiba Environment Secretariat)

In the *favelas*, or shantytowns, inaccessible to recycling pickup trucks, Curitiba operates the *'Ecocitizens'* program. The program encourages homeless and low-income persons to collect and separate recycling from inaccessible neighbourhoods in exchange for bringing recycling to one of 92 sites, the 'ecocitizens' receive bus thickets, fresh fruits and vegetables, and children's school supplies. Ecocitizens remove 500 tons of recyclables a day, for a total of 11,000 tons of garbage since the program's inception. The program has benefited sixty impoverished neighbourhoods with 31,000 families by improving neighbourhood sanitation conditions and by providing an influx of resources: nearly a million bus tokens and 1200 tons of surplus food as in-kind payment. (idem)

PART C – CLUSTERS AND COMPETITIVE ADVANTAGE

This part of the theoretical research explains the concept of competitive clusters that will be used in addressing the economic issues identified in Batam SEZ.

2.8 GENERAL CONSIDERATIONS

As explained in the introduction part of this chapter, the long – term development of an industrial city especially depends on its capacity to diversify and innovate. Such conditions are met in a cluster. According to Porter (2000) clusters are:

"a geographically proximate group of inter-connected companies and associated institutions in a particular field, linked by commonalities and complementarities" (p.16)

Clusters can include (1) suppliers of specialized inputs (such as components, machinery, and services), (2) providers of specialized infrastructure and (3) governmental and other institutions that provide specialized training, education, information, research, and technical support (such as universities, standards-setting agencies, think tanks, vocational training providers, and trade associations). (idem.)

Table 4: Cluster advantages function of various factors (after Porter, 2000)

Clusters and Productivity	• Better access to specialized inputs and employees; • Better access to information; • More complementarities between companies, in terms of products, marketing; • Better alignment of activities among other cluster participants; • Better access to various institutions and public goods; • Improved incentives and performance measurement
Clusters and Innovation	• Perceiving faster and better the new buyers' needs; • Perceiving earlier new technological, operating or delivery possibilities; • Easier to innovate and test new technologies, products and other goods or services.
Clusters and New Business Formation	• Better perception of new business opportunities; • Lower entry barriers of new businesses; • Lower exit barriers for business that wants to expand outside the clusters.
Clusters and Competition	• Cluster interconnectedness amplifies rivalry which has benefits on innovation and productivity; • Information access improves the competitiveness with respect other companies in the same field.

Inside clusters companies find essential conditions to compete, produce and, especially, create new businesses and innovate Inside a growth cluster companies have a competitive advantage because "*competition is dynamic and rests on innovation and the search for strategic differences*." (p.19) Close linkages with buyers, suppliers, and other institutions are important, not only to efficiency but also to the rate of improvement and innovation. Strengthen

Clusters can offer multiple benefits to companies in terms of productivity, innovation, new business formation and competition. Porter states that nowadays generic inputs (such as raw materials) are easy

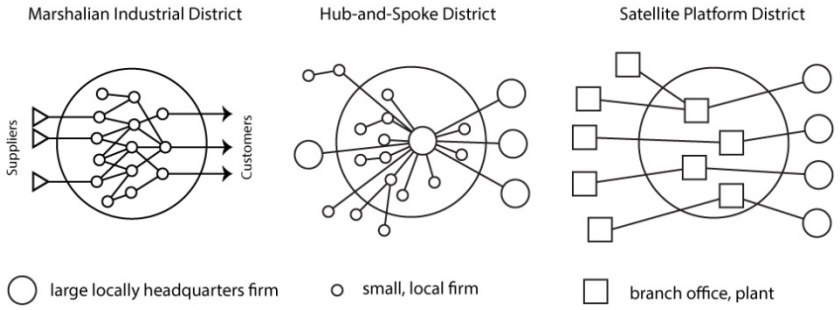


Figure 38: Industrial cluster models. (source: Markusen, 1996)

to access but the level of "*prosperity depends on the productivity with which factors are used and upgraded in a particular location*." (Porter, 2000, p.18)

According to Markusen (1996) there are several industrial cluster models. (fig. 38) "*Marshallian district*" is predominantly homogenous, made up of with small and medium sized, locally owned companies. The "*hub-and-spoke* quite contrary is heterogeneous, made up by several dominant firms, which represent the core of the cluster or the 'hubs', and numerous small firms that are linked directly to these and forms the '*spokes*'. The hub firms define the relation inside the cluster and its dynamics, while the small firms trade directly with the large ones and depend on their client strategy. Unlike the other cluster structures, the "satellite platforms" is a larger, geographically speaking, cluster uniting medium and large branch facilities located externally at the international scale, with others located in a particular geographic region to benefit from the governmental facilities, such as it is the case for the Special Economic Zones.

In general, a company has a competitive advantage over its competitors when "it is able to generate a greater value output for its stakeholders, using the same amount of input and/or retain more customers than its competition." [10] The more sustainable the competitive advantage, the more difficult it is for competitors to neutralize the advantage.

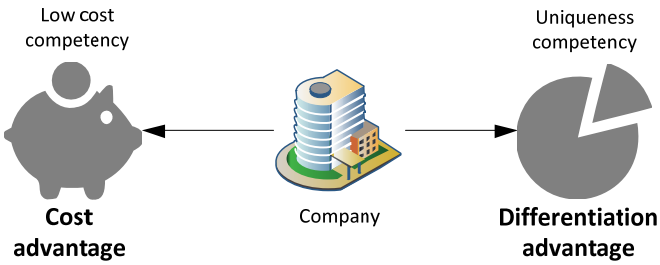


Figure 39 Generic competitive advantages for companies. (adapted after Porter, 1980)

There are two main types of generic competitive advantages (1) comparative advantage and (2) differential advantage. "Comparative advantage", or "cost advantage", is a firm's ability to produce a good or service at a lower cost than its competitors, which gives the firm the ability sell its goods or services at a lower price than its competition, or to generate a larger margin on sales. A "differential advantage" is created when a firm's products or services differ from its competitors and are seen as better than a competitor's products by customers. (Porter, 1980)

2.9 DEVELOPING A COMPETITIVE ADVANTAGE

There are three main factors that are directly influencing the competitive advantage of a company, two factors are internal and related to the "*operational effectiveness*" and the "*strategies employed*", while the third factor is external and depends on physical conditions and "the quality of the business environment" (Porter, 2000, p.19). "The Diamond of National Advantage" (Porter, 1990, 2000) indicates the main factors, or drivers, that affects a growth cluster. These drivers are (fig. 40):

a. The "(input) conditions" which represent the initial resources put into the cluster from natural and human resources to physical, information and scientific – in general the exterior factors related to the physical conditions described above;

b. The "demand conditions" depends on the sophistication and demand level of the local customers,

c. The "related and supporting industries" refers to the presence and capacity of the local suppliers and related companies,

[10] Source: www.investopedia.com/competitive advantage, access date 15-01-2013

d. The "firm strategy, structure and rivalry" refers to the quality of the business climate.

e. To be noted that the spatial conditions that the real estate and urban planning can work with, are present specifically in the *input conditions,* though, according to Porter, these cross-cuts all factors and industry. These conditions includes elements such as the availability and quality of the natural resources; availability and quality of the transportation, information, technological and scientific infrastructure; and level of specialization and development of the human resources.

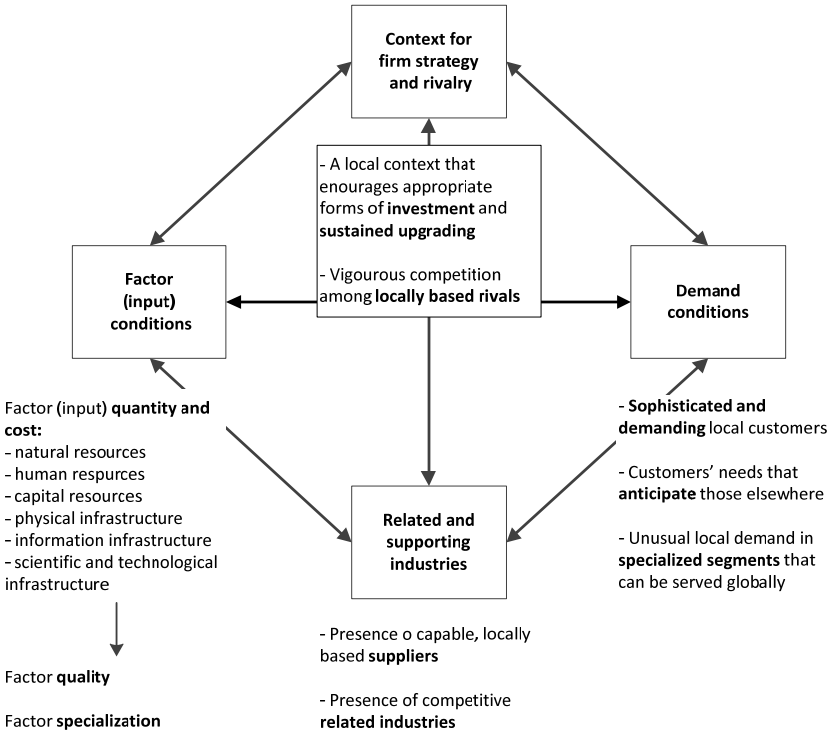


Figure 40: "The diamond of national advantage" sources of locational competitive advantage after Porter (2000)

Porter gives several physical and spatial improvements recommendations, though general, for the authorities that wish to assist the development of clusters in their administration, with respect the *factor conditions* and *related and supporting industries.* These are:

- enhance specialized transportation, communications and other physical infrastructure;
- establish local university research efforts in cluster-related technologies; and
- establish cluster-oriented free trade zones, industrial parks, or supplier parks; (Porter, 2000).

In Porter's view, there is a direct relation between the living standard of a nation and the companies' performance level, more exactly the better the living standard of the people, the more performing the companies will be. (Porter, 1990, 2000)

One can conclude that companies that search for 'cost advantage', in the SEZ cities, are most likely to have a 'footloose' behaviour, meaning they are inclined to easily exit the city as soon as the production costs begin to rise and the initial competitive advantage begins to wear-off. Hence, these companies are not committed to the development within the city and on the medium, long-term the city itself might have to suffer. If however the city is able to develop together with the company an 'differentiation advantage', such as 'operational effectiveness' in the case of Apple and the Chinese SEZ cities, than the company is compelled to stay, contributing more or less directly to the long-term growth the entire city. How is this situation achieved we shall try to understand in the next case study

TEXT BOX 6: THE COMPETITIVE ADVANTAGE OF CHINESE SEZ CITIES AND APPLE

Traditionally, SEZs are promoting cost advantages such as tax exemptions and business incentives. In addition, labour and land costs are also much cheaper compared to the origin countries where most of the international

corporations willing to relocate are coming from. In time, this costs' advantage wears off, given the improvement of the labour condition and infrastructure and an increasing of wages, especially if the SEZ's authorities are promoting an open economy.

Unlike other countries promoting SEZ policies, China was able to develop an expanded and specialized supply chain, which retained important companies such as Apple. Despite the continuous rising of the production costs and the US politicians' persuasions for the factories to return in US, the Apple products will remain manufactured in China because of the operational effectiveness.

In an article published on January 21st 2012, the New York Times describes how Apple production facilities remained in Asia, not because of the labour costs, which currently are minimal with respects the expenses of buying new parts, but because of the manufacturing efficiency and supply chain existing there. (Duhigg and Bradsher, 2012)

Citing a former executive, the same article reports that Apple relied upon a Chinese factory to finalize iPhone manufacturing "just weeks before the device was due to be on shelves". Because Apple had redesigned the iPhone's screen at the last minute, the assembly line was forced to overhaul overnight. 8,000 workers from the factory's dormitories were waked, and within half an hour begun a 12-hour shift to fit the new glass screens. Within 96 hours, the plant was producing over 10,000 iPhones a day. "The speed and flexibility is breath-taking," the executive said, "there's no American plant that can match that." (idem.)

According to sources cited by the same New York Times' reporters, Chinese manufacturers begun also providing essential technical solutions to solve key design issues that originated in the design countries. This is how, over the years an estimated 90 % of the iPhone components originates in China nowadays this helping the supply chain expanding and specializing, making it hard for Apple to return production to US. (idem.)

It can be said that with Apple, the Chinese SEZ cities went a step further than most SEZ areas, providing not only one of the best and largest supply chains in the world but also the crucial, mid to upper-level skilled workforce able to solve highly specific technical issues, outside the original country where the product is first designed. These two elements ultimately helping Apple, transforming design into reality.

(after The New York Times' article "*How the U.S. lost out on iPhone work*" by Duhigg and Bradsher, 2012)

FINAL REMARKS AND A SEZ CITY MODEL

In the range of cases presented, Eindhoven, Shenzhen and Curitiba, one can notice that with regards planning and administration, Curitiba appears to be located in between the others. Though its development is depending on the political decisions it succeeded through the IPPUC, the main planning institute, to remain largely independent. This is how also the finance is perhaps better managed and sufficient for the city to be independent from the transport subsidies coming from the central government.

This position might benefit also Batam the central case study of this project.

In concluding this chapter, one can make a general model of present day cities located in the SEZ areas. This model is meant to be used as a comparison tool between various cities in SEZ areas and it will be perfected in the following stage of this thesis.

Table 5: Conceptual model SEZ cities

Criteria	Characteristics
Location:	- In general, strategic areas for goods and raw materials to be shipped in and out easily (preferably in large quantities and in containers to reduce costs)
Population:	- Generally heterogeneous immigrating from various parts of a country in the SEZ areas; - Predominantly young, but low-or only basically skilled; - Increasing fast in a relatively short period
Infrastructure:	- Orientated on the transportation infrastructure, telecommunications, utilities infrastructure

	- In general SEZs are specialized in certain industries having predominantly a number of certain infrastructures developed (e.g. petrochemical and oil processing and storing zones, electronics production, IT services, etc.)
Spatial development pattern:	- Overall, fragmented development, marked by urban sprawl, dotted with industrial parks (usually fenced in, providing in-house facilities for their workers), undeveloped or empty land and - In general there are only the basic public infrastructure provided for the population in the cities, such as health-care facilities, schools, commercial facilities
Type of corporations which are attracted:	- Multinational corporations, with main markets and headquarters outside the SEZ area - Performing mostly intense manual works (such as ensemble lines, sewing or tailoring, etc.) - In general, producing goods meant for large consumption (e.g. electronics, household appliances, garments and shoes, etc.)
Types of incentives:	- Focused on providing tax and other business exemption and incentives
Type of administration:	- Usually a special governmental body;
Type of work force:	- Reliance on female workforce sometimes 60-70 % of the total workforce - Relatively young, early twenties - Having the secondary education achieved

III. BATAM DESCRIPTION AND ANALYSIS

3.1 GENERAL DESCRIPTION

Batam Island is the largest, 412 km2, and the most developed island from an archipelago of around 400 islands located in the Riau Archipelago province NW Indonesia. Together all these islands form Batam Special Economic Zone or SEZ, total land area of Batam SEZ, is 1,040 km^2. (Regional City Planning Department of Batam, 2010)

The city-island is located at about 30 - 45 minutes distance by ferry from the global and regional trading hub Singapore, and in the middle of the busiest sea-trade route of the world, the Asia-Europe shipping corridor, this giving the strongest point to the city. According to the Singapore Port Authority, more than 1,000 vessels are at any time, either passing or at anchor, in the waters between the two islands.

Morphologically the island is predominantly flat in the areas around the coasts, while in the more central parts of the island isolate spots can reach over 150 m height. The island is recognized to have deep water near its shores, making it perfect of marine operations, such as shipyards.

BRIEF HISTORY

Historically, Batam island was part of the powerful Malacca Sultanate and later the Johor sultanate after the Portuguese conquered the Malacca city in early 16th century. The island is first mentioned in the agreement signed on December 18th 1829, between Sir Thomas Stamford Raffles, representing the British East India Company, and the representative of the Dutch VOC, P.J. Elout. Through this agreement, the Johor Sultan, agrees for Batam to remain in the sphere of influence of the Dutch colonial powers, while Sir Raffels can take-over its sister island, where Singapore city will soon start to appear.

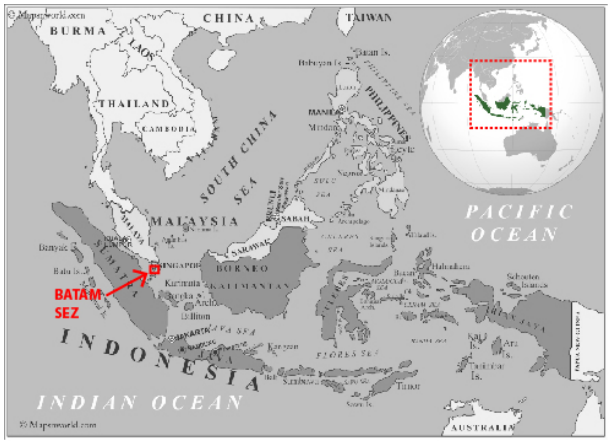


Figure 41: Location of Batam SEZ within the SE Asia region and on the globe. (modified map from Wikimedia Commons, 2010)

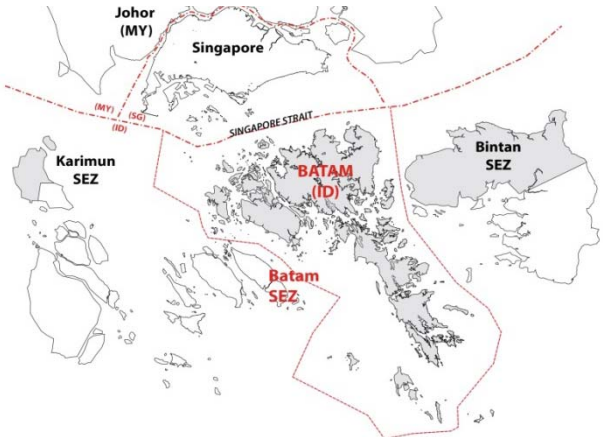


Figure 42: Batam SEZ's within the Singapore Strait context. (source: modified Open Source map)

Ever since the island again falls in obscurity, reappearing in the history after more than a century, in 1969 when the second president of Indonesia, General Soeharto, recognizes it as a strategic basis for the oil & gas operations. In the following year, Soeharto becoming the President of Indonesia, decrees Batam as an industrial base and the first free-trade zone of the Indonesia.

In 1990, following the signing of the SIJORI economic cooperation agreement between Singapore and Indonesia, many manufacturing companies begun relocating across the strait, from Singapore to Batam. The companies retained their headquarters and other core value chain activities in the city-state, relocating only their production and operation facilities.

In 2007 the free-trade status is extended over the whole archipelago of island, forming Batam SEZ or Batam Municipality. Two other SEZ areas were established east and west of Batam: Bintan SEZ, specialized in tourism, and Karimun, specialized in storing and refining oil and gas.

SOCIO-DEMOGRAPHIC DATA AND MAIN ADMINISTRATIVE UNITS

The total population of the island was 1.12 million, as per September2011, the overwhelming majority being located in Batam island. Administratively Batam City is included under the Indonesian Riau Archipelago Province and is divided in 12 districts (*kecamatan* in Indonesian), each having further sub-divisions (*kelurahan*). Most of the districts are stretching over Batam island, except Belakang Padang, Bulang and Galang Districts which includes the majority of the surrounding islands.

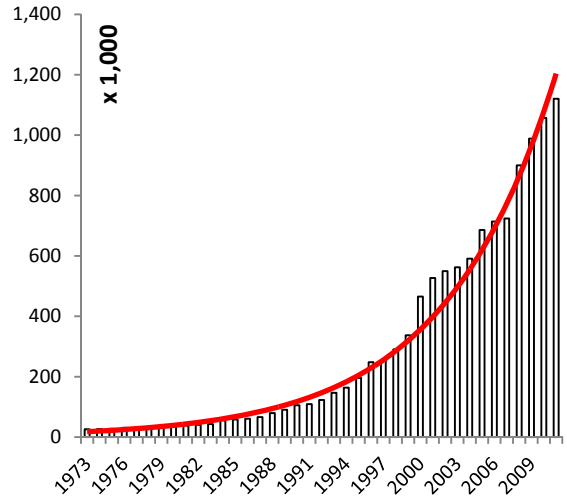


Figure 43: The population growth over the years in Batam. The red line is an exponential growth approximation. (source: Pemko, 2011)

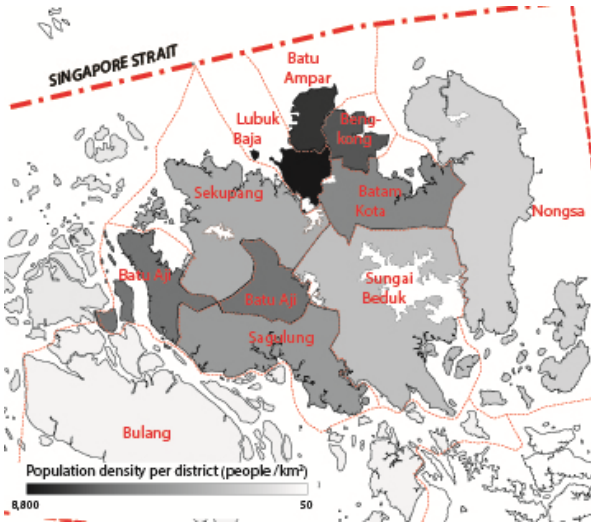


Figure 44: The main districts of Batam island and the population densities, the darker the color the more densely populated. (data source: Pemko, 2011)

Over the centuries the island was sparsely populated. The population begins to pick up, after its declaration as an industrial and free-trade area, reaching from just several thousand before1970 to 105,000 in 1990 and over 1 million in 2010. The majority of the population is located in five development centers across the island, the main one being located on the NW tip of the island (in an area called Jodoh-Nagoya) where initially the actual development has started and where currently most of the main functions of the city are located.

Table 6: Batam Municipality districts and basic facts as per September 2011 (source: The City Government of Batam, 2011)

District (*kecamatan*)	No. sub-districts (*kelurahan*)	Total population	Total area (km2)	Density (people / km2)
Lubuk Baja	7	100,981	11,426	8,838
Batu Ampar	4	93,593	11,187	8,366
Bengkong	4	107,126	13,214	8,107
Batu Aji	4	152,996	41,337	3,701
Batam Kota	6	107,559	38,964	2,760
Sagulung	8	130,267	54,780	2,378
Sekupang	5	124,921	68,302	1,829
Sei Beduk	6	113,689	106,447	1,068
Nongsa	6	54,253	114,546	474
Blk. Padang	4	24,053	69,120	348
Bulang	6	11,776	158,753	74
Galang	4	18,638	350,764	53
TOTAL	64	1,120,574	1,040	3,166 (average)

The most densely populated districts in Batam are Lubuk Baja, Batu Ampar and Benkong, (with a population density on average of around 8,500 people / km2) which are also the centre of the island, while the least dense are the districts stretching over the islands surrounding Bulang and Galang (with a density of around 60 people / km2).

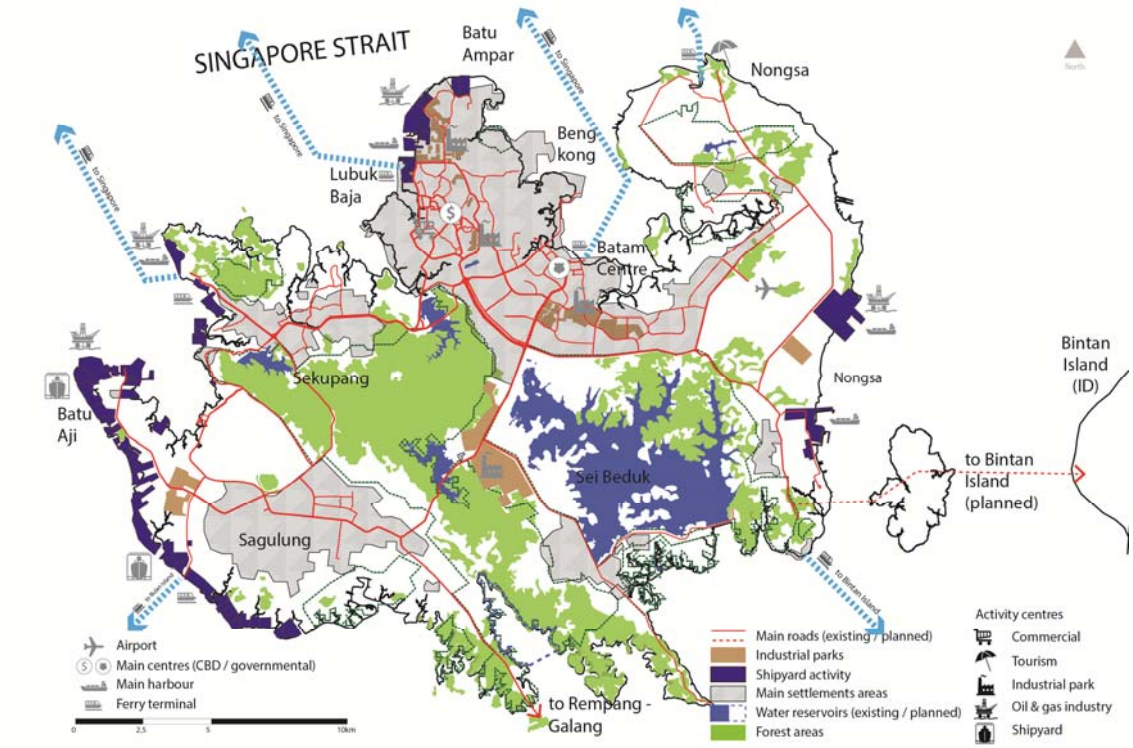


Figure 45: The present organization of the island, with the main activity centers, human settlements and industrial and shipyard areas. (source: Pemko, 2010)

Ethnically Batam is diverse, given the fact that most of the population migrate here from all over Indonesia. This makes for a segregated development in the island, following the ethnicity groups of the residents. For example, the original Malay population continues to be located in the old fishing villages (*kampungs*) along the shores, with little contact with the rest of island.

MAIN ACCESS POINTS AND INFRASTRUCTURE

As an island the main gates of entry in Batam at the international and regional level, are either via water or air. Batam has a relatively good basic infrastructure for people via its ferry terminals and the airport, but in terms of goods and cargo access, it remains tributary to Singapore, since the present infrastructure cannot accommodate modern cargo carriers. The main cargo terminal is located in Batu Ampar, NW side of the island.

At the local level the transportation is made via roads, mostly using individual motorized means, such as cars or small scooters. The road infrastructure is most dense on the north-west side of the island, focused on the Batu Ampar, Lubuk Baka, Bengkong and Batam Centre districts. Batu Ampar is the original center of development in Batam, accommodating the first industrial activities since the early ‘70s. An important part of the roads, especially those not used for the transportation of goods, remain unpaved. The authorities have in plan to build a new bridge that will connect Batam to Bintan island, located east. Batam is already connected to the islands located south, through a series of 6 bridges and a paved road.

The public transportation consists of microbuses operated by private drivers, without a fix route and a reliable schedule, most of the time waiting at the gates of the industrial parks, to pick up workers at the end of their shifts. The authorities plan to build by 2017, two monorail lines, one from Batam Centre to Batu Aji and the other from the airport to Batu Ampar. (BIFZA, 2012)

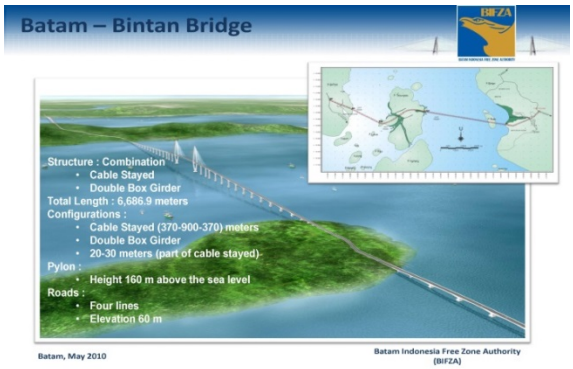


Figure 46: The new bridge in plan to connect Batam and Bintan islands (source: BIFZA presentation, May 2010)

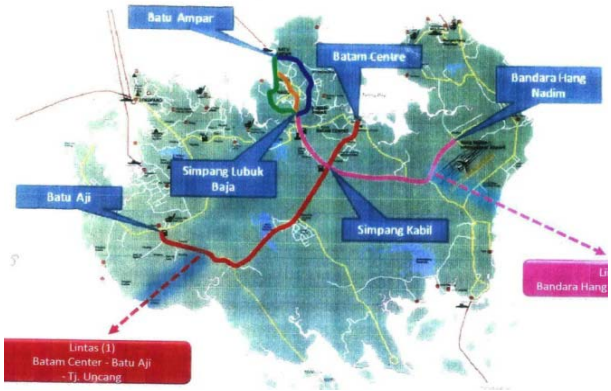


Figure 47: The two monorail plans proposed by the authorities (source: BIFZA presentation 2012)

According to a competitiveness survey report conducted by Kam et al. (2009) among 157 companies in the city, it was revealed that in general the companies are relatively satisfied with the sea transportation, logistics and telecommunications infrastructure. (p.109)

INDUSTRY AND ECONOMIC DATA

Batam has an export-oriented economy based on the manufacturing industry in particular low-tech electronics, such as household appliances, bike components, etc. The main trading partner for Batam is Singapore, which generates about 70% of the FDI in the island, followed by Japan, with 10% and Malaysia with 6%.

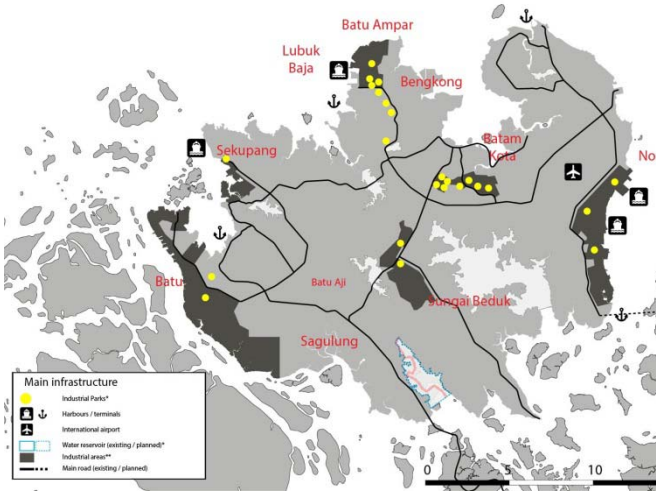


Figure 48: Main industrial parks location in Batam and shipyards (source: BIFZA, 2011

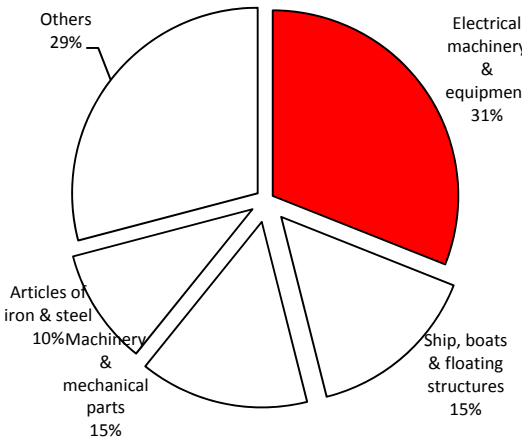


Figure 49: Main categories of products exported from Batam, in value (mil US$) up to June 2011. (source: BIFZA, 2011)

These industrial activities are concentrated in 26 industrial parks (as per 2011 see Annex 1), located on or with direct access to the primary road infrastructure. Most of the industrial parks are developed in the north side of the island, nearby the city center and the main road and harbor infrastructure in Batu Ampar.

In addition to the industrial parks there are around 50 shipyards producing primarily tugboats and cargo barges but also specialized equipment for the offshore oil & gas drilling companies, such as drilling platforms, ROVs, special drilling equipment etc. Most of these shipyards are located on the west side of the island, predominantly on the south coast.

According to the aforementioned competitiveness survey report conducted by Kam et al. (2009) most companies finds "*cost effectiveness*" as key reason for choosing Batam for their operational facilities, the manufacturing[11] companies finding the city most attractive for operational facilities, technical support and logistics but less attractive for group HQ, sales and R&D activities. (p.100)

Formal agriculture can be found in the islands surrounding Batam island, in the south in Rempang and Galang - were fruits and staple crops (corn and cassava) are grown, and in Bulang island SW of Batam, where animal farms (in particular pigs, chickens and crocodiles) are producing exclusively for the Singapore market.

3.2 MAIN DEVELOPMENT PHASES OF THE ISLAND

In order to understand the present spatial development of Batam, and the main problem the island confronts nowadays it is important to look into the evolution of the island. The present spatial organization of the island is relatively recent, beginning in the late early '70s, and can be summarized roughly in three main development phases.

THE 1ST DEVELOPMENT PHASE: THE BEGIN OF INDUSTRIALIZATION (1969 – 1989)

The industrial development begun in 1970 through a presidential decree[12] issued by the second President of the Republic of Indonesia Soeharto. Batam started as a support base for the oil & gas companies operating offshore in the region (Lueras, 2011, p.258) initially being administrated by the national oil company, Pertamina. After the '78 oil crisis, the administration passes to a special government body called "Batam Authority for Island Industrial Zone Development" and later on known as "Batam Investment and Development Agency", in short BIDA). This governing body will continue administrate the use of land and the investments up until today under several laws passed in 1977 by the Ministry of Home Affairs, the Ministry of Trade, the Ministry of Finance and the Ministry of Transportations.

In 1972 the first masterplan laid the current primary road infrastructure, which acts like east-west axis of the island – all the important development areas and functions having direct access to it. In 1973 through a presidential decree[13] the industrial developments already located in Batu Ampar, Sekupang and Kabil are decreed as 'bonded' - meaning that no taxes were applied to goods stored here, while in 1978, the statute is extended to the surrounding areas, creating the first free trade zone area in Indonesia. (Regional City Planning Department of Batam, 2010, p.4)

The initial settlements, in addition to the already existing fishermen kampungs located on the shore of the island, appeared in NE part of the island in an area called Jodoh-Nagoya, currently in the Lubak Baja district, south of the Batu Ampar industrial developments. These settlements were modest and were serving only for the rig workers that temporarily lived on the island. The total population at the start of the development was estimated to 3,000 people, consisting mainly of the natives, in time this beginning to pick-up in such a measure

[11] Manufacturing sector includes: electronics, shipbuilding, textiles, chemicals, heavy machinery, minerals and metals, plastics, refined petroleum and gas products and, other (Kam et al., 2009, p.15)

[12] PD no. 65 / 1970 about the development of the island of Batam, October 19th, 1970

[13] PD no. 41 / 1973 about the whole island of Batam declared industrial area

that an act is issued in 1980 to limit the immigration[14](Regional City Planning Department of Batam, 2010, p.5). The act will soon be revoked under the pressure from the central government, however in 1984 a local government body (*Pemerintah Kota Batam,* or *Pemko,* in Indonesian) is instituted in order to deal with the social problems that begun spreading all over the island (such as illicit economic activities - gambling, prostitution and high criminality rates). (Lueras, 2011)

By the end of this first development phase the initial bounded warehouse area is considered a success and consequently it is enlarged to include the whole Batam and a few other smaller islands, located nearby the coast. But despite the declared 'success' the foreign investment, remained modest compared to the expectations of the authorities. Singapore, Batam's sister-city, by this time an important industrial and tradeing hub in the region, was still not attracted to the prospects of investing in Batam. (Regional City Planning Department of Batam, 2010, p.5).

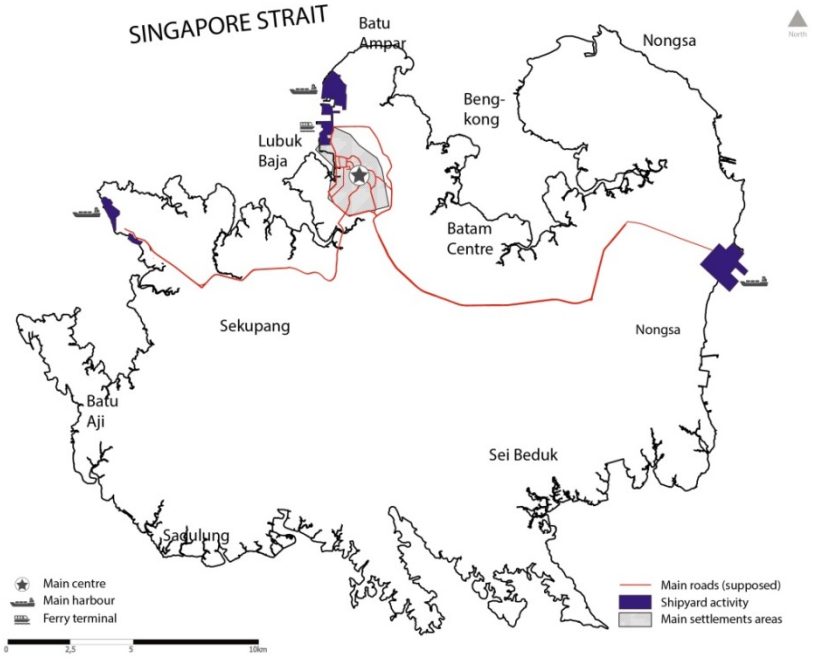


Figure 50: The estimated spatial organization of the island in the early development phase. (various sources)

This will change however in 1990, following an economic agreement signed between Singapore, Malaysia and Indonesia known as the *SIJORI* agreement. After its signing the manufacturing activities, that required large workforce and space, will begin moving from Singapore to Batam. In part this took place also because the labor and land costs in Singapore started to spike high due to the acute land and workforce shortage. The agreement had many implications for Batam, including placing the island back on the world map and the beginning of a new development phase.

TEXT BOX 7: THE SIJORI ECONOMIC AGREEMENT

It is important to explain the SIJORI economic agreement between Singapore and Indonesia, because through this Batam arrived to be what it has become today. Experts sees in the agreements both positive as well negative implications for the development of the island.

The agreement is signed on 28th of August 1990 between Singapore and Indonesia and has as objectives the "*promotion and protection of investments*". In essence the agreement opened the doors for direct investments from Singapore and made manufacturing companies to relocate their production and operation facilities, from the more expensive city-state to the much cheaper conditions in Batam.

14 Decree of the Minister of Justice no. M. 01-PW-10-01-83 "concerning the decision that Batam is a special on immigration matters" from June 7th, 1980

The agreement would make Batam part of the *SIJORI Growth Triangle*. The 'triangle' was supposed to represent the economic cooperation between the three neighboring nations namely: Singapore, Malaysia and Indonesia. According to Sparke the 'triangle' is a "*discourse of complementarity*". (2004, p.490) Following this agreement Singapore would exchange with Johor (the south province of Malaysia) and Riau (the province where Batam is located): capital, skilled labor, advanced technology, access to world markets, advanced telecommunication and physical infrastructures, business contacts and management skills, in return for unskilled or semiskilled labor, natural resources and land.

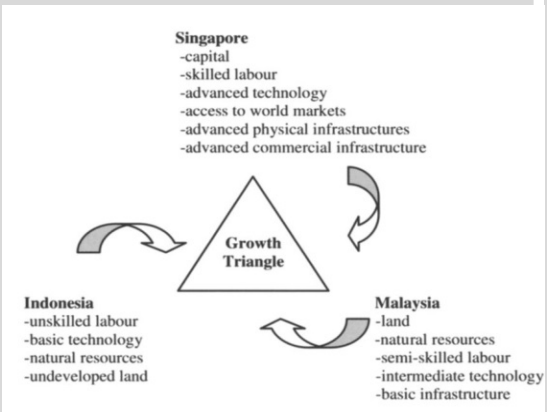


Figure 51: The SIJORI agreement principles or the 'Triangle of Economic Complementarity' (after Debrah et al. 2000, according to Sparke et al., 2004)

Various authors, argues that the agreement, though seen equilateral, was advantaging Singapore on top of the rest (Grundy - Warr et al., 1999; Colombijn, 2003; Sparke et al., 2004; Holm, 2011). The agreement would provide easy access to natural resources (such as fresh water, sand used for land reclamations, wood and agricultural space) to Singapore and also allowed for many of the profits to return to Singapore, in the form of finite products and value-added materials that would have the label 'Made in Singapore'.

Sparke et al.(2004) argues that the major advantage for Singapore stayed in the cost differences between the three nations, Batam being the cheapest location of all. The prices for land and labour in Batam were less than half with respects the prices in Johor and around a third of the prices in Singapore.

Nevertheless, the press hyperbolized the success of the cooperation, the agreement being at that time, one of the most praised examples of the positive effects of the globalization (Parsonage after Sparke, 2004, p.486). In 1991, 'The Economist' writing that the "*the growth triangle can hardly fail to impress*". (idem)

As a result of this agreement, two major developments can be observed as taking place in Batam.

(1) With concern the society development, through the SIJORI agreement, Singapore offshored the lowest skill, labor-intensive, work, while anchoring the more remunerative, hi-skilled workforce for itself (Royle, 1997; Colombijn, 2003; Sparke et al., 2004)

(2) Concerning the spatial development, the investments, which would soon flow in the island because of this agreement, would shape the spatial organization and development of Batam until today, by the perpetuation of the industrial park models, similar to Foxconn City in Shenzhen SEZ, this 'dictating' more or less the spatial development in the island (Cairns et al., 2010).

THE 2ND DEVELOPMENT PHASE: THE GLOBALIZATION PERIOD (1990 – 1998)

With the signing of the SIJORI agreement in 1990 Batam enters in a fast industrialization and development process marked by the foreign investors that begun entering the island.

By this development phase the island is already recognized as an area of strategic importance and a center of trade, industry and tourism, which allowed for state money to finance the basic essential infrastructure: an asphalted roads network, power stations, water reservoirs, ferry terminals and the international airport fallowing the presidential approval in 1983. (Holm, 2011, p.277).

The free trade zone status is expanded to the other islands around Batam - Karimun and Bintan islands - where Singapore was offered the opportunity to choose what and where to invest precisely. A series of six bridges and an asphalted road, is now connecting Batam to the southern islands, Rempang, Galang and Galang Baru, the most southern lying island in the municipality.

According to the Agrarian Law from 1960 foreign companies cannot operate in Indonesia without an Indonesian partner or without being registered under the Indonesian law as Indonesian companies. For this reason the industrial parks in Batam begun providing third party services to foreign companies, in general leasing the space for a pre-determined period (30 years initially) and providing workforce hired under the industrial park administration much in the same way as the case of Foxconn and Apple in Shenzhen SEZ. One of the earliest industrial parks in the island "Batamindo" will open its gates in 1991 and it was meant to be a model for the other industrial parks to follow. (Sparke et al, 2004)

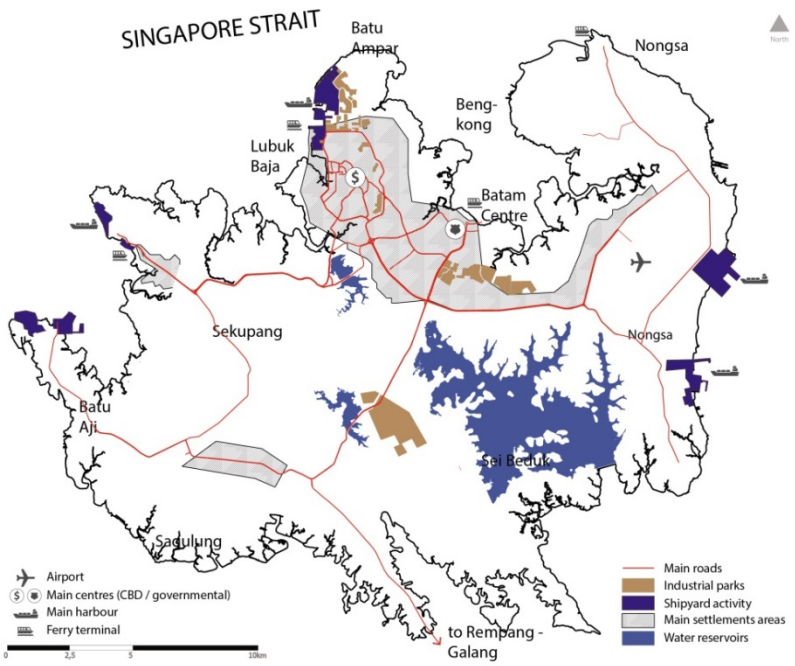


Figure 42: The expected development during the second development phase of the island. (various sources)

TEXT BOX 8: BATAMINDO INDUSTRIAL PARK: THE FLAGSHIP OF INDUSTRIAL DEVELOPMENT OF BATAM

Batamindo is one of the earliest industrial parks to open and one of the most developed in the island currently. The park started as a joint project between Singapore Economic Development Board[15] and Indonesian Ministry of Trade represented by the Salim Group, following the SIJORI agreement signed in 1990. According to Sparke et al, it was meant, to be the flagship of the economic cooperation between the two nations and the model for other industrial parks in the island to follow. (2004)

The advantages of the park are described in an article of "The Economist" in 1991:

"*The Batam Industrial Corporation (Batamindo), 40% owned by Singaporean interests and 60% by the Salim Group, is transforming the island of Batam into a floating factory, two-thirds the size of Singapore and only a 30-minute boat trip from its financial district. […] Batamindo will supply custom-built factories on 30-year leases. The Salim group can supply unskilled but nimble-fingered workers (mostly young girls) at S$92.50 ($54) a month*."(according to Sparke et al., 2004, p.488)

The Singapore partner made the initial design of the park and ensured the entrance of the multinational companies, while Salim Group took care for the labor recruitment and the other legislative tasks necessary for the companies to be able to operate in Batam. (Grundy-Warr, 1999).

[15] According to the official site Singapore Economic Developemnt Board has as a mission to sustain Singapore as a leading global hub for business and investment (link: www.edb.gov.sg/content/edb/en/about-edb.html) [accessed 11-05-2013]

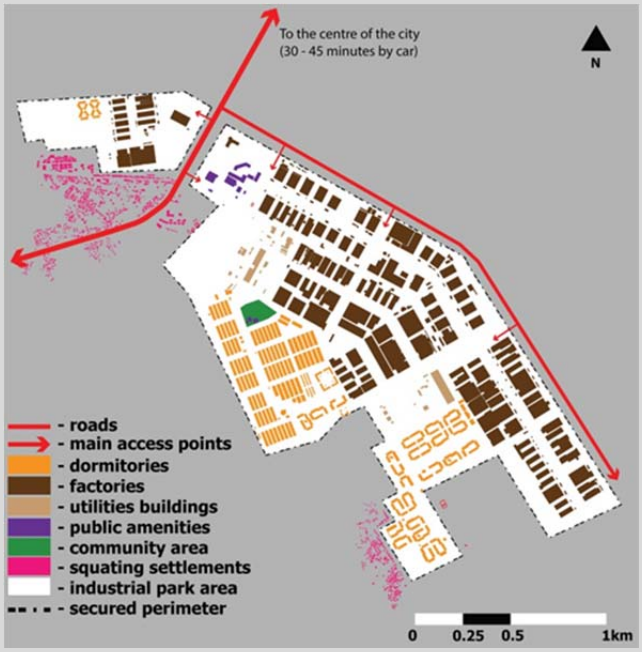


Figure 52: Batamindo industrial park, organisation, (source: modified plan from PT Batamindo Investment Cakrawala, 2011)

The park covers 320ha of land and it is restricted to the use of the personnel and visitors only. It contains a total number of 200 security personnel (in addition to the park maintenance) and around 60,000 workers (in 2012 according to the head of Batamindo Industrial Park).

Various goods are produced in Batamindo from low-tech electronics to contact lenses and plastic moldings for household appliances. Around 80 companies, some of them well known international brands such as Varta, Siemens, Shimano, Sumitomo, are located in the park. (PT Batamindo Investment Cakrawala, 2011).

Batamindo is conceived as "*a-city-within-a-city*", being a self-contained, self-sufficient, development where working and living are inseparable. The workers are living, eating, going to shop and to the doctor, etc., on the premises of the park. The park contains production spaces (5 different types of standard factories), public amenities (canteens, shops, health care center, community area), utilities (it produces its own electricity, has its own telecommunication network, etc) and dormitories for the workers.

Figure 53: Aerial view of Batamindo Industrial Park (source: PT Batamindo)

Figure 54: A a typical makeshift room in a squatting settlement or "ruli".

Kristyne Peter, from the International Metalworkers' Federation recounts her visit to the place:

"*The massive industrial complex is protected by heavy iron bars with razor wire running along the top. To enter and leave you must pass a guarded security check point and provide identification. [..]. Many workers never leave the industrial park. They live in company housing, go to the company shops, visit the company clinic and pray at the company mosque. It is a caged existence*." [16]

There are several dormitories types in the park, the most common being under the form of 4 floors blocks of flats, where more people are fitted to sleep together, sometimes even as much as 15, in one room. According to the head of PT Batamindo, only around half of the current number of workers are housed in the dormitories, the other part providing their own accommodation, in most cases in the squatting settlements around the industrial

[16] From: http://www.imfmetal.org/index.cfm?c=18178&l=2 [accessed: 11-05-2013]

park. The squatting settlements or 'ruli', as they are called in Indonesian, lack access to even the most basic amenities such as running water, sewage or electricity.

The workers are hired on yearly contracts that can be renewed once or twice at most. According to the HR manager from one of the companies in the park, around 80% of the total employment in the park is made by young girls, age 18 – 24, because they are easier to work with and pay more attention to work than boys. Most of the companies in the park operate in three shifts (7am to 3pm; 3pm to 11pm; and 11pm to 7am), depending on the period of the year and the amount of production necessary.

(after PT Batamindo Investment Cakrawala, 2011)

The lower production costs and the location would start being the main competitive advantages of Batam in the region, attracting more and more investors, both from outside but also from inside Indonesia. (Colombijn, 2003; Sparke et al., 2004; Lueras, 2011) Similar to Shenzhen, land speculation begins to intensify in the island, helped by the relative easiness and low price to secure the land. Many private residential complexes, tourist resorts, shopping centers and other real estate objectives, appears in the island, without following a coherent land-use plan.

In this period the island's population will start growing more intense than before, the population tripling by 1998 causing the apparition of a lot of illegal settlements. Authorities tried to deal with these problems, partially because it was affecting the image of the island and its investment potential. However the authorities' intention of creating more of "*a Singapore-like environment of security, public order and good management begins to fade over the land clearance conflicts, residential uncertainty and illicit commercial activities, which become main sources of revenue for employed but poorly paid or totally unemployed residents*." (Grundy - Warr et al., 1999)

The investment frenzy begins to fade after the Asian Crisis from 1997. Executive housing areas, marketed as "Orchid Park" and "Shangri La Gardens" are abandoned to dust, like many other commercial projects, because of the lack of buyers (idem.) In this year, the Indonesian Rupiah would suffer a great drop in value and the assets in banks would be seriously devalued. This would set the stage for one of the largest social uprising, in May 1998, since the end of the Dutch colonial period, which would lead to the abdication of the President and its replacement (Lueras, 2011).

In the years post the Asian crisis the initial competitive advantage of Batam, the cheap land and labor costs, begins eroding, international companies starting to look for other cheaper locations in the area such as Cambodia or Vietnam. This process continues even nowadays, stimulated also by the 2008 crisis. Similarly, the local government beings assuming more and more autonomy in the end this process leading to the present administrative dichotomy.

THE 3RD DEVELOPMENT PERIOD: THE AUTONOMY (2000 – PRESENT)

In 2000 Batam officially become known as the Autonomous City of Batam [17] and together with the southern islands - Rempang, Galang and Galang-Baru – which are now included in one administrative unit called "Municipality of Batam" - is declared "Free-Trade Zone" and "Free-Trade Port", basically reinstating once more the free-trade nature of Batam.

[17] State law no. 53 / 1999 and completed with the law no. 13 / 2000 Batam Municipality is changed to the Autonomous City of Batam

In 2004, the local government, Pemko, is invested with more autonomy and no longer has to answer to BIDA, traditionally the only administration body of Batam until then[18] (Regional City Planning Department of Batam, 2010). This makes for the land administration in the island to become more cumbersome, since, according to the 1960 Agrarian Law, BIDA still retains the right of administrating the land. Currently the investors in the island, will no longer have to deal only with one administration body, BIDA, but with two BIDA and Pemko. This caused a series of problems which influences negatively the competitiveness and the development of the island (Kam et al., 2009).

Nevertheless, the autonomy for Pemko marks a change in the direction of the development of the island. If so far the development was seen from the point of view of the industrial needs, now social problems started to be more often on the agenda.

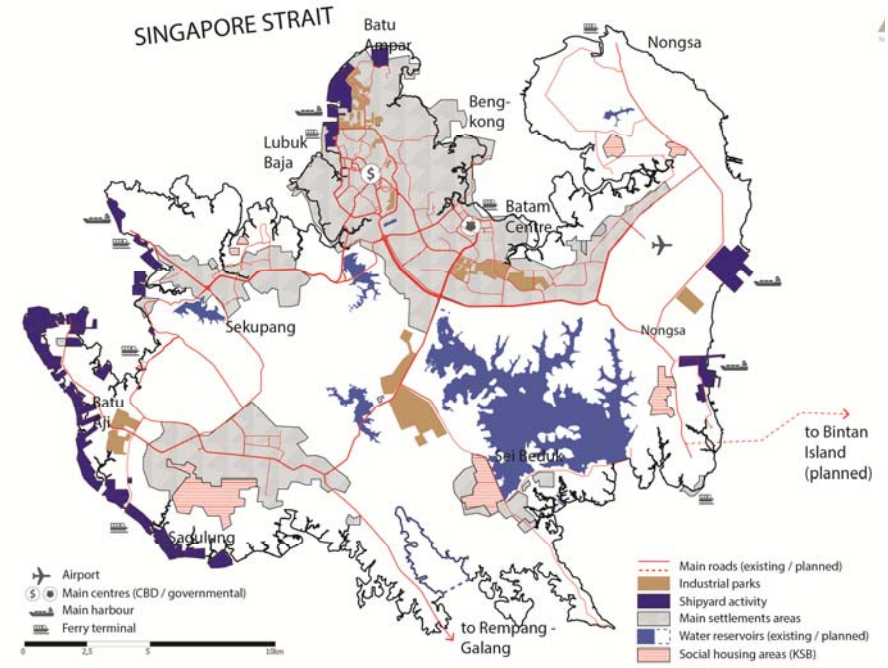


Figure 55: The present development of the island. (various sources)

As such the authorities started again dealing with the housing problems in the island. Several social housing projects, of the type 'ready-to-build' plots (known as KSB) are being implemented in the island in Sagulung, Sei Beduk and Nongsa districts in particular. Until now the social housing attempts have been few and by far insufficient. Other residential complexes begins to spread in the island, following the main road infrastructure, and without an apparent systematization plan which controls the development, most of the time resulting in urban sprawl and reduction of the ecologically preserved areas, by the side activities of the residents (such as informal agriculture)

In 2007 the area is renamed from *Free Trade Zone* and *Free Port*[19] to *Special Economic Zone* or SEZ, declaring once again the global aspirations of the authorities.

The spatial problems that Batam currently faces are harder to address because of the insufficiency of public funds. Fallowing the independence law and the autonomy of the local government, the public funds from the central government have been drastically reduced or even dried out, leaving the local authorities to manage on themselves. The more recent masterplans that appeared indicates development even in areas where previously protected habitats were located (e.g. the islands in the south of Batam currently are dedicated to

[18] Law Act no. 32 / 2004 regarding Local Government.

[19] Law no. 36 and 44 / 2007

industrial development). It looks like the local authorities, instead of improving the present situation are willing to redevelop new land areas.

3.3 PROBLEM ANALYSIS

There are five major problems identified in Batam that can be roughly divided in two categories: (i) spatial problems – consisting of poor housing conditions for the majority, mobility problems and environmental issues; and, (ii) economic – institutional problems – related to the declining competitiveness of the island and to the land use administration, respectively.

POOR HOUSING CONDITIONS

From the development phases described previously, one can understand that at first the island was developed sufficiently good for the industry, underestimating the number of migrant workers and the social implications this would attract. The problems began surfacing in the '80s, when the authorities unsuccessfully tried to curb down the immigration following high criminality, illicit economic activities and other social issues that were affecting the image of the island.

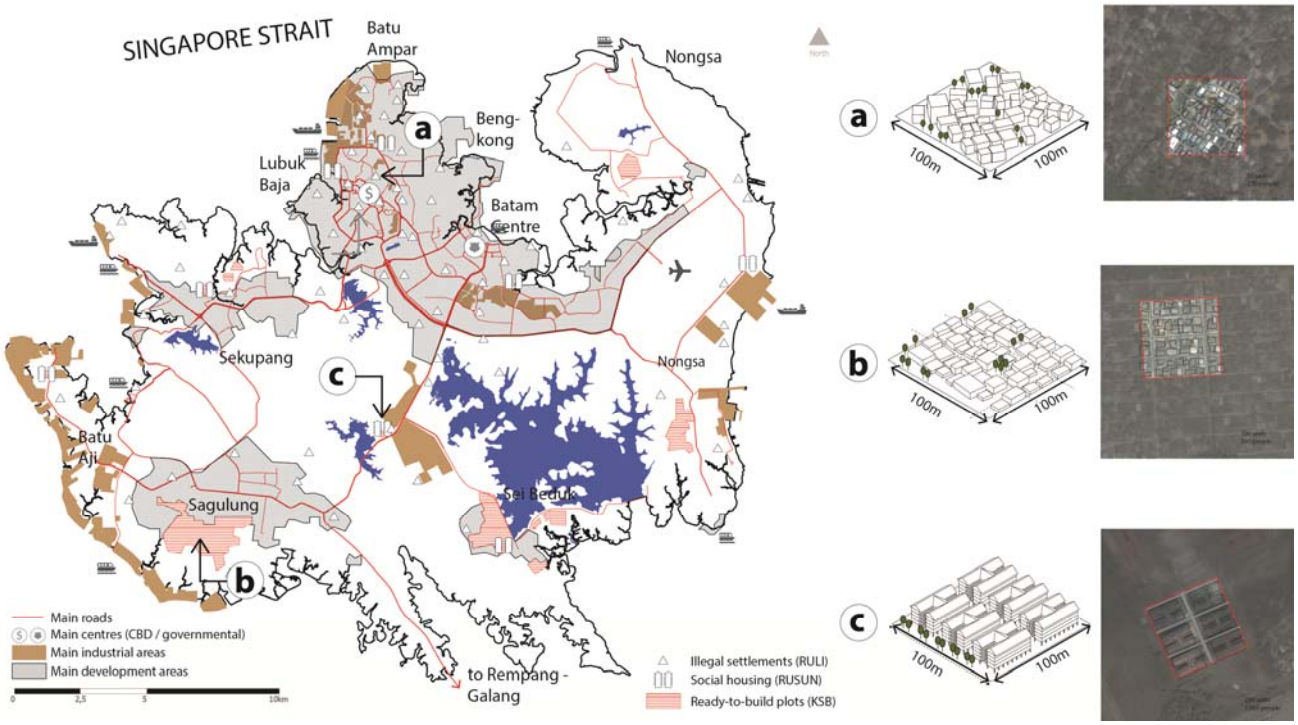


Figure 56: The affordable housing typologies in Batam with densities. The letters on the map represents: (a) RULI or illegal settlements, (b) KSB social housing - 'ready-to-build' plots; and (c) RUSUN, workers' dorms – blocks of 4 floors. (source modified map from Pemko, 2010, Cairns et al, 2012, Google Maps)

At a spatial level these problems translated most of the time in the form of illegal settlements or 'ruli' (*rumah liar,* literally meaning 'wild houses,' in Indonesian). In a research mentioned by Grundy-Warr et al., around 112,500 people were living in illegal settlements in 1997 (Naim, 1997, according to Grundy-Warr et al., 1997),

while the official data from 2001 mentions more than 47,000 houses as illegal[20]. According to some authors (Grundy - Warr et al., 1999; Lindquist, 2009), at the base of this problem, stays a combination of factors: lack of affordable housing, under- or unemployment and scarcity of affordable, public transportation.

The living conditions in a ruli are basic. Almost all houses missing sewage and direct connection to running water. Few of them are connected to the power grid.

So far, the efforts of the authorities in providing affordable housing have been focused in three directions: (i) improving the living conditions and legalizing the ownership for some of the well-run squatting settlements (such as Kampung Tiban in Sekupang area); (ii) worker's dormitories, rented out to migrant workers located near industrial areas (known as *rusun*); and (iii) ready-to-build plots, sold at subsidized prices for people to build their own houses, (knows as *KSB*). These efforts remain insufficient in part because of the lack of available land for the authorities to develop new affordable housing projects[21], and in part because of the legal and financial barriers in the acquisitioning process by the average residents (Pemko, 2010).

Table 7: Comparison between the main affordable housing types

RULI **illegal settlements**	**KSB** **ready-to-build plots**	**RUSUN** **workers' dormitories**
		
Type: privately built / unregulated	Type: state subsidized / regulated	Type: public funds / regulated
Density: 50 units or 270 people / ha	Density: 100 units or 380 people / ha	Density: 288 units or 1,000 people / ha
+ strong communities based on ethnic background; + close to main activity and production areas or near the main road network; + there are small economic activities within the better established ruli's	+ promotes ownership; + reduces the environmental impact; + it positively contributes to the human capital development and social balance within the island	+ adjacent to the main production areas; + clean, safe and attractive; + reduces the environmental impact + better integrated within the city than the alternatives in the industrial parks
- basic living conditions; - negative environmental impact such deforestation and land wasteful; - ownership is problematic	- far from main road network and production areas; - poor infrastructure and living conditions; - difficult to acquire	- insufficient and small (24m^2 per unit); - difficult to acquire (long waiting lists) - restricted to the renting for active workers only

Aside of the insufficiency of legal affordable housing, there are also other important caveats to bear in mind when it comes to the quality (such as size) and access to amenities and social services. (Cairns et al., 2012) This is most obvious in the case of the KSB, the ready-to-build plots, which are only 6m x 8m in size, most of the time built far away from the main road infrastructure in areas where mobility is limited, and the basic infrastructure leaves much to be desired (such as unpaved roads). Nevertheless, this type of affordable housing

[20] Source: "*This year 40 thousands ruli will be disciplined*" (Batam Pos, 2011) [Accessed 31-10-2012].

[21] Source: *Kementrian PU bangun 4 twin towers rusun baru di Batam*. Tribunnews Batam, [online]. Available at: <http://batam.tribunnews.com/2012/03/05/kementrian-pu-bangun-4-twin-tower-rusun-baru-di-batam> [Accessed 31-10-2012].

remains the most spread in the island and one of the most successful so far, because it promotes ownership, positively contributes to the social balance within the city and it is better regulated.

REDUCED PUBLIC MOBILITY

Apart from the central areas of the city (Batu Ampar -Lubuk Baja - Batam Centre districts), where the development first started and densified over time, this allowing for the distances between main functions to be walkable, the city is primarily car focused. About 60% of the population live at more than half an hour distance from the main city functions located in the NW part of the island, in the aforementioned districts.

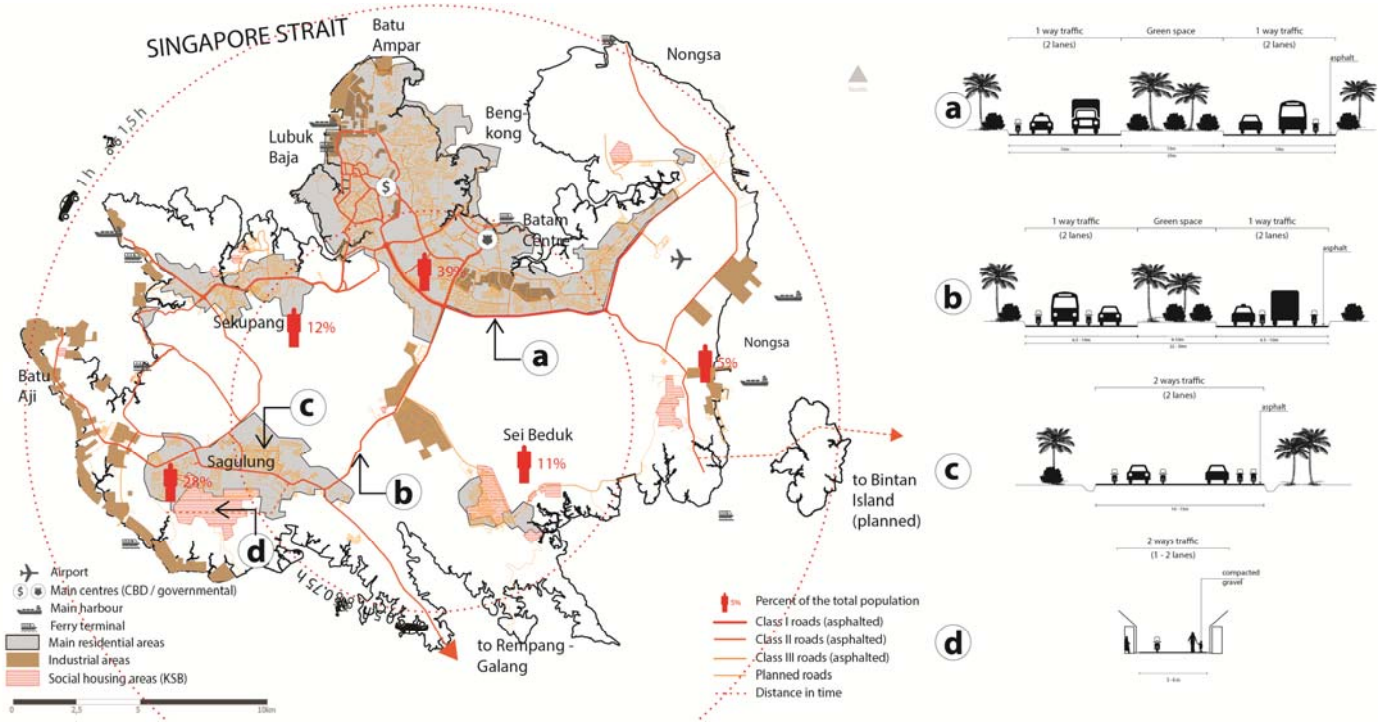


Figure 57: The road network in Batam, with main development typologies, population densities and main road profiles. The letters on the map represent: (a) class I, (b) class II, (c) class III and (d) class iv. Class I to III are paved roads. (source modified map and data from Pemko, 2010, Google Maps)

Despite this a large part of the roads inside the districts, are only partially paved or totally unpaved, making it difficult for the cars or busses to reach the residents. This restrains travelling especially for those financially disadvantaged, such as those living in illegal settlements or social housing areas. Most of the KSB type social housing areas in the Sagulung, Sekupang, Sei Beduk and Nongsa districts, are affected by this situation because these areas are located far away from the primary road network (class I and II roads) that connects the whole city. The majority of the roads in the KSB areas are unpaved, class IV roads.

The regulated public transportation in the island is made up of small to medium-size buses with one door, run by the local authorities. However, these have a limited reachability, are scarce and unreliable.

Currently, the most used transportation means for the middle to low income residents are: (i) for the public use - the paratransit[22], using micro-buses; and (ii) for the private use *ojeks* (small scooters or motorcycles). These means are unsafe, polluting and unreliable, if we speak about the public transportation, because they do not

[22] Paratransit is defined as alternative mode of flexible passenger transportation that does not follow fixed routes or schedules. (from Wikipedia)

follow any fixed route or schedule. In addition, at times there is a competition between the private drivers to pick-up and drop-off passengers, which can lead to increased chances of road accidents.

Table 8: The comparison between the most frequent transportation means for the low and middle-income residents

***Ojek* or scooters (private use or unregulated)**	**Paratransit (unregulated)**	**Medium-size busses (regulated)**
		
Type: privately owned / for private or public use (as taxi)	Type: privately owned / for public use	Type: government owned / for public use
+ flexible, fast and can reach difficult accessible areas; + occupies little road surface; + can provide an additional revenue if used for transporting other people (as a taxi) or for work in general	+ flexible, works like a taxi; + cheaper and safer than an *ojek;* + more environmentally friendly (consume less gas per passenger)	+ more comfortable and safer than the microbuses + follows a fix route + cheaper and more reliable than the rest + more environmentally friendly
- noise and air polluting; - unsafe; - can become a nuisance in the traffic; - relatively expensive	- unreliable – doesn't have a fix route or schedule; - relatively unsafe; - has limited reachability (mostly only on paved roads)	- insufficient number of cars and unreliable schedule; - limited reachability (only on paved roads)

According to Power (2012) following a research into the housing estates in Britain and US, transport deprivation is resented especially in the subsidized housing estates, leading to many socio-spatial problems such as high criminality, low education levels and segregation of low-income households. Aside of the 'ghettoization process' that affects the social balance of the city, the author argues that this situation leads to the creation of a 'vicious circle' for which both the residents of these areas and the city as a whole has to pay, either via transport or fuel subsidies, environmental damage through higher fuel consumption and reduced human capital potential. (idem. p.44)

DEGRADING ECOLOGICAL BALANCE

Following photo evidence from the Google satellite imaging service, one can notice many signs of informal (or illegal) agriculture activity, soil erosion (either by sand quarrying or industrial activity such as shipyards) and (possible) soil pollution. These problems for which there is no other hard facts, aside of some testimonies from the locals with regards the quality of the water, appear especially at the fringes of the urban or industrial development.

This evidence becomes a problem especially when it starts affecting the ecological protection areas around the fresh water reservoirs (by deforestation for example) and the quality of the surrounding waters, affecting the quantity of catch.

In the past the authorities conducted several initiatives of removing the illegal settlements from the protection area of the Sei Beduk reservoir (the largest water reservoir in the island).

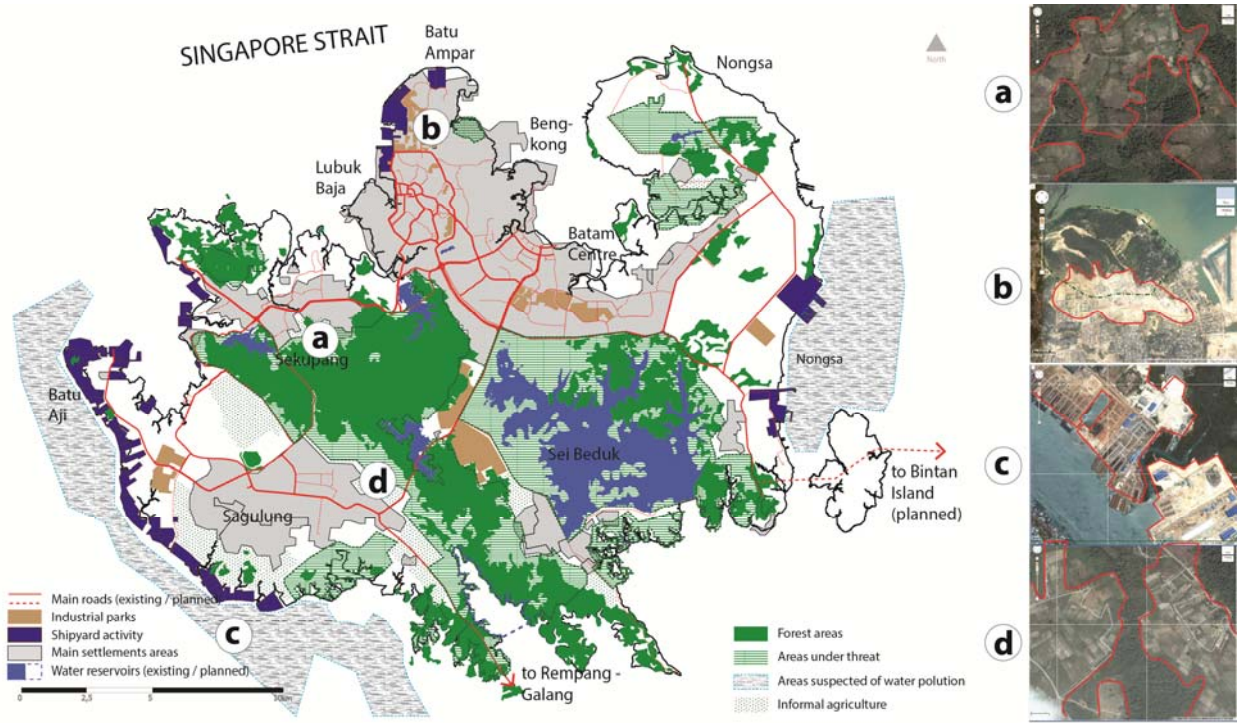


Figure 58: The environmental conditions in Batam, with major ecological structures and problems. The letters on the map represents: (a) and (d) informal agriculture in protected areas; (b) sand quarry in a protected area; and (c) soil erosion due to shipyard activity. There is no hard evidence, except the Google satellite images and the testimonies of the locals in what concerns the quality of the water. (source modified map and data from Pemko, 2010, Google Maps)

DECLINING COMPETITIVENESS AND INEFFECTIVE ADMINISTRATION

Aside of the above spatial problems, one can remark an abrupt loss of competitiveness and several administration / governance issues. According to the economic data evidence, between the 2008 and 2010, the tax revenue have been reduced with about 17% while the FDI dropped with about 60% in the same period. This shows also in the overall economic growth, which slumped from a peak of 7.65% in 2005 to 4.65% in 2009. (Regional City Planning Department of Batam, 2010; Batam Indonesia Free Zone Authority, 2011)

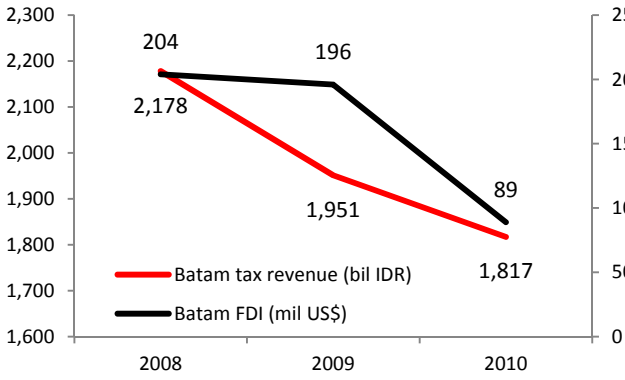


Figure 59: Graph showing the tax revenue and FDI development in Batam (source: BIFZA, Pemko, 2011)

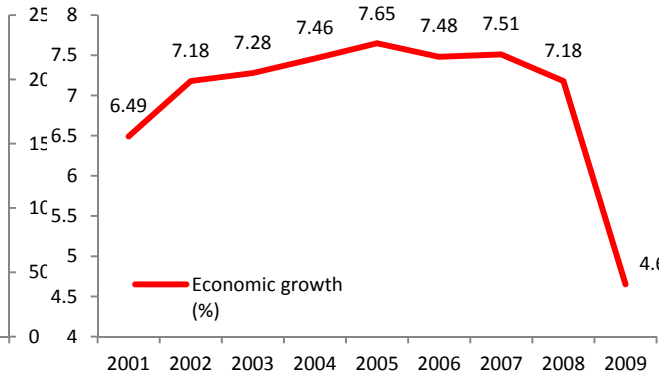


Figure 60: Graph showing the evolution of the economic growth in Batam. (source: Pemko, 2010)

These economic data are supported by various experts in the island, such as the director of the Batamindo Industrial Park, John Sulistiawan, who explained that the 2008 financial crisis affected the number of investors and companies willing to continue working in the park. From around 100 companies In the period before 2008,

the total number of companies in Batamindo decreased to 74 in 2011 and from over 90,000 workers to 60,000, over the same period, data confirmed also from the Batamindo's presentation materials.

As explained in the 2nd development phase of the island, the signs of a wearing investment climate and negative image of the island appeared in 1998. This happened in part because of the Asian crisis, which left Indonesia particularly weak because of a sudden currency devaluation, and in part because of the social problems that begun spreading due to mass immigration. This made companies beginning to relocate again, in search of cheaper production costs (e.g. the 'footloose' behavior typical of companies in SEZ areas in general).

Kam et al. (2009), in their survey report over the SEZ competitiveness conducted among 157 companies from Batam, concludes that "*the overall level of satisfaction with the various competitiveness factors is relatively low*", in particular with what concerns the labor and governance conditions factors[23]. (p.109)

With regards labor factors, the companies declared less satisfied with regards regulation (min. wage, layoff and retrenchment) and the weak bargaining power of the unions. (p.110) In particular concerning the minimum salary in Batam, in 2012 this was more than double as compared to Vietnam - one of the main competitors in the region on manufacturing services[24]. The last rise of the minimum salary took place at the end of 2011, following a series of labor demonstrations extended over several days and which lead to factories shutdown and violence in several cases.

With regards governance, the companies declared less satisfied with regards corruption, coordination between the various administration bodies and the interpretation and consistency of the regulations. (idem) As explained in the 3rd development phase, administration problems started to occur after the Indonesian provinces were declared autonomy, the local governments gaining more independence from the central government located in Jakarta. This made the administration situation in Batam particularly difficult, because until then the island was under the administration of a special agency, BIDA, responsible for the development since the late '70s.

After 2004, when the local government, Pemko, officially becomes independent from BIDA, the island started to be lead from two sides. The most problems and the biggest element of contend being the administration of the land, which, according to the Home Affairs decree no. 43/1977, remains with BIDA. This administrative dichotomy was described by a local businessman "*as a boat with two captains*".

3.4 CONCLUSIONS

Two important concluding points can be drawn from the above analysis.

With regards the spatial development in general the city is characterized by poor housing conditions for the lower and middle income residents and urban sprawl. These are in short the main evidence:

- Social housing in the city is insufficient, (for example it is estimated that around 700 workers' dormitories RUSUN are needed when the current supply is only of 120 blocks[25]) and there is little or no space for new projects [26];

[23] Both scored average scores below 3, on a scale from 1 to 5 where 1 represented 'not satisfied' and 5 represented 'very satisfied' (idem.)

[24] Minimum salary in Batam €116 / month vs. - € 53 / month in Vietnam. From http://www.wageindicator.org <accessed date: 08- 01-2012>

[25] Batam Pos. 2011. '*40 thousand ruli will be disciplined*'. In Indonesian in original [online]. [Accessed 17-08-2011].

- New housing developments, such as the KSB social housing area, in Sagulung, Sekupang, Sei Beduk and Nongsa districts, are located far from the main transportation infrastructure disadvantaging their residents who are in the lower – middle income group;
- The city is car focused and the public transportation is insufficiently developed in part due to the condition of the roads and in part due to the management;
- At the urban fringes of the urban developments, satellite images indicates various signs of human activity (such as forest deforestation to leave place for agriculture or sand quarry activities) which can have a negative impact on the ecological balance of the island (such as the fish catch in the surrounding waters and the fresh water reserves).

With regards the economic – administrative situation, we remark that the city is located in between the Eindhoven and Shenzhen SEZ example, making it closer to the Curitiba case with regards self-administrating and self - financing. This is because:

- The city resulted from a top-down planning and development, such as Shenzhen SEZ but currently is lacking the financial support from the central government in order to address its problems;
- In addition, the private companies in the island are typical 'footloose', (i.e. that they are likely to relocate, if the conditions degrade, and they are unlikely to invest in the developing of the city) and hence Batam cannot benefit from a bottom-up development either, like in the case of Eindhoven.

[26] Napitu, N., 2012. Kementrian PU bangun 4 twin towers rusun baru di Batam. *Tribunnews Batam*, [online]. Available at: <http://batam.tribunnews.com/2012/03/05/kementrian-pu-bangun-4-twin-tower-rusun-baru-di-batam> [Accessed 31-10-2012].

IV. VISION AND STRATEGY

4.1 BATAM VISION

In the case of Curitiba, the city made use of a transport and land use integrated planning, i.e. a Transit Oriented Development (TOD) strategy, to mitigate its spatial problems. Central in this strategy stays a competitive administration and an efficient Bus Rapid Transit (BRT) system that has both the role of securing the mobility of the residents and also to attract along its path the development of the city, in corroboration with the land use regulation.

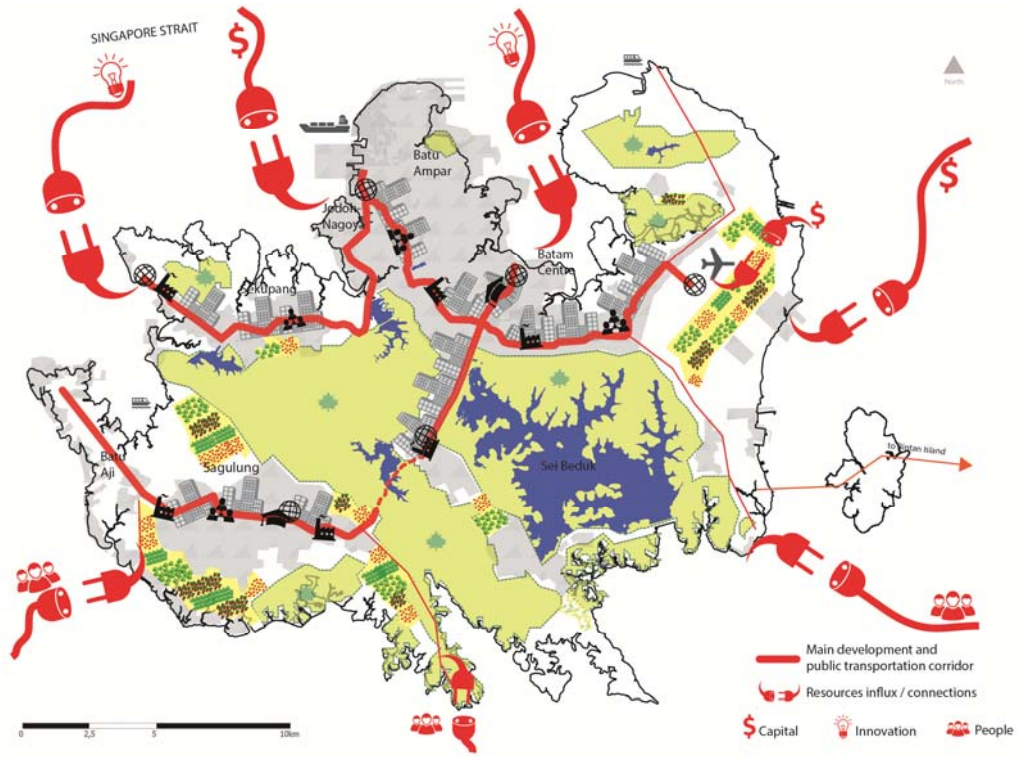


Figure 61: A vision for Batam.

In the light of the conclusions drawn from the problem analysis (see subchapter 3.4) we can imagine a similar strategy for Batam, and the corresponding vision for the city could be:

THROUGH ITS EFFICIENT ADMINISTRATION OF LAND USE, TRANSPORTATION AND ENVIRONMENT, BATAM WILL BECOME THE MODEL CITY IN TERMS OF LIFE QUALITY AND INVESTMENT OPPORTUNITIES IN INDONESIA, AND A LEADING INNOVATION AND COMPETITION CENTER AT THE REGIONAL AND GLOBAL LEVEL, WHICH WILL CONTINUE ATTRACTING RESOURCES FOR A LONG TIME TO COME.

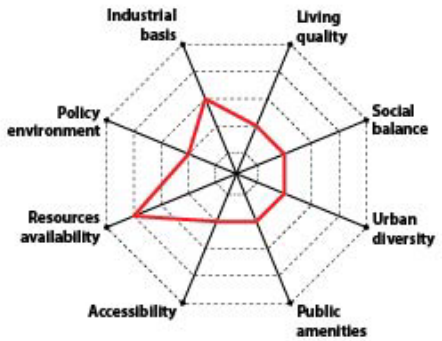


Figure 62: The current situation, function of the 'tree model' drivers.

Figure 63: The target situation of Batam SEZ function of the 'tree model' drivers.

Using the same drivers that stay at the base of the 'tree model' determined in the literature research, we can also evaluate more precisely the future targets of the city of Batam (fig.68, 69) or in more details this is presented in table 9.

Table 9: The envisioned future, in 30 years' time, for Batam using the 'tree model'.

BATAM SEZ VISION FOR THE NEXT 30 YEARS							
Living quality	Social balance	Urban diversity	Public amenities	Accessibility	Resources availability	Policy environment	Industrial base
- people can afford better or improved housing conditions because they have jobs; - people can pursue more easily their dreams; - people can recreate, be inspired or healthy in the new parks, various cultural facilities and sports fields; - parts of island preserved their natural habitat that people can enjoy	- people of various backgrounds can live, work and interact together; - the unemployment rate is small, and the welfare system is providing for those in need of help;	- the city contains a large variety of living and working environments and it can complement these with Singapore's; - living and working, leisure and business, functions are mixed	- most of the residents can reach the basic social services (health care, primary education, day-to-day shopping and religious) and public amenities (parks, gardens, squares) walking or biking; - the city includes an academy for the shipyard and offshore education well known at the national and regional level	- Batam develops a port able to complement Singapore's on the national and regional routes; - regular car is use is not necessary most people uses the public transportation system and the alternative slow traffic paths including footpaths - all residents have easy access to internet	- the city makes good use of its land availability conserving natural habitat areas while reserving strategic location for industrial expansion - the city self-supplies for an important part of its food necessities	- the policies aim at the creation of long-term strategic economic activities - the system is business friendly, consequent and trustworthy; - Batam develops several economic agreements with strong trading partners in the region but also more international; - an important percentage of trade is within Indonesia	- the island has well developed in all industrial sectors from agriculture and manufacturing, to services and research and design in strategic fields; - the city presents an economic cluster focused on the shipyard and offshore industry which maintains competitiveness and innovation in the city

4.2 REGIONAL LEVEL STRATEGY AND FINAL PRODUCT

At the regional level Batam will make better use of its strategic position, in order to become a leading innovation center, able to compete at the global level in terms of shipbuilding, oil & gas supporting services and equipment, and light industry. Batam will improve its policies and administration consistent, transparent and reliable, in order to improve its image and continue attracting capital, innovation, and people on long-term in the future. (fig.66)

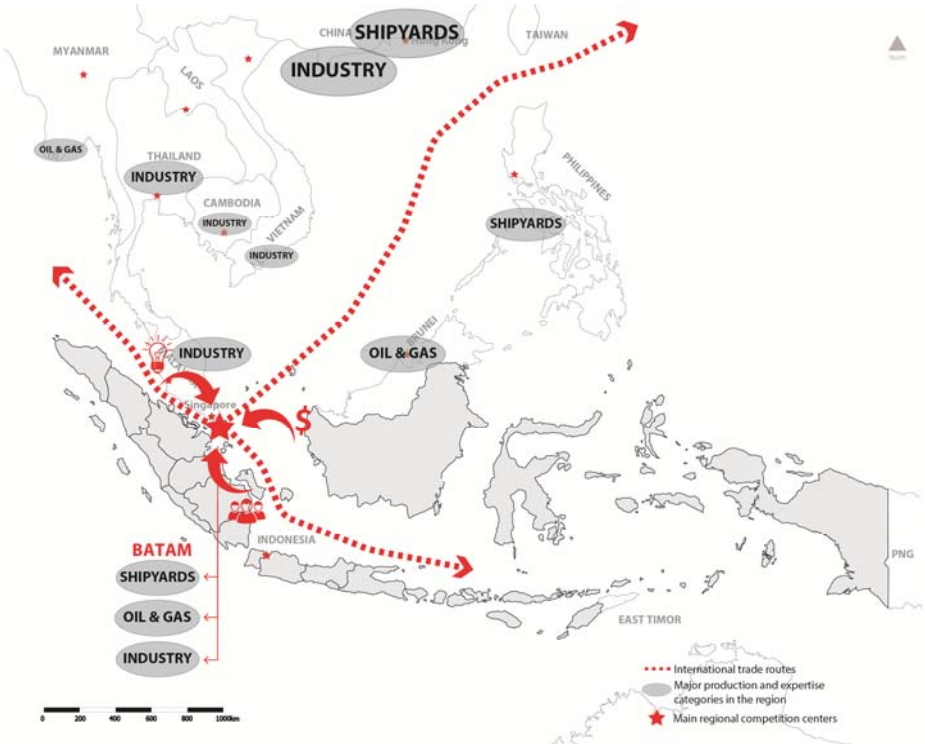


Figure 64: The strategy at the regional level.

In order to realize this, at the local level a number of strategic competition centers will be assisted to develop into a cluster, underpinned and supplied by a tight network of local centers and sub-centers, all hold together

by a public transportation system integrated with the land use and connected at regional and global level via the ferry and airport terminals. (fig.67)

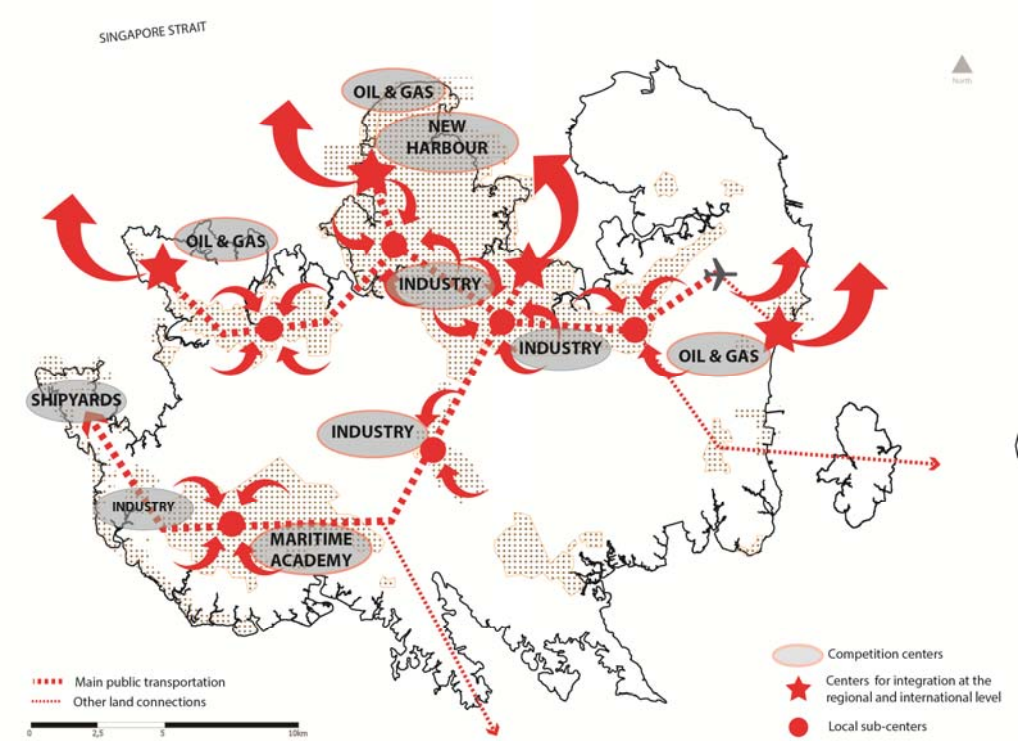


Figure 65: The strategy concept at the local level.

The centers and sub-centers will be located on the same public transportation route in places where transit stations are located. These will include affordable housing, public services and other amenities (such as retail, offices, factories) attractive for people and investors, to develop. The public transportation will consist of a BRT service because, similar to the case of Curitiba, it is cheaper and relatively easier to upgrade and maintain.

As such, the final product of this project will be

A TRANSPORT ORIENTED DEVELOPMENT PLAN USING A BRT SYSTEM FOR THE NEXT 30 YEARS, AIMING AT IMPROVING THE HOUSING CONDITIONS AND MOBILITY WITHIN THE CITY; RESTORING THE ECOLOGICAL BALANCE OF THE ISLAND, WHILE, CREATING THE CONDITIONS FOR PERSONAL DEVELOPMENT AND PRIVATE INVESTMENT TO HAPPEN.

4.3 LOCAL LEVEL STRATEGIES

The strategies are put in practice in order to realize the vision proposed. These strategies addresses the problems identified in the island and makes the final product of the project together with the interventions proposed. A strategy combines a series of spatial and policy level recommendations.

IMPROVING THE HOUSING CONDITIONS

Housing is one of the most basic factors contributing directly to the living quality. This strategy targets the migrant workers and the lower and middle income citizens, because these social groups that forms the majority of the population in the island and also are the most likely to live in poor housing conditions (such as illegal settlements).

It's not just its availability but also its quality that influences the life of the people. As it was showed in the case of Philipsdorp, it takes a commitment "*beyond the minimum standard"* in order to ensure a long-term positive impact on the development and advancement of the people, factory and Eindhoven as a whole.

In essence the objective of this strategy is increasing the density and diversity, along the main public transportation routes and at the BRT transfers stations' locations, which will specifically include affordable housing for special target groups such as workers or students. This way the BRT lines would become the lines of sustainable development.

This strategy proposes:

- Creating a mix-use development and increasing the land use coefficient along the main public transportation corridors - the minimum height recommended is GF + 4F;
- Creating a mix-use development, combined with affordable housing and public services at the bus transfer stations locations – the minimum height recommended is GF + 1 + 8 F;
- Improving the infrastructure in the areas located away from the main public transportation line (such as the KSB social housing areas) – at minimum asphalting and providing basic utilities (water, sewerage and electricity) of the strategic collector roads.

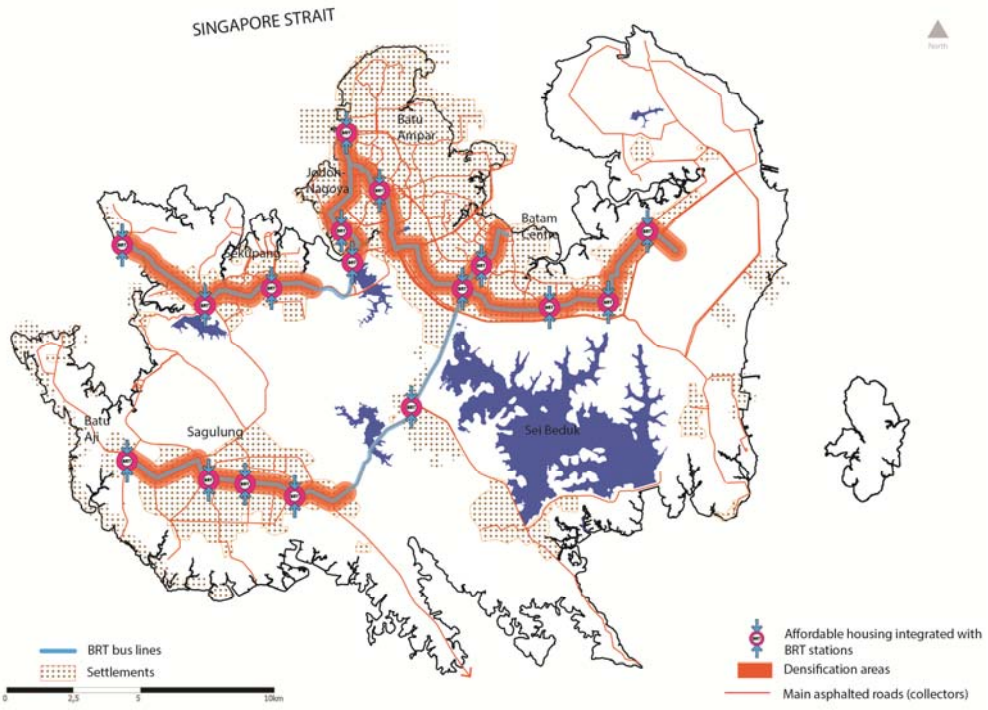


Figure 66: Improving the housing conditions strategy

In order to make this strategy to work the authorities, can implement two solutions, in order to both (i) ensure the space for development and (ii) also to self-finance the project. Each solution starts from the general case of a piece of empty land, located near the future BRT line.

Step 1. *Land acquisitioning.* The public authorities purchase the empty land for a sum X of money. The land can also be re-appropriated, in the situation that the land hasn't been used for more than 5 years, case in which the authorities will pay no initial money for the land.

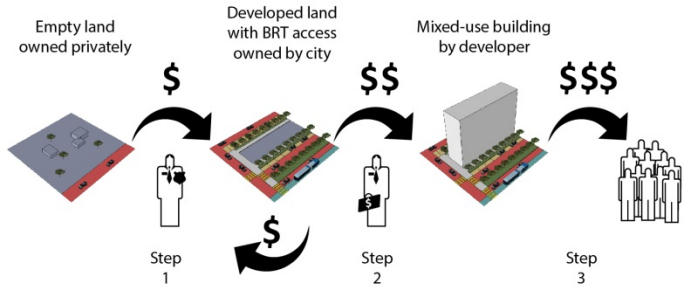


Figure 67:. Solution 1 to secure land and self-finance the project

Step 1. *Land development.* The authorities will develop the land (including: creating secondary access roads and parking, planting green areas, providing pedestrian infrastructure and street furniture and signage) and build the public transportation line. Following this improvements they will re-sell the land to a private developer in order to recover their land and development costs.

Step 1. *Project development.* The investor will take over the land and develop a high density (min. 4 floors), mixed-use project, with retail, and commercial spaces at the ground floor and offices or housing at the upper floors.

In the case of the second solution, the same 3 steps are used, with the only difference being that in the initial land acquisition and development, step 2 and 3, the public authorities can work in a PPP (public-private partnership) with the owner of the land in order to secure the land and finance the project. (fig. 68) This solution is preferable because it will involve more the local community and the residents and it will save the authorities from too much public spending in the initial phase of the project, making it easier for other projects to be carried out in parallel with this process.

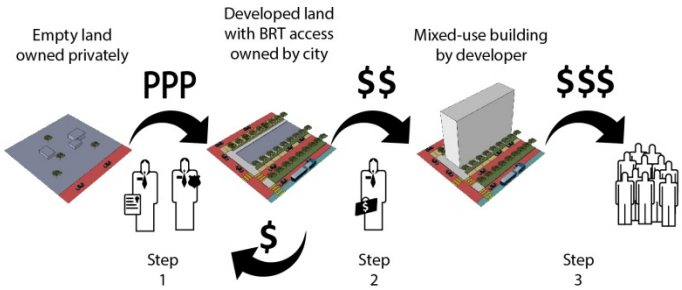


Figure 68: Solution 2 to secure land and self-finance the project

In the case of the transfer stations, where affordable housing will have to be provided, the strategy recommends that the authorities will develop the land and the building together, either by themselves or in PPP, following that the exploitation of the commercial levels will be leased or sold to companies and developers in order to recover the costs. Over this point however, more will be detailed in a next strategy.

IMPROVING THE MOBILITY

This strategy stays at the base of the proposed TOD for this project, and at minimum, if all else will fail because of various factors (e.g. market conditions, inefficient management, etc.), it is expected for this strategy to still work and provide the city with a transportation system

Scholars, such as Power (2012), conclude that transport deprivation can lead to a 'vicious circle' for which both the disadvantaged (such as the social housing residents) and the city, as a whole, has to pay. As in the case of Curitiba, the public transportation, plays an crucial role in creating an 'virtuous circle' of development. Public transportation brings more equal opportunities for the residents and improves the social balance, it help improving the quality of the environment by using less fuel and cars, and can also create new investment opportunities.

In essence this strategy objective is to develop a BRT system of the 'trunk and feeders' type, with transfer stations integrated at the local and regional level, via a network of improved collector roads, ferry and airport

terminal. The operation of the trunk system will be done by the public authorities through a special body, while the 'feeders' will be used by the present paratransit.

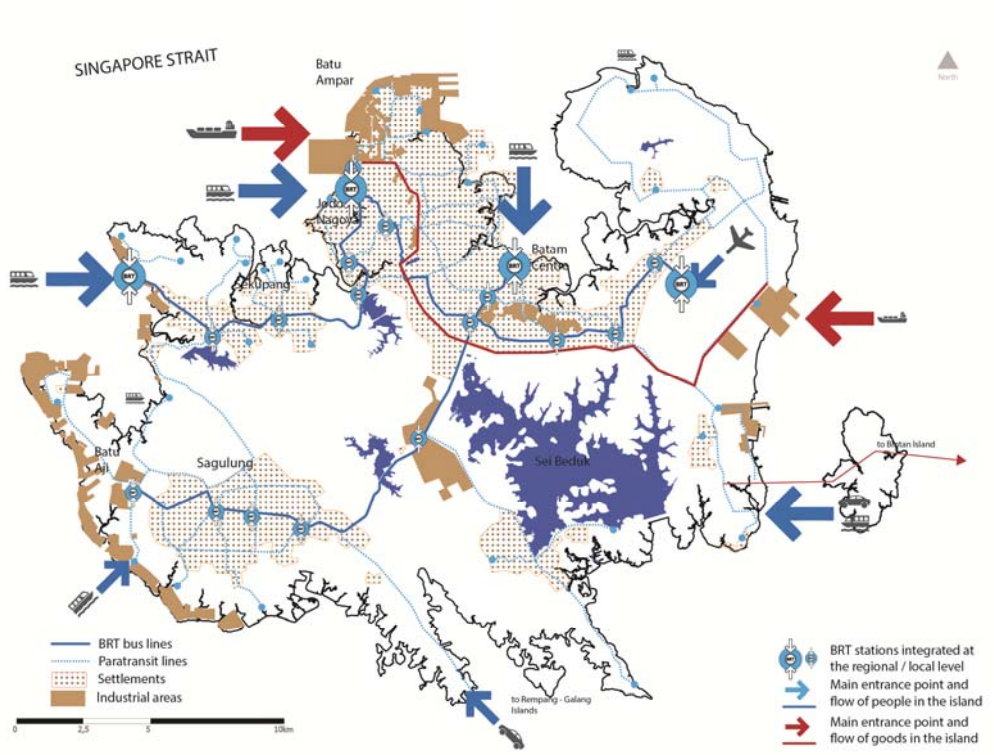


Figure 69: Improving mobility strategy.

This strategy proposes:

- Connecting the major functions and centers (such as the airport, CBD, new harbor, maritime academy, administration center, etc.);
- Separating the public from the goods traffic in between the major harbors in the island in order to improve the traffic flow;
- Creating new-subcenters by the location of transfer stations in places that already attracts people, so that it continues and enhances the functions in the respective areas;
- Creating a mix-use development, combined with affordable housing and public services at the transfer stations to allow easier access for the disadvantaged residents to the services;
- Place new major activities (e.g. maritime academy, industrial parks, shopping centers, etc.) in the radius of 400m, or 5 minutes walking from the transfer stations;
- Creating a one-fare thicket for the whole island in order to incentivize public to use the public transportation and making it equitable for the lower and middle income residents to use the system.

Key to the integration of this BRT system will be the transfer stations. These will be serving both as destinations as well as easy and fast connecting spaces to various services (e.g. ferry, airport, paratransit) and functions in the city (e.g. industrial parks, higher education facilities, offices, shopping, etc.). If successful an BRT transfer station will stay

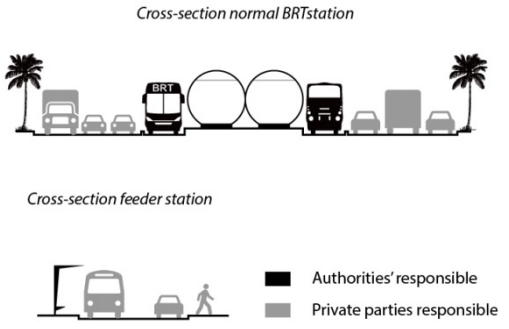


Figure 70: The typical cross-sections of the trunk/BRT line and the feeder line with indicating the building and controlling responsibilities of the public authorities.

at the core of a new-subcentre in the city.

There are 5 principles used to build a successful BRT transfer station in Batam, :

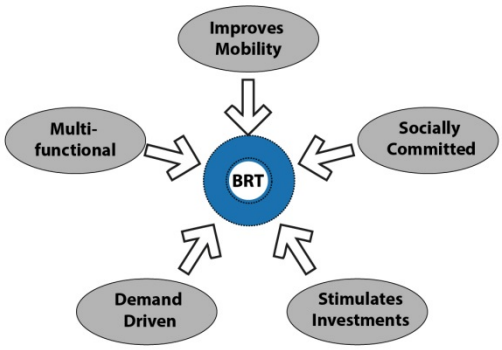


Figure 71: The 5 reasons for the transfer stations.

1st *It has to improve the mobility*: it is pedestrian friendly, it offers fast and safe transfers to other public transportation means, it has good road connection that serves it (i.e. the collector roads used by the paratransit);

2nd *It has to be socially committed:* it provides affordable housing for targeted groups (e.g. social housing, student or worker's dorms) and creates spaces for the interaction and meeting between people;

3rd *It has to be multifunctional:* the station has an enhanced environment meaning that there are various services (such as: post office, public office, general practitioner, post office, library, employment office, etc.) in addition to shops and commercial spaces;

4th *It has to be demand driven:* as much as possible the station is located in areas where it can boost the already existing activities and it is convinently located (preferably max. 5 minutes walking distance) from main functions in the city (e.g. industrial parks, higer education facilities, harbor, etc.); and

5th *It has to stimulate investments*: in itself it offers excellent development locations but it has also to give a better image for the whole island and introduce potential investors to more opportunities of development in Batam.

RESTORING THE ECOLOGICAL BALANCE

This strategy concerns in particular the protection areas surrounding the fresh water reservoirs in the city. These areas are vital in maintain the quality and quantity of fresh water in the island and also have the potential to increase the attractiveness of the living areas for the benefit of the city as a whole.

To a point, it can be allowed for the human activity to intervene (either intentionally or not) against the natural settings (e.g. modifying the shores to allow shipyards' activity). If this point is crossed than on the long-term both the natural habitat of the island and the human activity will have to suffer, as it appears to happening now in Batam.

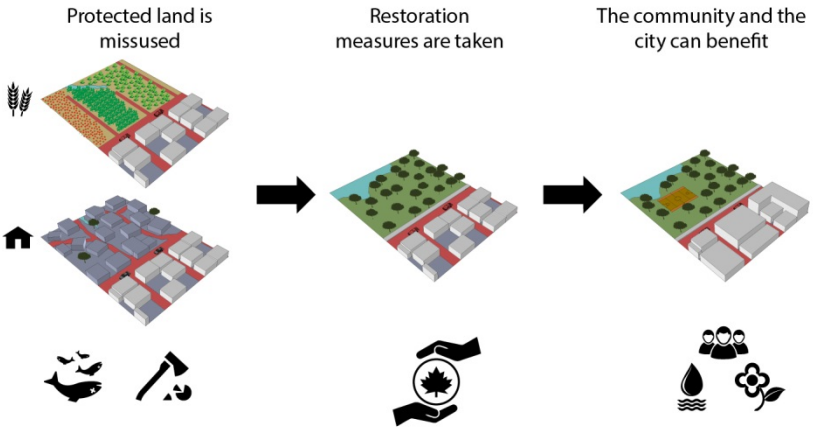


Figure 72: The principles of restoring and benefiting from the ecologically protected areas .

In essence the objective of this strategy is creating an environment where human activity and nature can co-exist and, moreover, profit from each other. On the long term it is expected that the restored areas will bring the improvement of life conditions (e.g. clean environment, attractive living, recreational facilities, etc.) and secure vital natural resources for the development of the island for years to come.

This strategy proposes:

- Removing the illegal activities in the natural protected areas and restoring to the initial ecological conditions;
- Creating parks for recreation and leisure in parts of the protected areas that are near major human activities;
- Creating temporary or permanent agricultural spaces in the island – like for example on unused land outside the ecological areas, or inside the protection area of the airport.

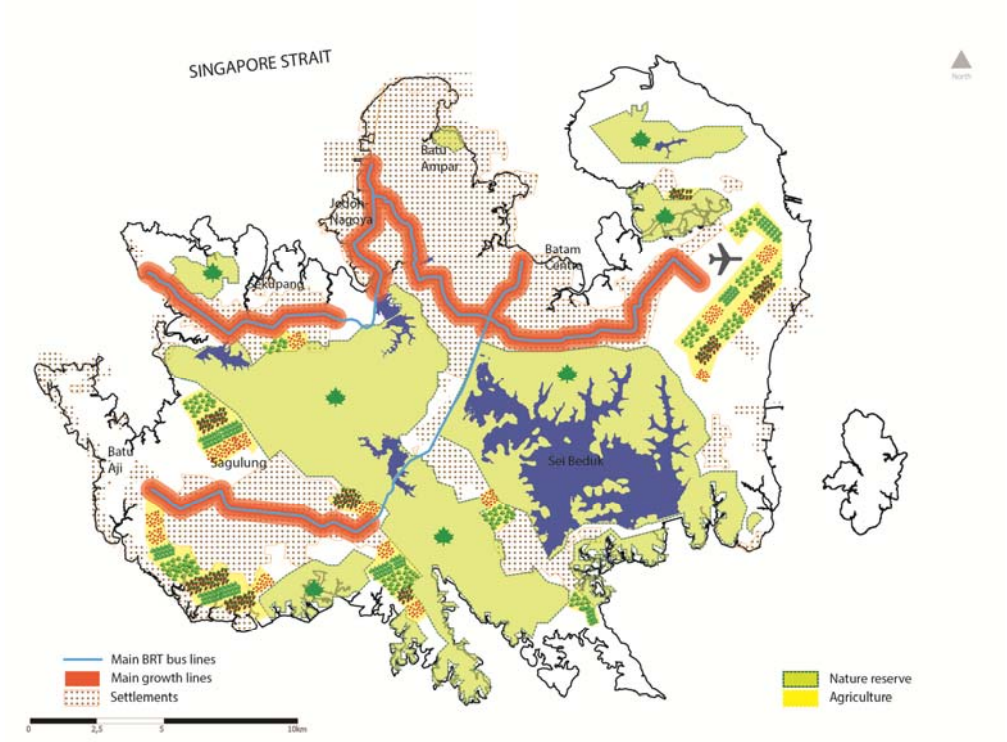


Figure 73: Restoring the ecological balance strategy.

CREATING THE CONDITIONS FOR INVESTMENT AND INNOVATION

This policy objectives deals in particular with the loss of competitiveness, problem. As explained in the literature research, cities are vulnerable should they are not innovating and diversifying their economic basis (see the case of Detroit) even in such situations.

Looking at Shenzhen, the city succeeded to maintain 'footloose' companies by developing new advantages'. A possible solution for this problem might be the creation of an economic cluster, Porter (1990, 2000), based on the shipbuilding and oil & gas industry in the city, which appears to be the most advantaged industry in the city according to the research (text box 11).

But in order to help this industry grow, the natural conditions (i.e. strategic location and sea access) are not sufficient - the city needs to develop its human capital and infrastructure.

In essence this strategy objective is to stimulate the development of a cluster, by building a modern harbor, a maritime academy and promote the activity of the island to potential investors through its BRT system.

This strategy proposes:

- Developing a new harbor and maritime academy and connect these together at the local and regional and international level, via the BRT system and its transfer stations;
- Integrate investment promotion facilities in regional and international integrated BRT transfer stations (at the ferries and airport terminals);
- Integrate higher education, research and affordable housing facilities (e.g. students' dorms) in some of the transfer stations.

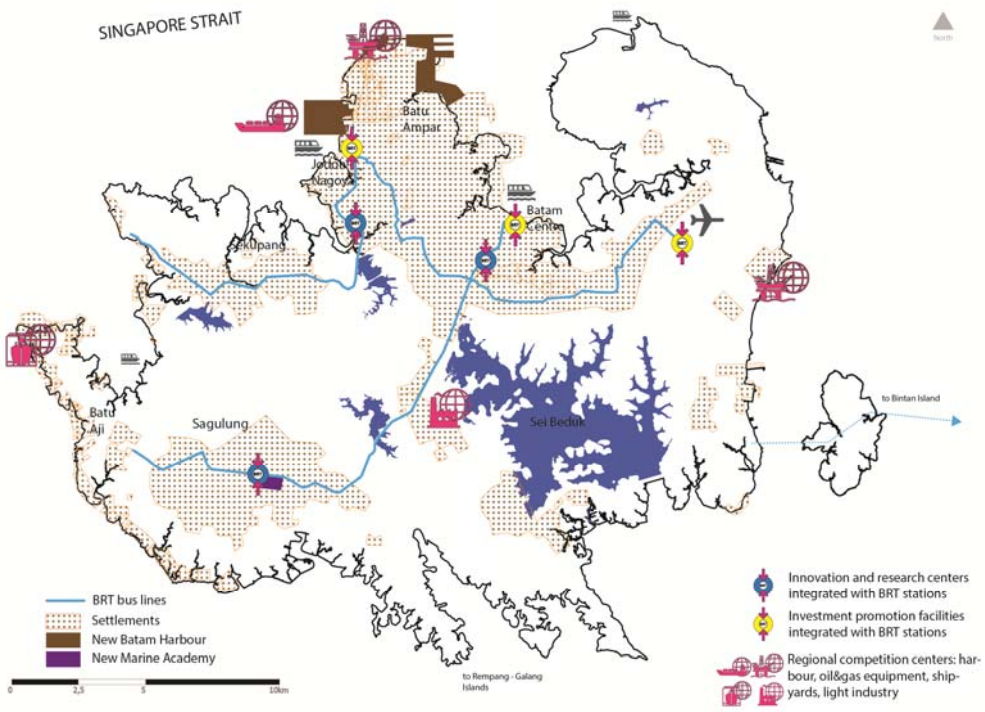


Figure 74: Improving mobility strategy. .

TEXT BOX 9: DETERMINING THE COMPETITIVE ADVANTAGE OF BATAM

Shenzhen managed to retain the 'footloose' companies even when the production costs begun to rise. It managed to do this by developing other competitive advantages, such as operational effectiveness. Using Porter's 'diamond of national advantage' (fig.40), which analyses the competition environment, one can conclude that the strategic location (i.e. on one of the busiest trading routes of the world) and the island morphology (i.e. deep waters near the shores) of Batam can offers the best advantages for the city yet. (see table 10) These natural characteristics are unique and hence cannot be found in other locations around the world, nor can they be replicated.

Such advantages can benefit the shipbuilding industry. Research revealed79 companies activating in the shipbuilding industry of Batam, the majority having relations with the offshore oil and gas market. These companies include six of the largest nine Indonesian shipyards, registered in the 2012 Clarkson Research's World Fleet Register. (see Annex 1 for the location of these)

According to the economic data from June 2011, 'ship, boats and floating structures' were the second most valuable category of products made for export in Batam, totalizing 14% of the total exports.(Batam Indonesia Free Zone Authority, 2011).

In this situation one could suppose that shipbuilding and oil&gas industry, might represent the seeds of the next economic cluster of Batam, in addition to the light industry.

Figure 75: Shipyard activity on the coast of Batam. In the photo various cargo barges can be identified.

This type of industry will advantage Batam also because it is less likely to be of a 'footloose' type. First because it is a more capital intensive activity than the manufacturing industry and second because companies operating in this sector are less likely to relocate easily do to their in-built infrastructure.

But in order to help this industry turn into a cluster, there is more to do than natural conditions.

Also from Porter's diamond analysis, we can conclude that there is still room to develop:

- Harbors – Batam still depends on Singapore's harbour for international connections which;
- Public transportation – in order to closely connect the various services in the island and people together; and
- Human capital in the activities necessary for the cluster (for example by providing an maritime higher education facility).

Looking into the Dutch Maritime Cluster, we found out that the harbor activity is one of the most integrated with the rest of the cluster, staying at the center of all other activities (including trading, shipbuilding, etc.)[27]

Table 10: Analysis of the competitive advantages of Batam using the 'dyamond of national advantage' by Porter.

Factors:		Assessment in the case of Batam
Factor conditions (input)		Natural resources: - strategic global position, nearby the busiest shipping line of the world; - immediate access to deep sea waters (suitable for shipbuilding, and large boats operations); - land access (the southern islands the future connection to Bintan); fresh water, sand, access to fishing - no mineral resources in the island, but can access them from the rest of the country
		Human capital - around 0.5 mil unemployed the majority having a middle school education; - a quarter of the population young to very young (under 15 years old)
		Capital resources: - few (only 20% of the investments in the city are made from public money);
		Physical infrastructure: - good with respects primary infrastructure; - lack of a globally connecting harbour hub (still depending on Singapore for most of the global connectivity); - poor public transportation
		Information infrastructure: - good partially provided by Singapore
		Scientific and technological infrastructure: - limited, partially supported by Singapore
Demand conditions (input)		Local customers: - none or very few – especially for the manufacturing products (electronics and such) – low purchasing power is an issue; - in general not very demanding nor very sophisticated at a global scale level comparison; - it is possible their demands might anticipate the demand in other parts in Indonesia, as Batam locates a large number of different ethnicities from all over the country (it can act as a testing bed for various products and services
		Regional / international customers: - Batam has an export oriented economy hence its manufacturing is directly influenced mostly by the international demand - In terms of heavy industry (shipbuilding, oil & gas) Batam is influenced by a regional demand, which can be more specialized
su pp or tin		Concerning light industry (such as electronics, garments and footware, etc.): - there are a limited number of suppliers located in Batam, most of the time the specialized components being

[27] From Peeters 1999, according to Nijdam, H. & De Langen, P. W., 2003. Leader firms in the Dutch Maritime Cluster (paper). ERSA 2003 Congress.

Context for firm strategy and rivalry	imported via Singapore, or, in some cases, being entirely produced in-house
	Concerning heavy industry (shipbuilding and the related oil and gas supporting services, etc.): - there are some specialized suppliers (such as Mc Dermott) which appeared ever since the island started to be developed in the early '70s and there are related industries (like maintenance, repair, oil and gas, etc.) which appears to develop
	Concerning light industry (such as electronics, garments and footware, etc.): - there is little rivalry and competition at the local scale level capable to sustains investment and upgrading
	Concerning heavy industry (shipbuilding and the related oil and gas supporting services, etc.): - there is more serious local competition this being seen the increasing number of shipbuilding companies which started to populate the island especially since the year 2000

IMPROVING THE ADMINISTRATION

In order to realize the strategies it is necessary to have an efficient, one body, administration that control the use of land. Currently this measure is not applied in Batam leading to many problems in connection to the space planning, but also, competitiveness and investors' attraction.

Looking at the Curitiba example, it is important for the same land planning body to continue its work across election cycles, controlling both land planning and public transportation development. Until the land-transport integration was accomplished IPPUC (the Institute for Research and Urban Planning of Curitiba) developed and implemented the BRT network and the triaxial system of development. Only in 1990 a new company, URBS (Urban Development Authority of Curitiba), is now planning and controlling of the transit in the metropolitan area and conceives permissions to bus transit operators. Nevertheless, both IPPUC and URBS guarantee continuity in terms of transit and traffic solutions as well as urban planning. (Lindau et al., 2011)

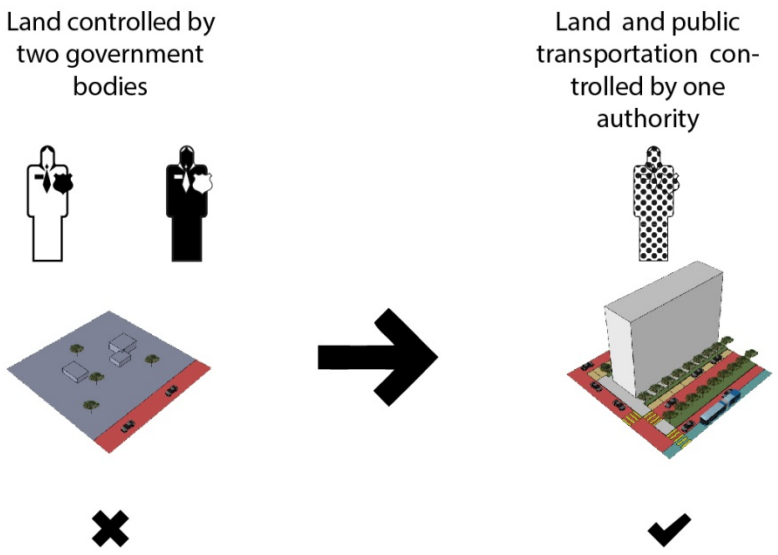


Figure 76: The strategy for improving the administration.

The same principles should be applied as well in Batam for the success of the strategies detailed above.

In essence this strategy objective is to change from a an administrative dichotomy of land, to an unique body controlling both the land development and the public transportation implementation. In time this administration body can change, but not until the land and the public transportation are integrated in an unique coherent plan.

Such a change would also benefit the investment climate in the island and the businesses, since, as it was described in the previous chapter, private companies find the governance of the island as one of the least desirable factors.

4.4 PHASING

Phasing is meant to control when and how much is developed at one time, so to be able to direct the strategies function the market conditions. In the present case, the entire strategies are thought to be carried out over ±30 years, in three major phases. The final time frame, can be shorter or longer, in the end depending on how the city / market reacted to the interventions.

At the end of each phase, there will be an evaluation period for the authorities to measure the achieved success of the previous phase and function of the market conditions, decide what next steps needs to be carried out in the following phase. The BRT lines path can change, following the market needs, however it is is expected they will continue to connect the same major activity centers.

PHASE 1

An essential preparatory intervention, which has to be carried out at the beginning of each phase, would be securing the land space. (see the 'improving the land conditions' strategy previously). Ideally the authorities would be able to secure the land before the transportation line will be laid out in order to avoid land speculation and price increase.

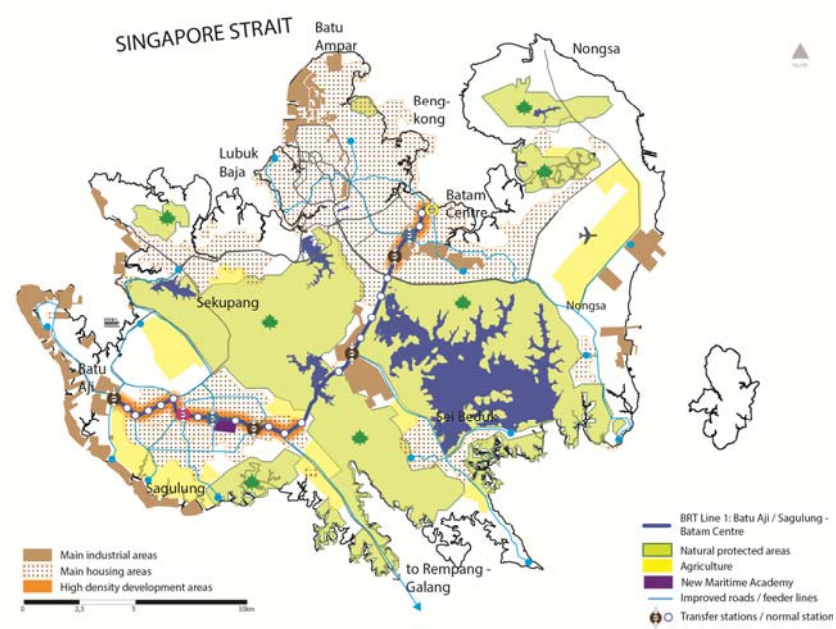


Figure 77: The estimated spatial organization of the island in the early development phase. (various sources)

The essential interventions and expected changes in this phase are the following:

- The first BRT line will be build connecting the Batu Aji and Sagulung district area to the Batam Centre; first securing the land along the main transportation corridor, improving the collector roads (e.g paving the roads, and placing the utilities infrastructure) and building the transfer stations;
- The natural protected areas will be restored by removing the illegal activity and then replanting trees and securing the areas.
- Rehabilitating ha
- Agriculture land will be appointed in the island, either on temporary locations (if the land is in private property but unused) or permanent (such as in the protection areas of the airport).

Following this first phase, it is expected that in certain parts, along the BRT line trajectory, new higher density development will appear. At first near the transfer stations where the flow of passengers would be the most intense, this generating new attraction poles and possibly the creation of new sub centers.

If the market conditions are favorable and the first BRT line achieved its objectives, it can be passed in the second phase.

PHASE 2

In this phase it is important to secure the land along the bus corridor before anything else, because part of the BRT line does not goes on the primary road network would normally would and hence sufficient space needs to be secured to carry on the intervention.

The essential interventions and expected changes in this phase are:

- At first the new habour and bridge connecting to Binan islands, are supposed to be built;
- The collector roads used by the paratransit as feeder services will be improved;
- The second BRT line connecting the airport to the new harbor, and passing through Batam Centre will be constructed, after first the land along the line has been secured as explained above.

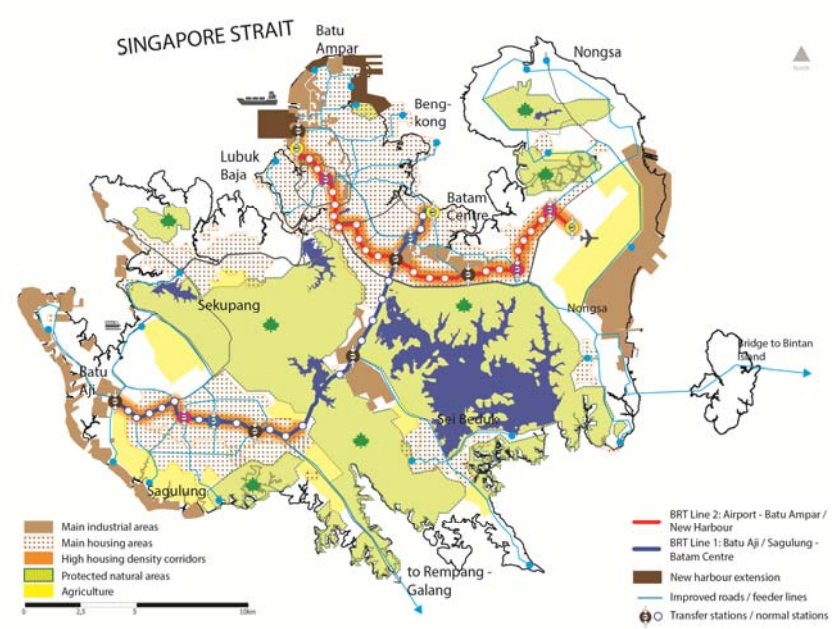


Figure 78: The estimated spatial organization of the island in the early development phase. (various sources)

After this phase, the BRT line can play an strategic role in creating a new image for the city and opening new opportunities for investment, because it will connect some of the most important activity centers and entry gates in Batam.

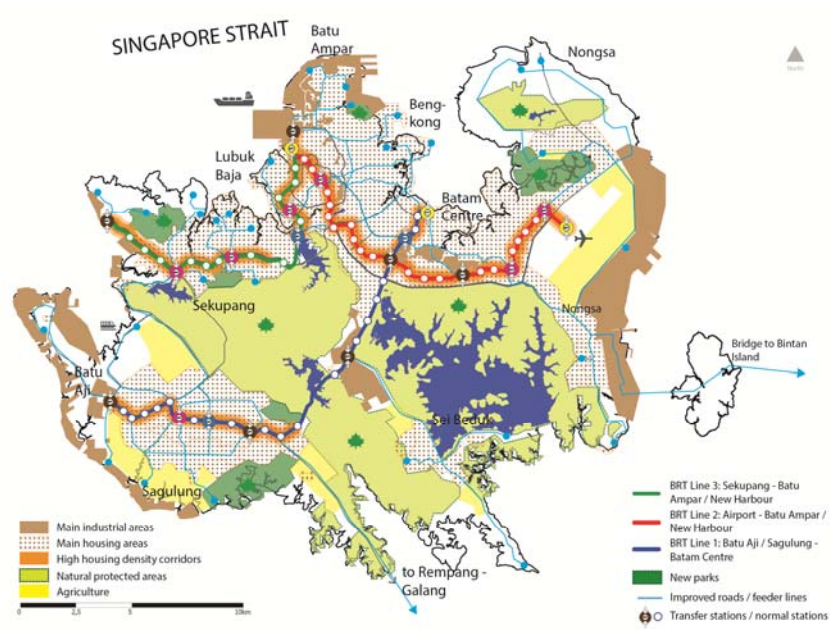


Figure 79: The estimated spatial organization of the island in the early development phase. (various sources)

PHASE 3

By this time it is expected for the industry and development in the island to cover more land.

The essential interventions and expected changes in this phase are:

- At first the land will be secured and the collector roads used by the paratransit as feeder services will be improved;
- Several natural protected areas, which

now are near the developments are supposed to transform in parks for the public use;

- The third BRT line connecting the industrial area of Sekupang with the new harbour in Batu Ampar will be constructed.

After this phase, the city is supposed to have completed all the strategies, hopefully being closely to the intended vision.

4.5 INTERVENTIONS PROPOSED AND LOCATION SELECTION

The role of the interventions is to give an indication of how the main strategy can work. These are supposed to be strategic meaning that they can be realized at a smaller scale and with minimum public funds, but it has the potential to create positive changes at the larger scale.

The underlying principle is that these will create the conditions for larger, private, investment to happen, which is expected to recover the initial investment made by the authorities (e.g. through property tax for example).

To illustrate the land development intended for Batam, these interventions are proposed:

(1) At the sub-district scale - the bus stations –illustrating the basic design of the three station types (the transfer, the normal and the feeder bus station).
(2) At the district level – the land use principles and the program;
(3) At the island level- the BRT system (explaining how the trunk and feeder lines work) and the new harbor intervention;

The interventions will be carried out in Sagulung district because in here the problems identified at the island level are found to be the most critical.

The area is located in the SW part of the island and it contains about 28% of the total population of the island (about 280,000) making it the second most populated area in the city.

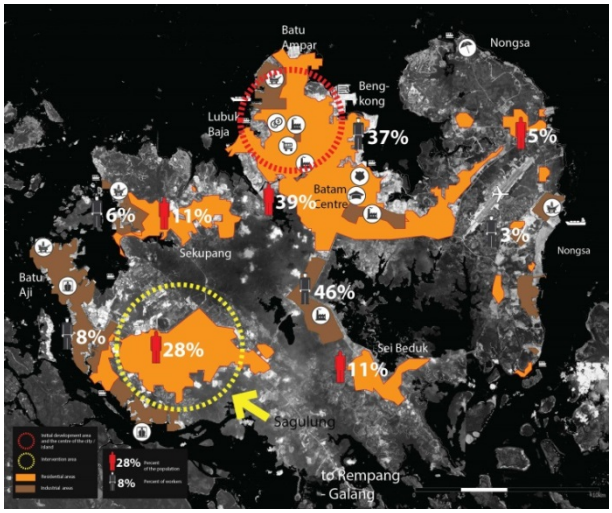


Figure 80: Location of the Sagulung area at the island scale and the percent of the total population.

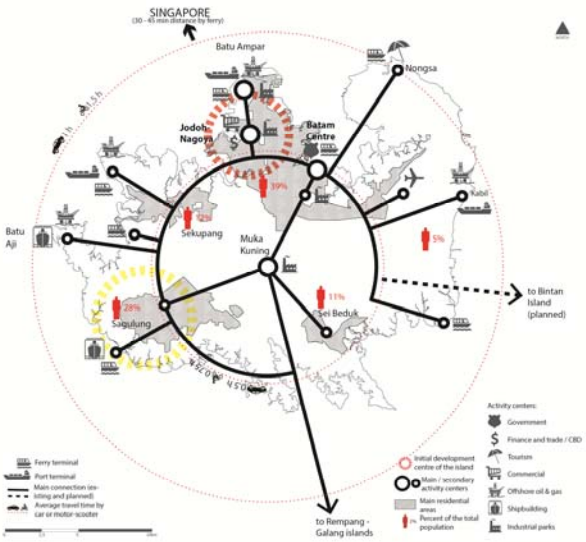


Figure 81: The main roads diagram function the estiamted travel time.

The area is considerably far from the main activity centers of the island, around half an hour, or 45minutes distance by car. Yet, this area holds the largest social housing development in the city, of the KSB type.

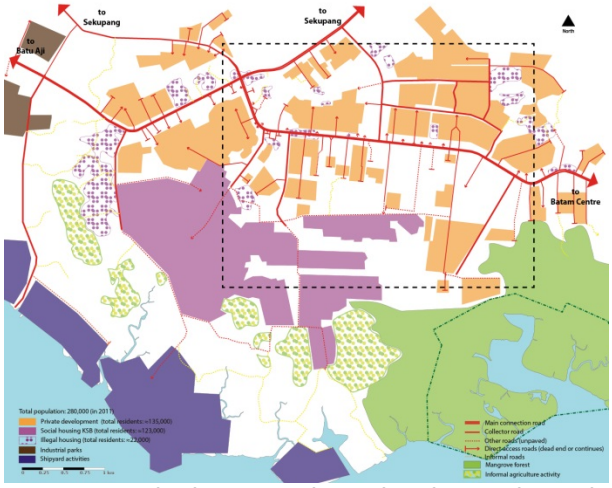


Figure 82: Main developments in the Sagulung district – the social housing is in purple (the marked area is zoomed-in for details).

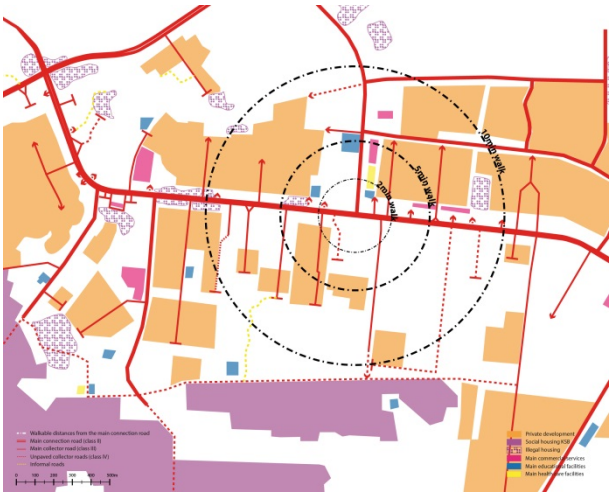


Figure 83: The location of the main public amenities and the walking distances.

Overall the area is presented as a patchy development, made up of cul-de-sac, gated communities, each with a direct connection to the main road, which is the only connection to the rest of the city. At the district edges are located the social housing areas, more compact built and with a considerably poorer infrastructure.

At the borders of the social housing areas marks of agricultural activity, most likely informal, and illegal housing can be noticed from the satellite images.

The whole development puts under threat the protected mangrove forest located in the south part of the district.

At the more zoomed-in level, one can notice that the public amenities and services are located around the main road, but these remain out of reach from the social housing areas.

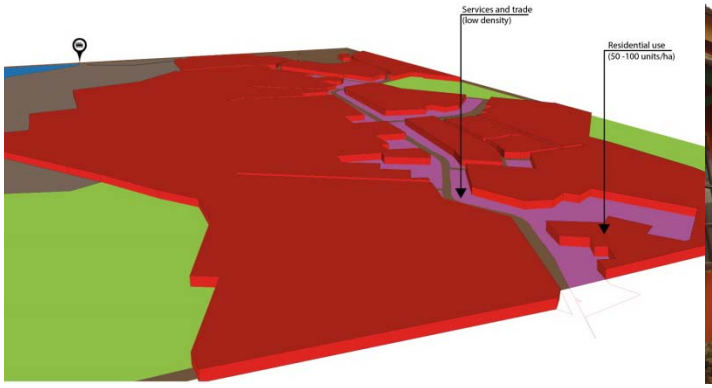


Figure 84:The current planned density of development. Red is high density residential area (>100 units/ha).

Figure 85: The living conditions and the infrastructure in the Sagulung KSB.

From a planning point of view, the whole area, except for the area along the main connecting road, is dedicated to high density residential use, meaning > 100 units/ha. This point in particular contradicts the TOD basic principles, which recommends higher densities along the main public transportation lines in order to prevent urban sprawl.

V. INTERVENTIONS

5.1 DISTRICT LEVEL INTERVENTIONS: THE LAND –USE PRINCIPLES

From the brief analysis of the Sagulung district one can conclude that the area is marked by a centrifugal growth (i.e. pushes the development outside) creating border conflicts with the surrounding areas (such as the protected forest). In applying the TOD principles (fig.22), the development has to have a centripetal growth, towards the main public transportation lines and the transfer stations of the BRT.

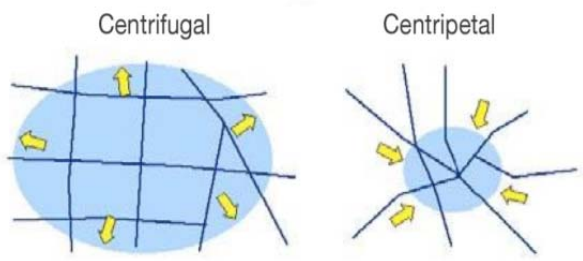


Figure 86: Illustrating an centrifugal and centripetal growth (Rodrigue, 2002, after GTZ, 2004a)

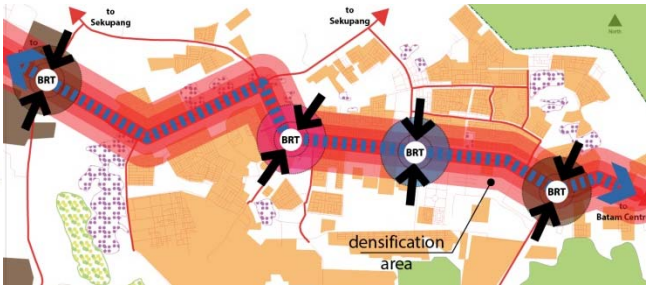


Figure 87: The concept for Sagulung – creating destinations and densification areas along the public transport system.

Applying the strategy for mobility and housing, the interventions would have to create destination points - in the locations of the future transfer stations – and high density, mixed developments along the main public transportation line, i.e. the BRT line. (fig. 87)

In order to realize this road network (fig. 88) and the land-use densities (fig. 89) in the area would have to be adapted. In a first phase only the roads that are considered strategic for directing the traffic flow to the BRT transfer stations will be improved (i.e. at minimum paved and with utilities integrated), these playing the role of collector roads later used for the feeder services.

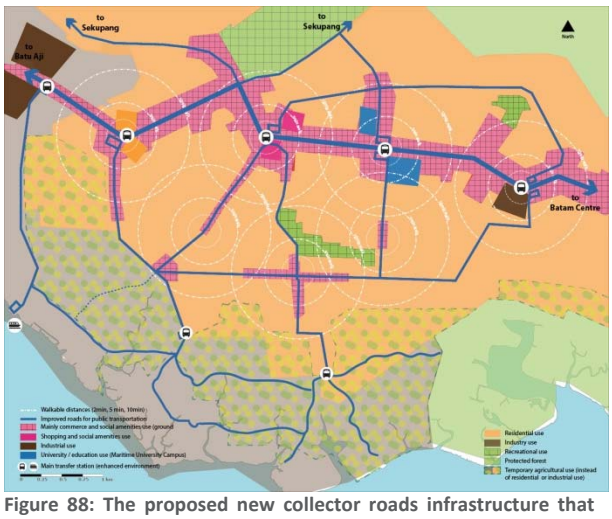


Figure 88: The proposed new collector roads infrastructure that will be improved and the transfer BRT stations.

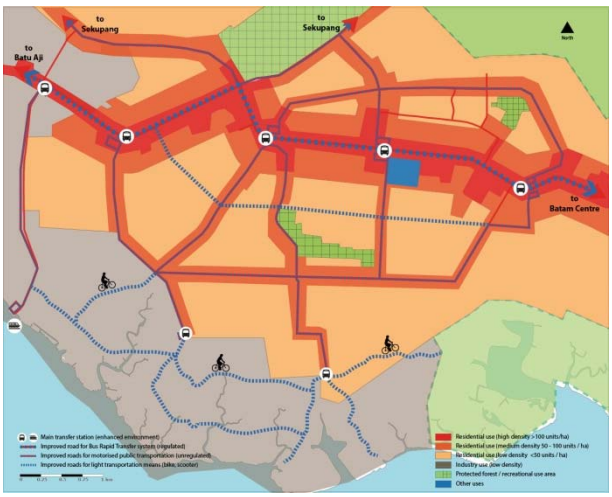


Figure 89: The proposed densities along the main road infrastructure.

The densities and the commercial or public functions would be developed in the buffer of 2 – 5 minutes walking (150 – 400m) from the main public transportation lines. The recommended heights along the BRT lines is GF + 4F while near the transfer stations this is doubled. This way one can create a critical mass of purchasing power and a pool of labour which can easily travel in the city to reach functions and activities.

The new transfer stations would be located in the places where already some public functions begun attracting the residents, such as existing market and shops - mangenta on the figures above, schools or other education

facilities - blue and industrial parks – dark brown. This way it will ensure that the development is demand driven and facilitates and perpetuates the human activity.

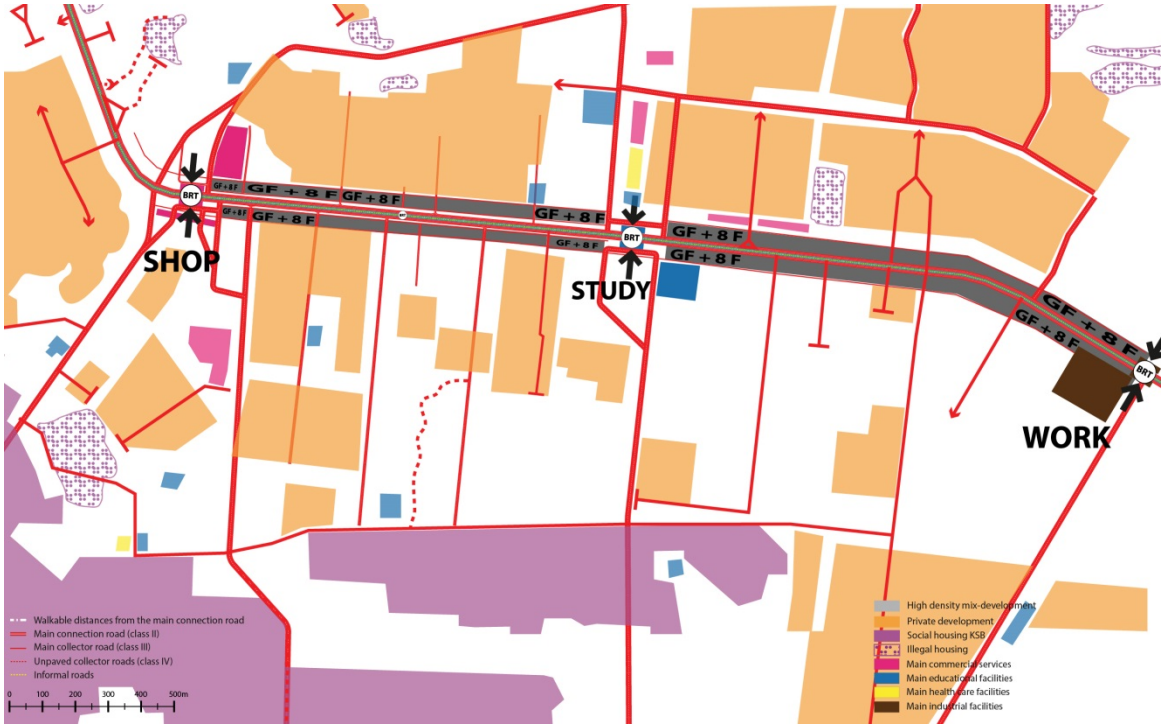


Figure 90: The program along the BRT line with the transfer stations in Sagulung district.

In order to help even more the creation of a character and community around these transfer stations, there will be four different programs around which these stations will develop. This way it is hoped that in the future these transfer stations, will stay at the core of new, sub-centers in the city, each with its own character and strong community. (fig. 90)

5.2. SUB-DISTRICT INTERVENTIONS: THE STATIONS

There are three types of stations that build-up the BRT trunk and feeder system :

(1) transfer stations, where passengers can change from one public transportation system to another and can access affordable housing and other public services;
(2) normal BRT stations; and
(3) feeder stations.

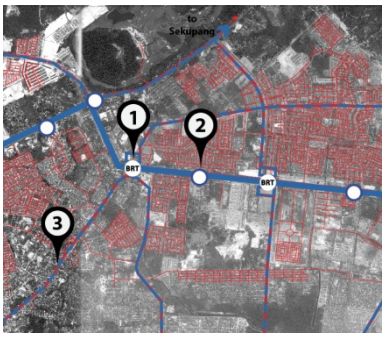


Figure 91: The location of the three different station interventions.

All stations will be built and controlled by the special authority in charge with the land use planning and public transportation. Their maintenance will be shared with private operators based on a competitive contract as it will be the case for the busses operation as well.

At the base of the design of the stations and the BRT system stays a comparative research between three cities that implemented BRT systems and are currently considered a success: these are Curitiba, Bogota and Guangzhou (GTZ, 2004). This research is presented in Annex 2.

THE TRANSFER STATIONS

The transfer stations are the building blocks of the BRT system and the whole strategy, because these are supposed to be the main vectors for positive changes in the island. As explained in the 'Improving mobility strategy' there are 5 principles that stay at the base of a transfer station: (1) improves mobility; (2) socially committed; (3) stimulates investments; (4) demand driven; and (5) multi-functional.

Function of their location there will be 4 different programs for the transfer stations each having a clear objective. These are:

(1) *The innovation impulse* – Stimulating the diversification and innovation of the economy, by training and educating its residents. These stations will be located near, higher education facilities (such as universities, academies, vocational schools, etc.) and will inside their premises cultural – educative facilities (libraries, musea, theatres, etc.)

(2) *The core of the community* – Creating a dynamic sub-center with a strong identity and community in order to improve the social balance and the opportunities in Batam. These stations will offer community services (such as day care, community centre) and easy access to already established public facilities in the city: (e.g. shopping centers, religious venues, etc.)

(3) *The productivity spur* – Increasing the productivity and connecting better the main economic activities in the island. These stations will be located near important industrial objectives (e.g. industrial parks) and will offer employment agencies and career advisors.

(4) *The investment promoter* – Creating an image of excellence and professionalism for the city and stimulating the private investments in the island. These stations will be located near international gateways in the island and will offer legal assistance, government support.

In addition to providing specialized services, the transfer stations will provide affordable housing, except for the 'investment promoter station which would provide hotels and convention centers, for the target groups (workers, students and other low income residents).

Below is a table describing in more detail each transfer station's program.

	 THE INNOVATION IMPULSE	 THE CORE OF THE COMMUNITY	 THE PRODUCTIVITY SPUR	 THE INVESTMENT PROMOTER
Objective	Stimulating the diversification and innovation of economic basis, by training and educating its residents.	Creating a dynamic sub-centre, with a strong identity and community, in order to improve the social balance in Batam	Increasing the productivity and bringing closer the main economic activities and the workers	Creating an image of excellence and professionalism for Batam and stimulating the private investments in the ialnd
Connectivity	Walking, paratransit, private transportation			Ferry or airplane
Built in amenities	Student dorms	Social housing	Worker's dorms	Hotels and convention centers
Public service offered	Library, musea, theatre	Day care, community center, health care	Employment agency, career advisor, general practitioner	Government office, professional assistance, tourism agency
Main linked locations	Universities, vocational schools, academies	Markets and shopping venues, main religious venues	Industrial parks, harbor	Various, possible investment locations all over the island

Stakeholders	Local authorities, int' development agencies, private corporations, NGO's	Local authorities, central government, local communities, private corporations.	Local authorities, central government, private corporations.	Local authorities, central government, private corporations.

To illustrate how a transfer station works, the 'core of the community' type has been implemented in Sagulung west (marked with 1 in fig. 91). This location was chosen because there are already some public facilities that attracts the local residents, due to the existing market and shopping amenities.

Figure 92: The present situation – the magenta buildings will be preserved.

Figure 93: The situation after the station has been built.

These buildings have been integrated in the new plan (colored in magenta in the fig. 92 and 93), the new buildings (colored grey) being located in the empty space between the existing buildings that are preserved and the road. (fig. 92 and 93)

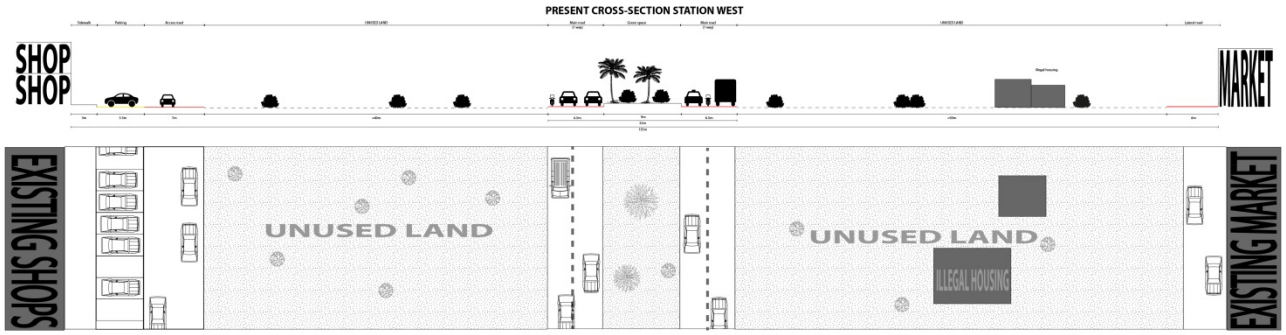


Figure 94: Cross section and plan of the present situation.

Essentially for this type of station is to safely and fastly transfer passengers from the paratransit to the BRT lines located in the middle of the street. This is realized through an overpass bridge connected to a multifunctional building. (fig. 94 and 95).

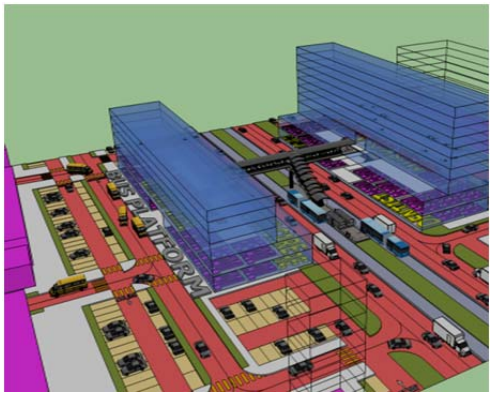


Figure 95: 3D view over the station from the SE side (direction marked in fig. 93)

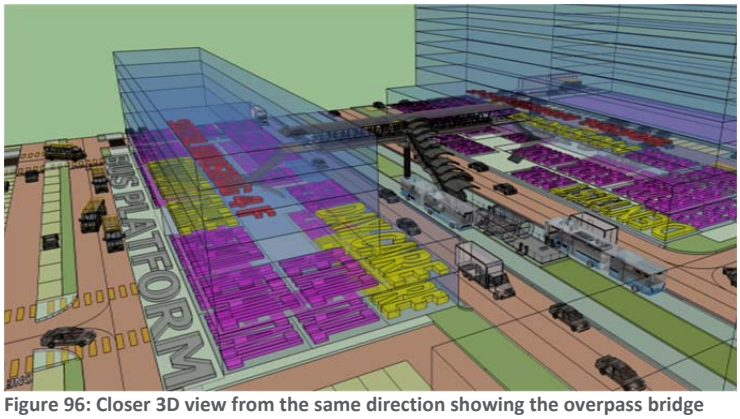


Figure 96: Closer 3D view from the same direction showing the overpass bridge and the transfer station building organization.

The building contains the program of the station which is of the type 'the core of the community'. At the ground floor and first floor – where the passengers are transiting between the paratransit and the BRT station platform are located the retail services and the rest of the program which characterizes this station (i.e. day care, community centre, health care, etc.). At the upper levels are located the social housing amenities. (fig. 97)

The buildings at the transfer stations are recommended to be of GF+8F in order to offer more space for the affordable housing. There is a discussion over how these upper floors can be reached, in the context that elevators adds considerably to the cost of the project and they require maintenance. In order to take a decision, the solution recommends first creating the space for an elevator without installing one, evaluate how the building comports over time (i.e. how the residents are reacting) and install one if necessary. This way it is hopped additional funds will be easily available for such facilities.

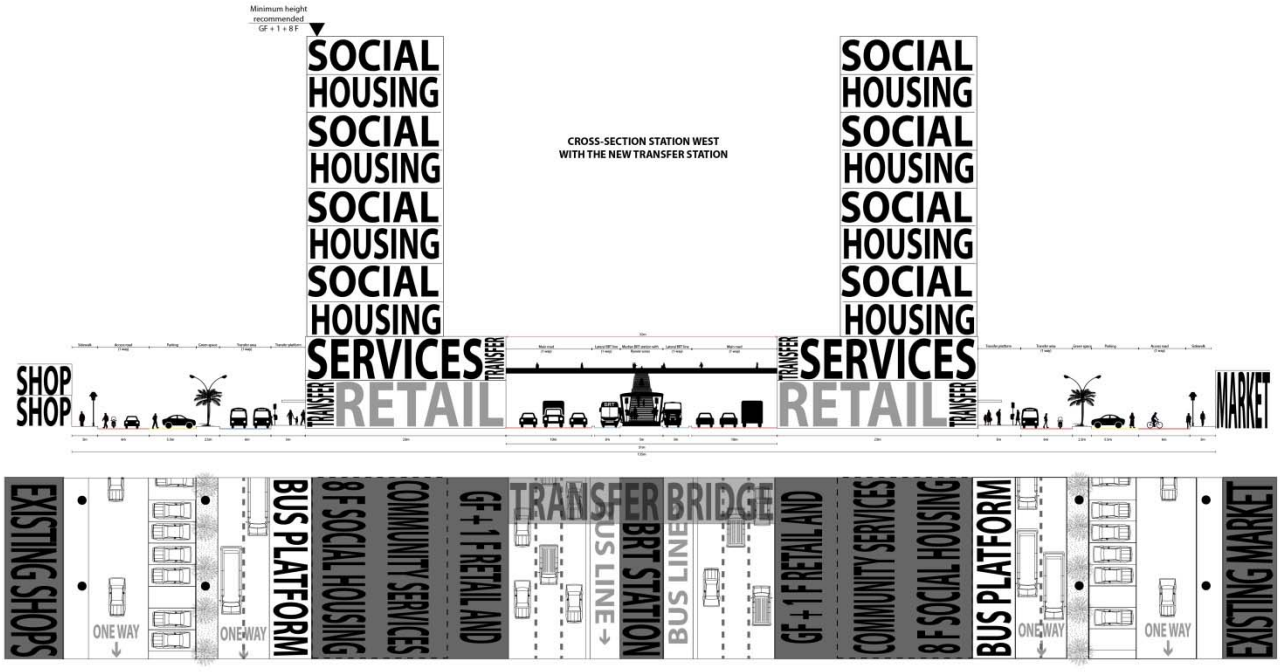


Figure 97: Cross section and plan in the situation after thetransfer station has been built.

Around the station the area will contain attractive pedestrian facilities (i.e. sidewalks and streets lined with trees, street furniture such as benches, lighting, etc.) easy loading and unloading platform for the passengers and parking spaces. The traffic around the station is organized 'one-way' to prevent car jams and accidents.

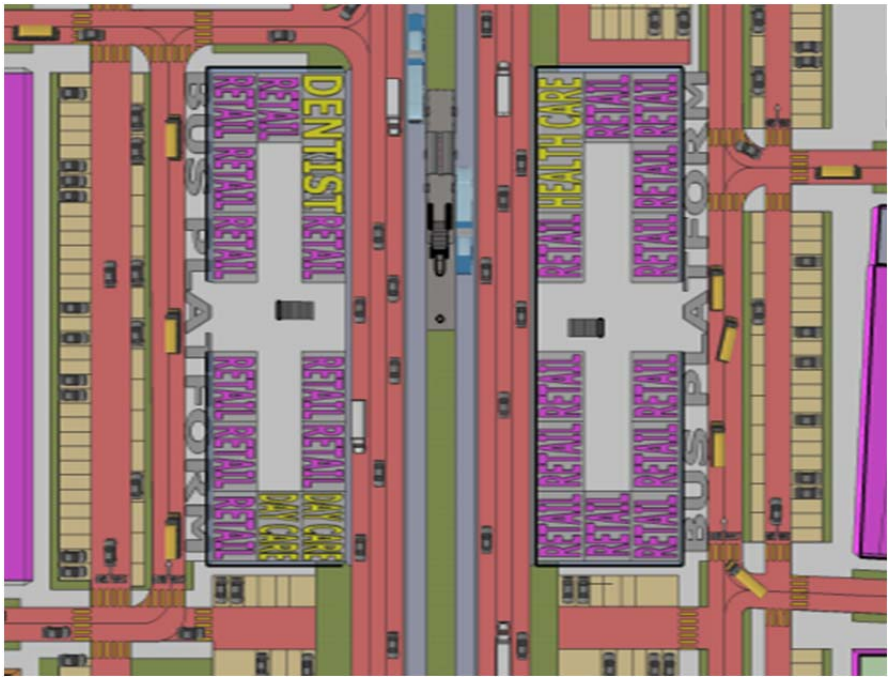


Figure 98: The station organization at the ground floor.

Concerning finance, this particular station is supposed to be built initially at the cost of the local authorities, in order to realize its program. However the retail space, at the ground floor can be leased for the recovery of the costs. For this reason the retail spaces have prime locations in the commercial floors of the station.

PPP with interested companies who wants to develop shopping malls or other commercial spaces at the GF + 1 levels might also be also an feasible solution.

THE NORMAL BRT STATIONS

For a normal BRT station a place it has been selected location marked with 2 in fig. 91. This location is interesting because it illustrates well the situation along the primary road network in Batam. The spaces on each side of the road, in a buffer of around 150 meters, are most of the time left empty even if it is privately owned. (fig. 99 and 101)

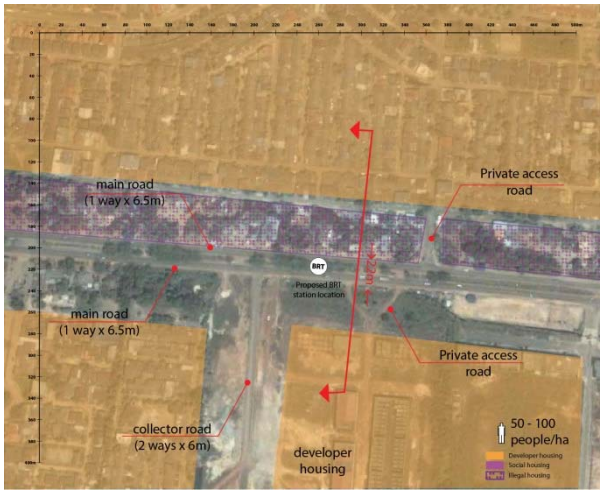


Figure 99: The present situation – the orange areas represent the gated communities.

Figure 100: The land use plan envisioned and the station location.

Unlike from the previous case, in this situation only the station itself will be built by the public authorities. However, if the land along the BRT line will be secured (see the possible solutions explained in fig. 67 and 68), it will also be possible to develop the land, in order to catch-in the land value increase. (fig. 100)

At minimum however, it is expected that through this BRT bus plan, favorable conditions will be created for private investments to happen.

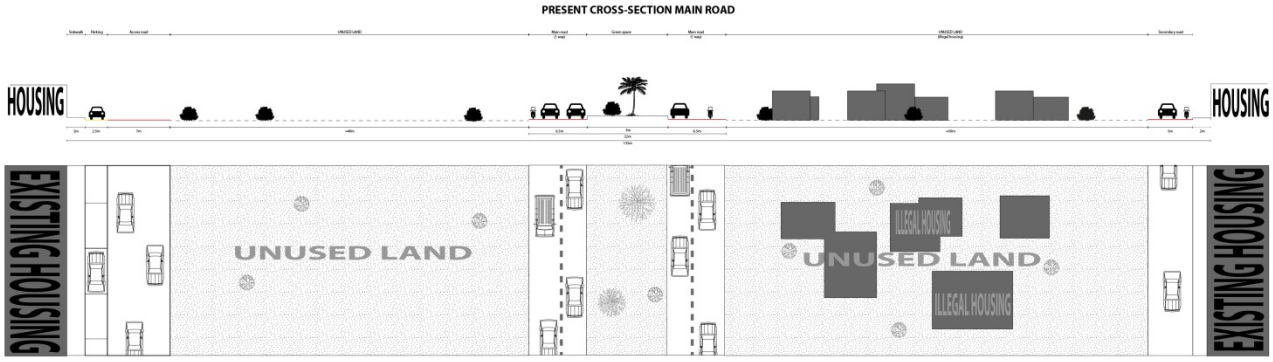


Figure 101: Cross section and plan of the present situation.

The height recommended along the BRT line is minimum GF + 4F in order to allow a proper use of the space. In practice this might not be realized unless the authorities will incentivize the developers, or they will themselves involve in the development (for example through a PPP). This can be done by promoting the ground floors of the buildings as commercial spaces that will have an easy access to the public.

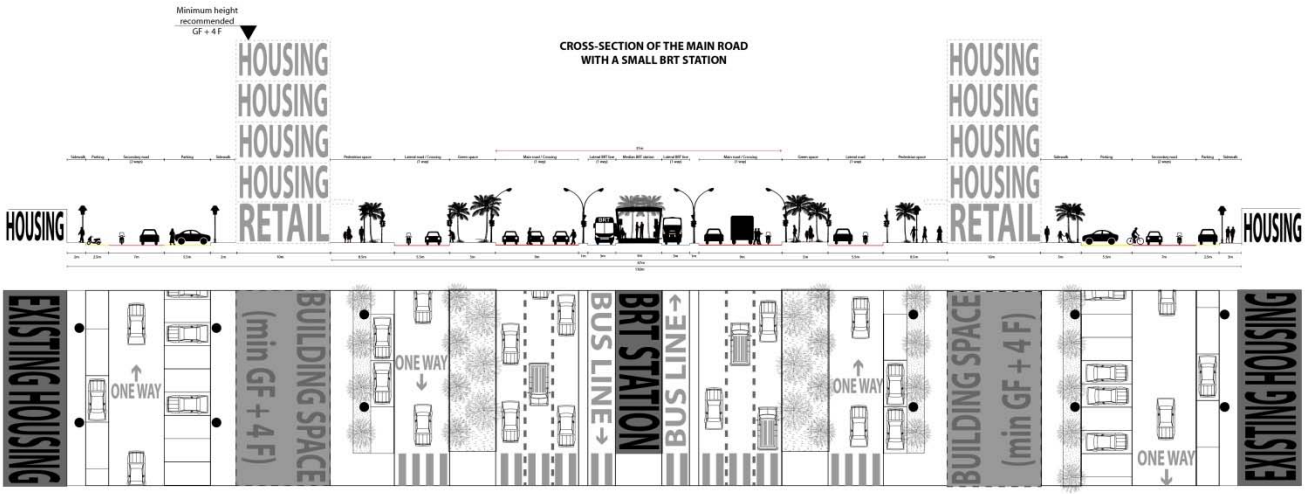


Figure 102: Cross section and plan of the envisioned new situation. Grayed-out buildings are not part of the intervention.

Important in the case of this station will be the access to the island type station where the passengers have to take the BRT bus. This will be realized at the street level and not through an overfly bridge. For this reason the road infrastructure around should include appropriate safety facilities (i.e. pedestrian crossings, traffic lights) and other means for the traffic to slow down and allow the passing of the pedestrians. (fig. 102)

Figure 103: 3D view over the station from the SE side (direction marked in fig. 93)

Figure 104: Closer 3D view from the same direction showing the overpass bridge and the transfer station building organization.

In addition the area has to be made attractive in order not to deter passengers from using the public transportation (for example by generously planting trees and providing green spaces. (fig. 103 and 104)

THE FEEDER STATION

The feeder station is located in the social housing area south of Sagulung, on one of the collector roads selected to carry the paratransit. (marked with 3 on fig. 91).

Since they will be used by the paratransit, which has a flexible route and schedule, only few stations will be built, in areas where it is most probable that the drivers will stop to pick up people. Such places are near schools, musholas, or other public spaces that already attract people.

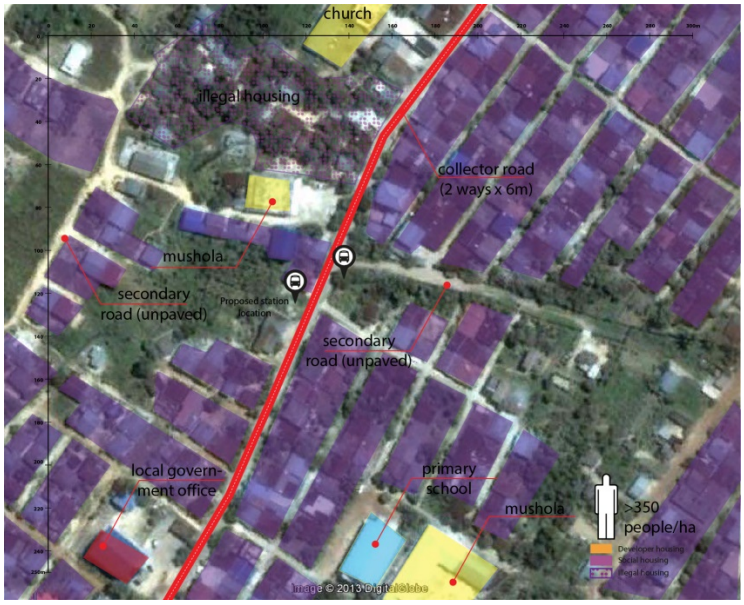


Figure 105: The present with the marked position of the proposed stations and the collector road meant for improvement. The purple buildings are social hosuing.

The present conditions of these roads are poor. Most of the time the surface is either unpaved or bad maintained. In addition, they also have a relatively narrow profile, which makes difficult for the station to be placed on each side of the road in the same area.

In the area where the stations will be built it is important to provide the pedestrian facilities to allow a safe mobility around these places. It might be necessary for some houses to be re-appropriated by the authorities and compensations given out to the residents in order to create these safe conditions.

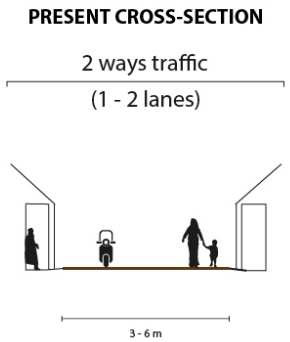


Figure 106: Cross section of the present road.

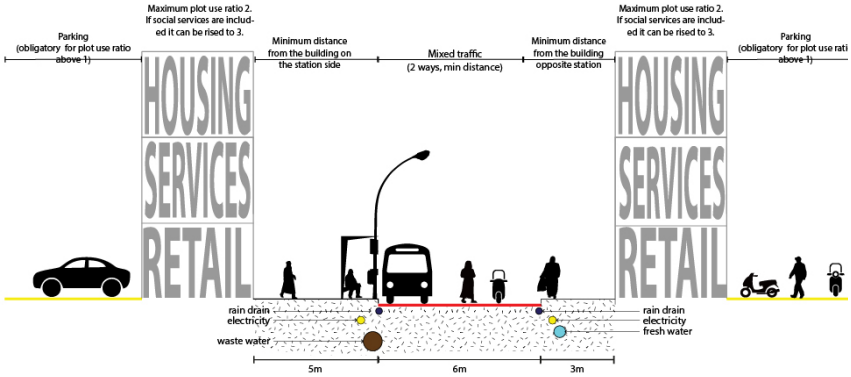


Figure 107: The new cross section of the road at the bus station area. The grayed-out buildings are not part of the plan but might occur if the market allows.

Provided that the station will prove successful it is expected that the built environment around it will change. The land use plan proposed along the collector roads allows a higher plot use ratio (i.e. several floors can be added) but not more than 2 or 3, and within minimum 5m distance from the road on the bus station side and 3m otherwise.

Of course, this development it is not certain to happen, but nevertheless, it might be possible that in the future this small bus station to generate spin-offs that will change the area.

5.3 ISLAND LEVEL INTERVENTIONS (A): THE BRT SYSTEM

Currently there are already plans for a public transportation network to be implemented in the island by 2017 using a monorail system. (see fig. 47) These plans are part of the central government strategy to increase the use of public transportation in the next several years. This indicated the need for such a system, the project hereby providing a more cost effective and flexible solution. In addition, this BRT system will stay at the centre of the new land planning.

Following the strategies proposed in this project, the BRT system not only that will alleviate the mobility and create more space for housing, but it has also the potential to attract private investments and create a better image for the city as a whole.

THE CONCEPT

The BRT system proposed herby is a trunk and feeders type of the one used in Curitiba. (see text box 6 for more details). At the base of it, stays a comparative research between the BRT systems implemented in Curitiba, Bogota and Guangzhou – considered as some of the most successful cases to date.[28] This research is presented in the Annex 2.

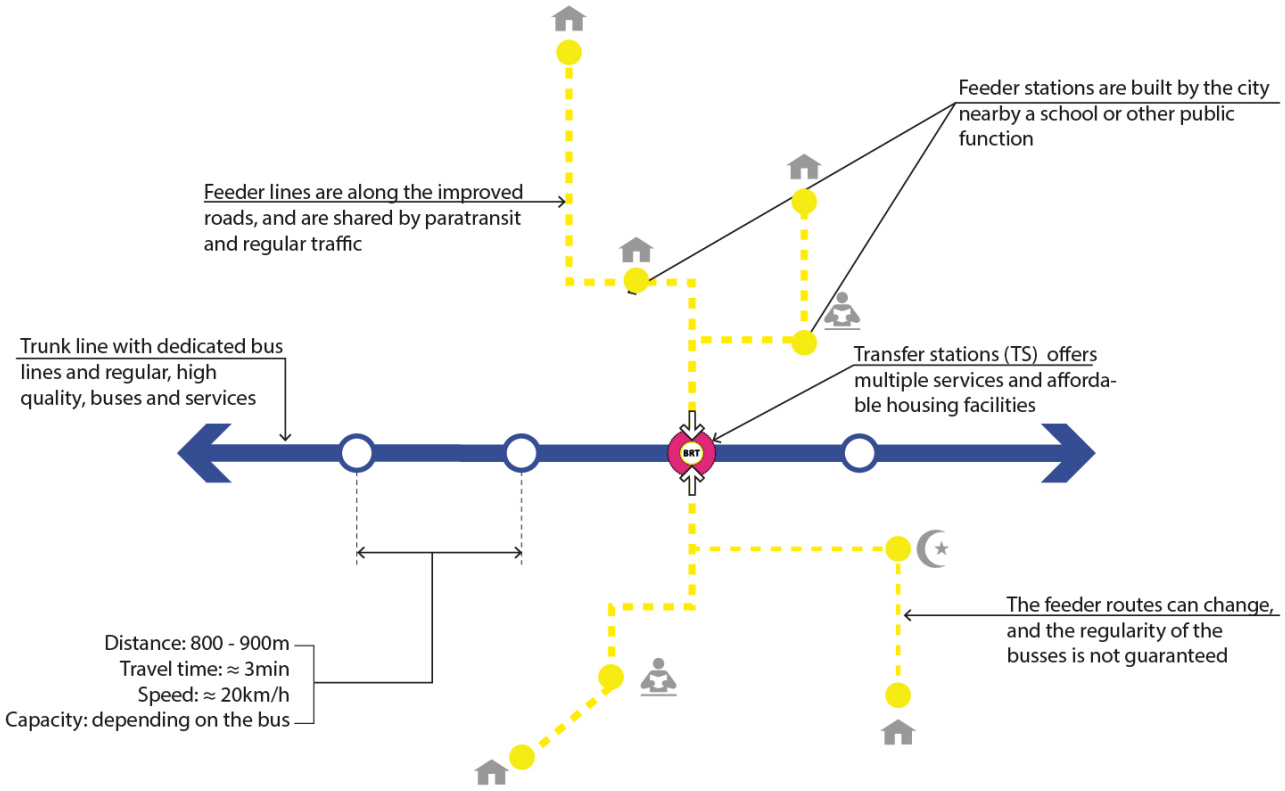


Figure 108: The principles of the BRT trunk and feeder system.

[28] According to GTZ mong other sources.

The basic principles of the system are laid out in figure 108. In essence:

- The trunk lines consist of dedicated bus lines located in the middle of the roads, in most of the cases the primary road structure and are serviced by regulated, high quality bus services.
- The feeder lines consists of a network of good quality collector roads (at minimum paved) and are serviced by paratransit vehicles
- The transfer between the two lines is realized at the transfer stations, of the type described previously.

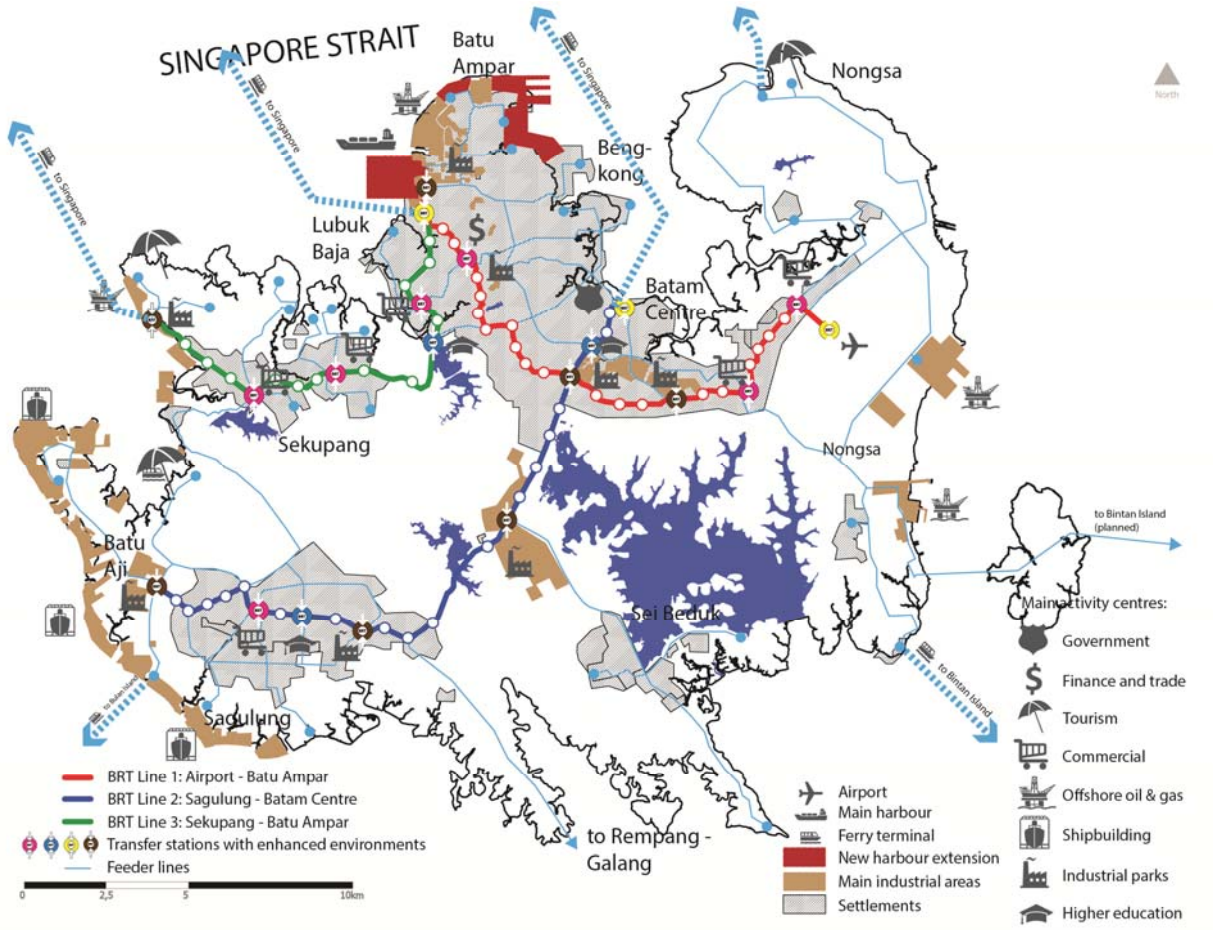


Figure 109: The entire BRT system with the trunk feeders and stations.

The proposal, including trunk and feeder lines, stations and main public amenities, services and main activities, and functions, have also been placed in Google Earth for much easier visualization. [29]

Figure 110: The BRT system in Google Earth (see footnote).

[29] The link to the data can be accessed here in Google Earth: https://gec-member-centric-locations-a-googleproductforums-com.googlegroups.com/attach/1761f854b0a4d417/b5dd571a-3598-4068-9ebf-0c039492576a.kmz?gda=71tVSUYAAABCOOd7mGLZDIT2ocKdlK8HSrnC9sDAEz2JGAiVdx2d4ObESSfwceF3DnnkMpcL3QZx40jamwa1UURqDcgHarKEE-Ea7GxYMt0t6nY0uV5FIQ&pli=1&view=1&part=4

THE TRUNK LINES

The trunk lines are serviced by regular, high quality and safe BRT buses. These are supposed to connect easily the passengers to the main centers, activities and other transportation means in the city. In addition from being connected to the feeder lines, the trunk lines are directly connected to the ferry and airport terminals, ensuring their integration at the regional and international levels.

The trunk lines are located in the central part of the primary roads, and will serve stations located in between the lines (island type) such as in Bogota case. This way the system can save space and costs, as compared with the variant of stations on each side of the bus lines (like in Curitiba case).

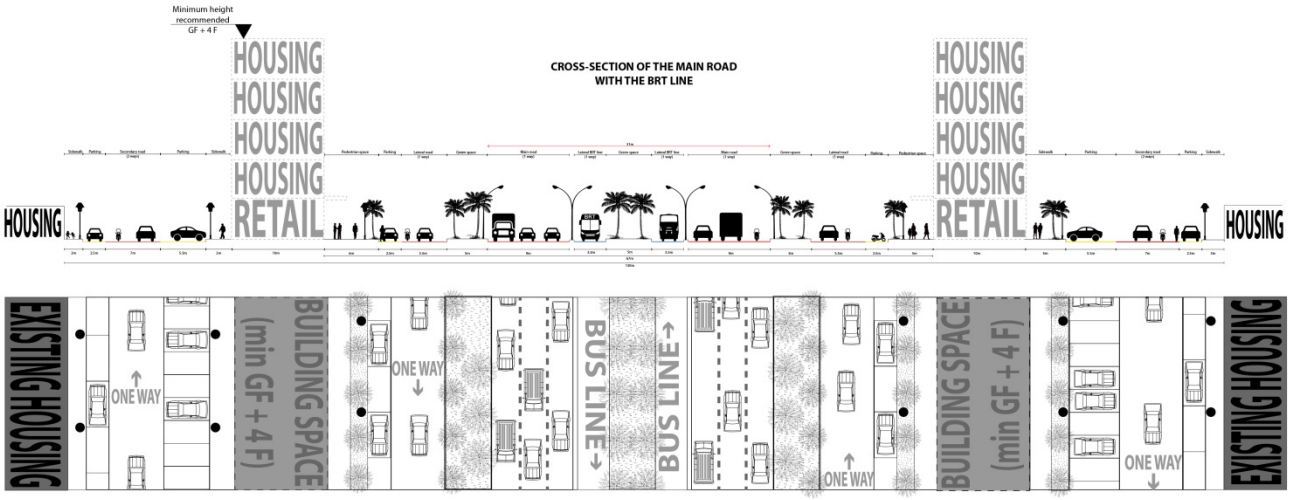


Figure 111: The proposed cross section and plan of the BRT trunk line. The grayd out buildings are not part of the proposal.

There are three BRT lines which are proposed through this project, each connecting distinct functions and parts of the city. The technical details of each lines can be found in table 11.

Table 11: the BRT lines details.

	BRT line 1 (blue line)	**BRT line 2 (the red line)**	**BRT line 3 (the green line)**
Main stations	Batu Aji – Sagulung Centre-Batamindo – Batam Centre Ferry terminal	Airport – Cammo –Harbour Bay Ferry terminal – New Batam Harbour	Sekupang Ferry Terminal – Sekupang Centre – Baloi Centre – Harbour Bay Ferry Terminal – New Batam Harbour
No. of stations	25 stations (8 transfer station	27 stations (8 transfer stations)	19 stations (7 transfer stations)
Total length	21km	20km	16.5km
Total travel time	40 - 65min	40 – 60min	30 – 50min
Average distance between stations:	900m	800m	900m

The BRT line 1 is the first proposed to be built, and it will connect Sagulung to the rest of the city and the main production areas. It is meant especially for people to more easily reach main production areas and work opportunities, as well as connecting to the main services the city center has to offer.

Very important for this line is to provide through its transfer stations the following amenities and services:

(i) additional social housing and community spaces in the Sagulung Centre TS, where a new sub-centre is envisioned;

(ii) worker's dorms, employment facilities and easy access to the industrial park in Batu Aji, Sentosa, Batamindo and Cammo stations; and

(iii) student dorms and easy access to the higher education facilities at the Batam Maritime Academy and Politechnic of Batam

(iv) fast transfer and investment promotion services in Batam Centre, where it connects to the international ferry to Singapore.

The line intersects with BRT line 2, direction Batam International Airport and New Batam Harbour, in Cammo Industrial Park TS.

Figure 112: The BRT line 1 connects workers and residents from Sagulung district to the main industrial parks in the island and the rest of the city.

The BRT line 2 is the 'investors' line' as it will connect the International Airport to the New Batam Harbor, passing through the financial center of the city located in Nagoya Hill. This line will suppose to introduce and facilitate potential investors towards the main investment opportunities in the island. This line also connects with the other two BRT lines and hence it provides easy access in all parts of the island using the BRT buses.

Very important for this line is then to provide through its transfer stations the following amenities and services:

(i) fast transfers, high quality tourism facilities and investment promotion services in the International Batam Airport and Harbor Bay TS, where it connects to the airport and the international ferry to Singapore respectively;

(ii) additional social housing and community spaces in Ruko Menalagi and Pasar Botania, where new sub-centers are envisioned;

(iii) worker's dorms, employment facilities and easy access to the industrial park in Tunas, and New Batam Habrour TS

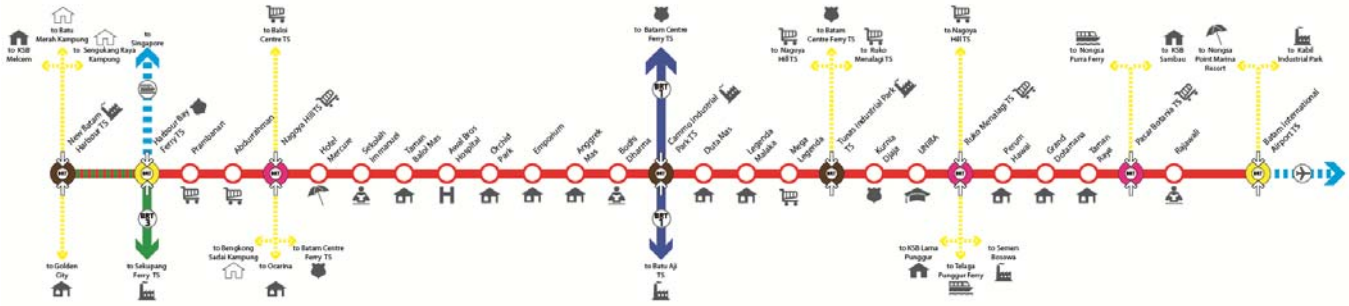


Figure 113: The BRT line 3 connects the airport to the new harbor and it is the line of investment promotion in the city.

The BRT line 3 is the 'oil & gas line' as it will connect two of the most oil & gas activity centers in the city: the Sekupang and the Batu Ampar area. By this it is supposed that new synergies will appear through the transfer between the two.

This line is supposed to be implemented the last, at a time when the development will begun squeezing even more the outside boundaries and the green spaces in Sekupang. Through this line it is hopped also that the natural protection areas in the district will be spared, by pulling in the development towards the transportation line.

Very important for this line is then to provide through its transfer stations the following amenities and services:

(i) additional social housing and community spaces in Sekupang Centre and Tiban Centre, where new sub-centers are envisioned;
(ii) fast transfer services to the ferry, worker's dorms, employment facilities and easy access to the Sekupang Ferry terminal, located near the Sekupang Oil & Gas Industrial Park;
(iii) student dorms and easy access to the higher education facilities at the UIB station.

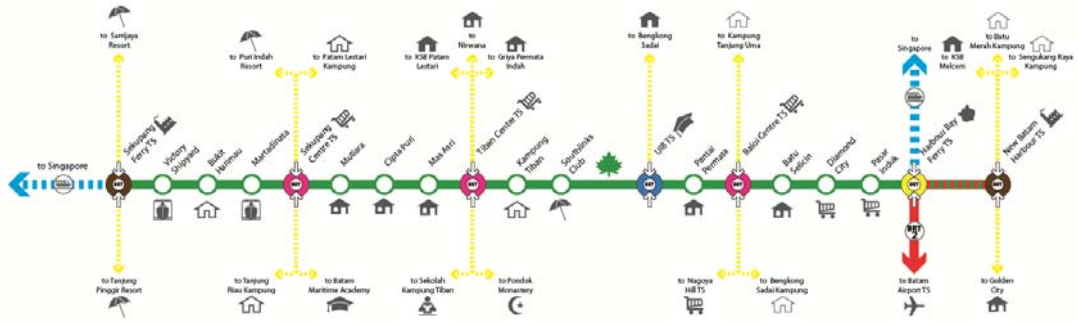


Figure 114: The BRT system and places of interest and main activities it connects can be accessed in Google Earth via the link provided in the footnote.

THE FEEDER LINES

The feeders connect with the trunk lines at the transfer stations. These are operated, in an initial phase, by paratransit operators in time, function of the market response, the authorities could consider regulating the services on some of the collector roads.

There are two essential roles that the feeders fulfill in this project:

(i) it helps integrating the BRT trunk network at the sub-district level; and
(ii) it provides basic improvements in the areas where these reach.

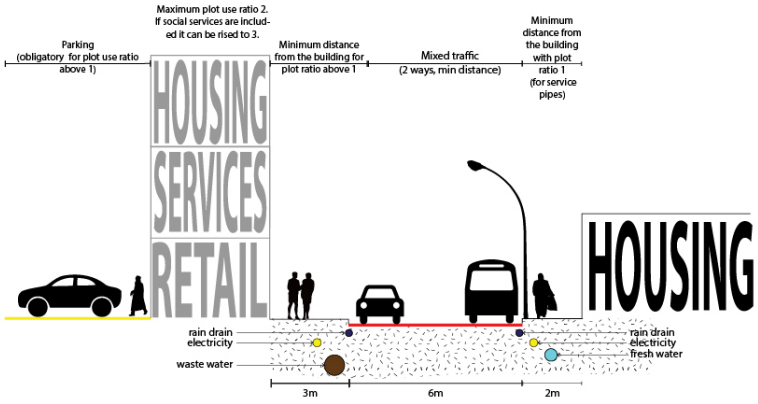


Figure 115: The proposed improvements for the collector roads that will support the feeders. The grayed out building is outside the proposal.

At minimum, even if the paratransit might not follow the collector roads, the improvement of these roads (e.g. the paving, the utilities' installations underground, the pedestrian facilities) will bring a positive impact to the living conditions in these remote, but relatively densely populated areas. Such as it is the case in the Sagulung social housing areas.

EXPECTED CHANGES

It is expected that the introduction of a feeder bus station in a social housing area such as Sagulung will create an virtuous circle of growth (i.e. the living conditions will improve, one improvement drawing another and so forth). (fig.116)

In a first phase the houses near the stations will change their function allowing more commercial functions.

In time, with an increased power of purchasing, the residents are expected to buy neighboring plots and add to their own house creating larger and better houses. Possibly green spaces (e.g. gardens) might appear after some residents will leave, positively influencing the atmosphere of the neighborhood.

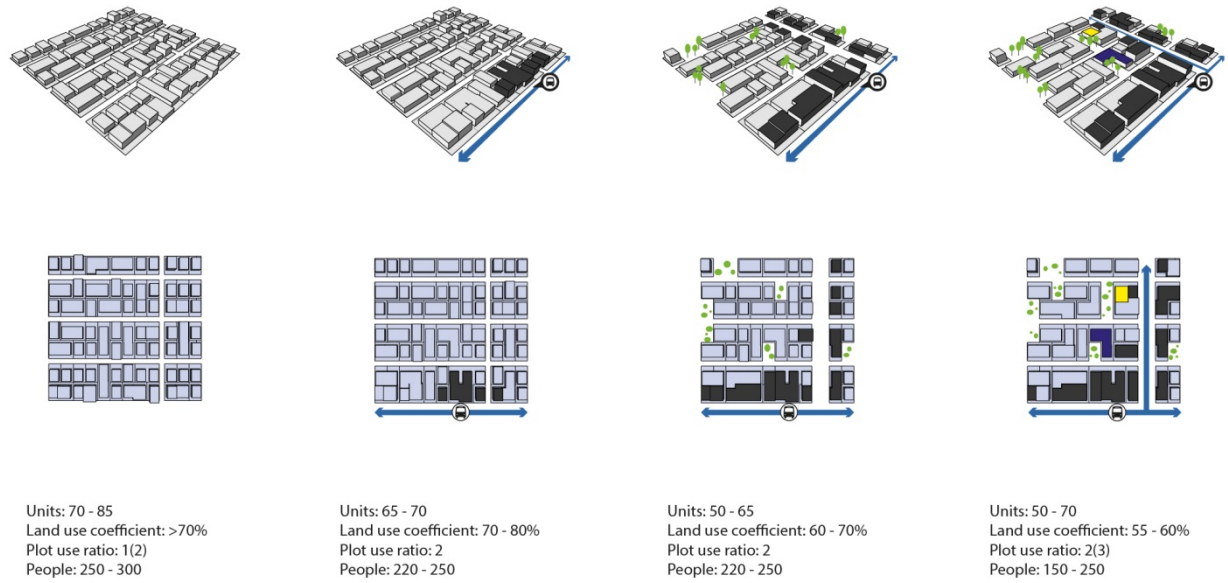


Figure 116: Expected transformations in an social housing area after the introduction of an bus station.

Finally a second street might open up allowing an improved traffic conditions that might attract new functions in the area: schools, day care, general practitioner.

OPERATION AND FINANCING

Both the trunk lines and the feeders infrastructure will be built, controlled and managed by the public authorities through a special administration body (see the 'improving administration strategy' above), in the limits described previously. The service operation on the feeder lines is provided by the paratranist operators that will not be controlled by the authorities. For the trunk services, the project proposes that the authorities will arrange a competitive contract with several private bus operator. Several options are suggested by GTZ in table 13. (GTZ, 2004b)

Table 12: Competitive arrangements for bus services (after GTZ, 2004)

Arrangement	Characteristics
Public monopoly	Authority owns and operates the system
Management contracting	Authority owns the system, hires management
Service contracting - gross cost	Revenue goes to authority, bidders compete for production cost
Service contracting - net cost	Revenue goes to operator, bidders compete for cost and revenue
Franchising	Authority may specify some parameters of the services
Quantity licensing	Limit on number, enough to generate competition
Quality licensing	Any operator who meets quality criteria can operate
Open market	Free entry, with a few basic rules

As regards finance, in Curitiba the system is self-paying itself, though at the beginning they did used subsidies from the central government to implement it. Among the solutions they used was to capture the land value increase. (fig. 116).

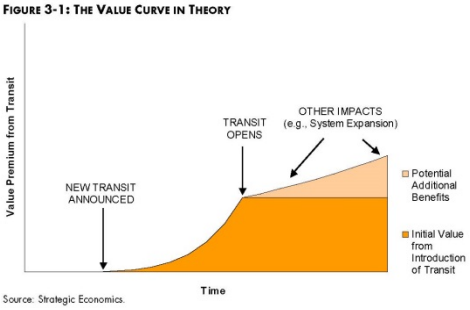


Figure 117: The estimated land-value increase near the public transportation transits.

Other revenues that can help recover the costs of the system can be drawn from the taxes on the properties that will develop along the transit line.

5.4 ISLAND LEVEL INTERVENTIONS (B): THE NEW HARBOUR

Essential for realizing the objectives under the 'creating the conditions for investment and innovation' is the building of a new harbor. It is supposed that by this new harbor the shipbuilding and the oil & gas industry can be boosted up to form a cluster in the future.

So far Batam did not profit enough from its strategic position, currently the city still depending on the harbor infrastructure in Singapore. Through this new harbor, the authorities will have an unique opportunity to better establish its position in the region and improve their image in order to balance up its declining competitiveness.

Judging from the case of Rotterdam, new harbours require more and more space. From an average plot size of 25,000 m2 as it is Waal – Eemhaven, the new Maasvlakte reaches 800,000 m2. Important is also the way the harbor connects to the city. In the case of Rotterdam there are road connections but also rails providing full options for the logistic companies. For this reason, the BRT system might prove essential to the development of the new harbor as well.

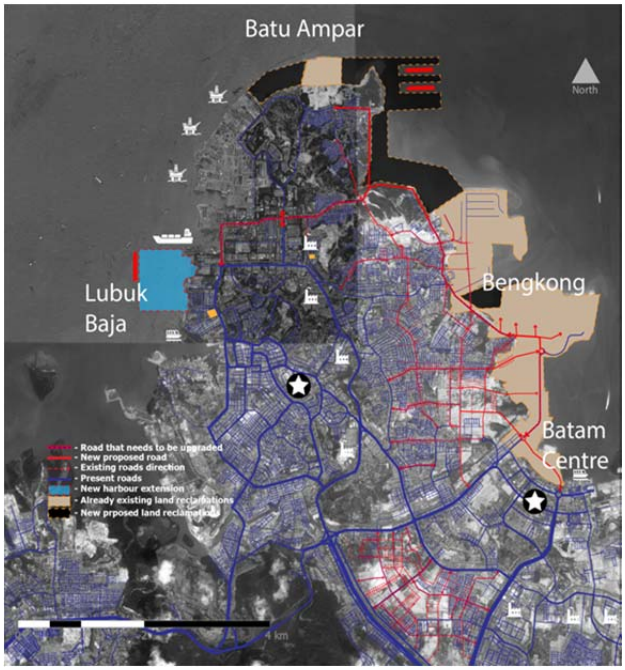


Figure 118: The new harbor location in Batu Ampar (in blue) and the extensions (in dark brown).

The location it is suggested to be in Batu Ampar, extending and creating new areas around this original core of shipping activity in the island. In a similar way to the BRT transfer stations, which continues and boosts the current activities where they are located. It is also possible, for matters concerning space and accessibility that the new harbour could also be built on the east side of the island, where currently there is still little development.

It is important however that the harbour will have space enough to develop and remain competitive over a long period of time. The aim is to partially complement, if not replace at the national level, Singapore's own harbour activity.

VI. EVALUATION

This chapter deals with the appreciation of the final results and risks of the interventions. It consists of two parts, one assessing the shipbuilding industry in the SE Asia region and worldwide, in order to evaluate the success of the cluster proposed for Batam, and a scenario analysis, which can indicate some sensitive appreciations of how the spatial interventions might work in Batam in the next 30 years.

6.1 ASSESSING THE REGIONAL SHIPBUILDING INDUSTRY

Currently, the shipbuilding industry in Batam is facing the competition from other hubs in the South-Asia / Pacific region. According to a 2009 comprehensive report on the European competiveness in shipbuilding industry, Japan, South Korea and China are the most important players in the region even at a global scale level (ECORYS, 2009).

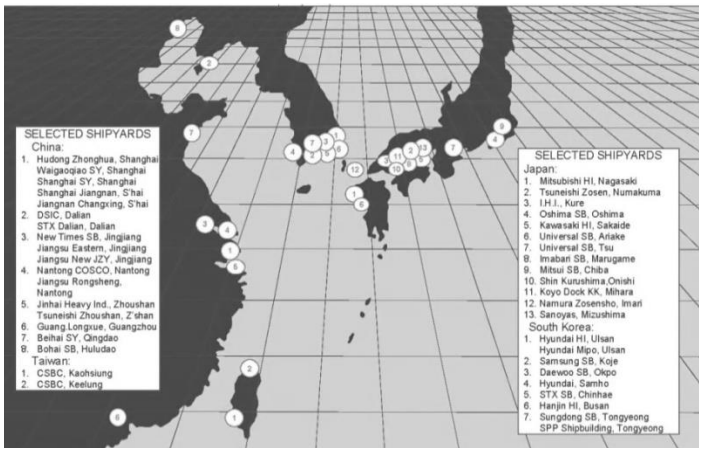


Figure 119:: The largest shipyards in terms of number of orders in SE Asia (source: Clarkson Research's World Fleet, 2012)

Figure 120: The McDermott shipyard in Batu Ampar is focused on oil & gas industry. (source: McDermott)

According to Clarkson Research's World Fleet Register China is the largest shipbuilding nation of the world and it will continue to be so, in this moment fulfilling almost half of the total global demand. Six nations out of the top ten are located in the SE Asia. These nations are China (#1), South Korea (#2), Japan (#3), Philipines (#5), Taiwan (#8) and Vietnam (#9).

Nevertheless Batam is competing with the newly emerging shipbuilding nations in the region, Vietnam, Taiwan and Philippines, which are competing on the low cost advantage[30]

The Philipines' case appear interesting because in the recent years, it gain a lot of momentum given the fact that Japan and South Korea made this nation as their preferred destination of FDI. A study by Japan International Cooperation Agency (JICA) and Nomura Research Institute (NRI) from 2011 show that the Philippines has the potential to become a shipbuilding and repair centre for oceangoing merchant and fishing vessels in Asia-Pacific, because of its location and natural conditions, abundant labour and fiscal incentives.

The country hosts some of the world's leading shipbuilders: Japan's Tsuneishi, South Korea's Hanjin and Singapore's Keppel. These companies build ships such as bulk carriers, container ships and passenger ferries. In the past, industry output was limited to small ships, tankers, barges, and fishing vessels, but with the entry of big shipbuilders, like Tsuneishi Heavy Industries of Japan and Hanjin Shipyard of Korea, ships with large tonnage capacities are being built. Marina data shows that the shipbuilding industry employs about 39,000 workers, including over 50,000 engineers and architects.

[30] From OECD presentation 'Actvities of World Shipbuilding FDI's in recent years' (link: http://www.oecd.org/industry/industryandglobalisation/41822177.pdf)

The Philippine's Board of Investments approved incentives in favour to Filipino-owned ship repair facilities in order to improve and enlarge their shipyards. Today there are 121 shipbuilding and repair facilities in the country. According to the same research by JICA and Nomura, Philippines is in the position of becoming a ship repair hub in the Asia-Pacific region for oceangoing merchant and fishing vessels, taking advantage of its strategic location to the region's shipping routes

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We can conclude that with regards Philippines, which appear to be the most important competitor in the region, Batam would still have a good position especially if it focuses on the offshore oil and gas product and services.

6.2 SCENARIOS AND EVALUATION CRITERIA

In order to evaluate the re final result of the interventions proposed, we can run a sensitive analysis using the scenario planning. Each scenario will be evaluated function of the eight drivers resulting from the 'tree model'.

The scenarios[31] consists in 3 possible futures of the global shipping industry in 30 years' time and they had been developed by Wärtsilä Corporation. [32] Two certainties at the core of these scenarios are:

1. Shipping will continue to be part of the transportation matrix;
2. Fresh water will become more and more valuable.

Figure 121: The five uncertainty variations in Wärtsilä scenarios (after Wärtsilä Corporation, 2010)

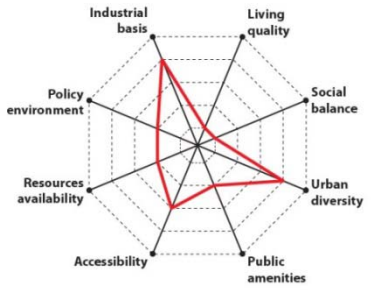
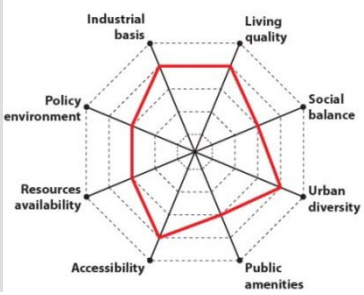
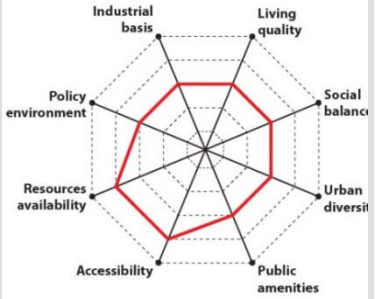
The scenarios are based on 5 uncertainties: (1) trade and economic growth, (2) response to climate change and sustainability issues, (3) geopolitical issues and global leadership, (4) solutions to deal with scarcity issues, (5) control of power which can vary as indicated below and which describes further more each scenario. In short the Wärtsilä scenarios are:

1. *Rough Seas* – the natural resources - water and food especially – are becoming more scarce, the security of the world is under threat, sea-transportation needs advance security and natural resources are more often than not traded between countries;
2. *Yellow River* - China is becoming the world leader, in terms of trading now it become and import and consumer country and not anymore an exporter; it is also the largest sea trader, being concentrated on shipping efficiency and energy conservation;
3. *Open Oceans* – the world is truly globalised, there are trading relation between each country, and much is focused on sustainability and environmentally friendliness; tourists are traveling much more than before, using latest class cruise liners.

[31] The document I used for inspiration for these scenarios can be found at this link: http://www.shippingscenarios.wartsila.com/Wartsila_Shipping_Scenarios_2030.pdf

[32] According to theirs site Wärtsilä Corporation is "a global leader in complete lifecycle power solutions for the marine and energy market"From: http://www.wartsila.com/en/investors/fast-facts (accessed 18-020-2013)

Table 13: Summary of the Wärtsilä scenarios and their effects on Batam.

	Rough seas	Yellow river	Open oceans
Expectation in 30 years			
Estimated influence on Batam in 30 years	- Batam begins exporting natural resources mainly to China, Singapore and other rich nations in the region: > the shipyard industry is boosted, the new harbour is enlarged and the BRT system is essential in connecting the whole island together. > this also boosts the competitiveness of the island and the cluster formation - Batam also develops more its agriculture, adding to the industrial base of the city, improving the urban diversity and contributing to the living - working integration: > the houses with the vegetable gardens, and the urban gardens prove to be a good strategy for people to pass through the crisis; - Nevertheless, the human capital remains low, the scarcity of the resources affecting the re-distribution of wealth and worsening the social balance in the city: > on the background of the oil crisis not all BRT lines will be built > few public amenities are built	- China becomes a major importing nation and an consumption society, Batam overall profit from this through its Chinese minority and by exporting natural resources: > the shipyard industry is developing and the harbour activities are intensifying; > the BRT system is implemented entirely (all 3 lines) through public-private partnerships with the Chinese investors > the industrial basis is developing being stimulated by new investors which introduce new industrial activities in the island - The social balance is improved and more public amenities are developed by the city but also by private investors, now that more people enjoy an increased prosperity; > urban sprawl is better contained in order to use more efficient the land - The policy environment is partially improving, stimulated by the attraction of new investors	- The trans-shipment increases and Batam benefits from its new, harbour that works together with Singapore in addressing the global trading needs; - The BRT system proves an useful transportation mean to attract tourists and investors in the island even in the remote corners; - The more globalised conditions are still influencing companies to act in a 'footloose' way; >all the BRT lines are developed and the working and living relation is improved

6.3 CONCLUSSIONS OF THE SCENARIOS

The previous scenarios concerned in particular the shipyard and harbor activity and seem to favor the development of these activities further, no matter what the future will bring. Even if it is a resource crisis or China dominating the world, the shipping industry, with its connective activities, appears to survive and develop.

However the competition from the region on the similar shipping activities might go for Batam as it currently goes for the manufacturing, i.e. the main investors might still chose the cheaper place in Vietnam or Philiphines – main competitors for Batam in the same industry profile.

For this reason, the Bus Rapid Transit (BRT) system, with its transfer stations providing additional services, can prove a crucial and strategic point to convince companies to choose Batam. The system allows for the whole

industrial activities in the city to be close together and helping them to exchange information and technological innovations more easily. All these through the continuous, easy and fast flow of people, which generates ideas, and capital. This way the competition would be on the side of Batam helping the city achieving its 'global city' vision.

CONCLUSIONS AND REFLECTION

The project hereby presented 5 strategies to improve: (i) the housing conditions; (ii) the public mobility, (iii) the degrading ecological balance; (iv) the competitiveness loss; and, (v) the inefficient governance of the island. At the base of the proposal stays a Transit Oriented Development (TOD) plan that uses a Bus Rapid Transit (BRT) system as main public transportation means.

In solving the problems the project created destination activities, used for housing, working, studying, and opportunities for investment and development, along the main BRT lines and especially at the transfer stations.

This is how it works:

- for improving the housing conditions, especially for the lower and middle income groups, the project proposes building affordable housing for targeted groups (such as workers, students) on top of the transfer stations of the BRT system, leaving the GF and the 1st floor for mix-use activities and transfer between the BRT buses and other transportation means;

- for improving the public mobility it proposes a trunk and feeder BRT system, that connects the main activity centers, productivity areas and functions in the city, and integrates these at all levels, from sub-district level to the international level, via transfer stations that ensures easy transfer between local roads, ferries and aiport;

- for improving the ecological balance, the project proposes a scheme to restore the green areas in the city (by removing the illegal activities and replanting trees for example) and create agricultural land, in areas that are underused, and parks in the areas that come under the pressure of development.

- for improving the competitiveness, the project proposes higher education and research facilities integrated or with direct access to special transfer stations in order to create opportunities for the residents to upgrade themselves, in addition to promoting investment opportunities in the island, by means of other special BRT transfer station located at the airport or the international ferry terminals;

- for improving the governance the project proposes the creation of a single authority body that will deal both with the land use development and the transportation planning and implementation.

The project also proposes a phasing scheme, in order to control and stir the development function the market drivers, which remains hard to predict. Provided that the suggested interventions described works (for example, it achieve the targets for the 'tree model' criteria) then the authorities can proceed for the next phases of the project, perhaps taking new decisions on how to improve the plan. At minimum, the objective of this project is to ensure the city to have an efficient public transportation system, because this in itself can create a virtuous circle of growth.

LESSONS FOR OTHER SEZ CITIES

Batam case is not unique, currently being thousands of similar industrial cities that deal with poor housing and working conditions, reduced mobility and inefficient governance. For this reasons this project hopes to pring important lessons for them as well.

For these industrial cities to progress, on the long-term they need the capacity to innovate and diversify. This innovation would only come through the development of the human capital, which is directly influenced by the living conditions present in the city such as the quality of housing, and transportation, the presence of a clean

and attractive environment, a fair social balance, affordable education and personal development opportunities, and others.

This project started from the industry and city relation in Eindhoven and Shenzhen and one important lesson from these cases was that, even if the industry started in poor conditions profiting from the cheap labor, in time the living conditions had to change in order for both the companies and cities to progress.

So the first and perhaps most important lesson might be: *providing good living conditions ensures competitiveness and city development.* This lesson can be called 'People first!'

A second lesson concerns the governance of such industrial cities. Most of the time there are multiple administration issues which leads to an inefficient governance. This might affect the investments, the administration of resources, especially land use, and finally can lead to the loss of the competitiveness, the worsening of the industrial activities and finally the declining of the city.

Hence the second lesson might write: *efficient governance will ensure continuous development for the city.* This lessons can be named: 'Efficient governance!' seize

The third and final lesson is about the identification or creation and use of potential. Batam has a good strategic position but insufficiently profited from, the city's progress remaining in the shadow of Singapore. Decision-makers should put at better use such unique advantages for attracting specialized industry, especially by rising its value and importance through man-made infrastructures. This is how the BRT system and its transfer stations would operate as well in Batam.

Hence the third lesson is: *identify, create and promote potential for attracting long-term growth and development.* This lesson can be called: 'Seize the potential!'

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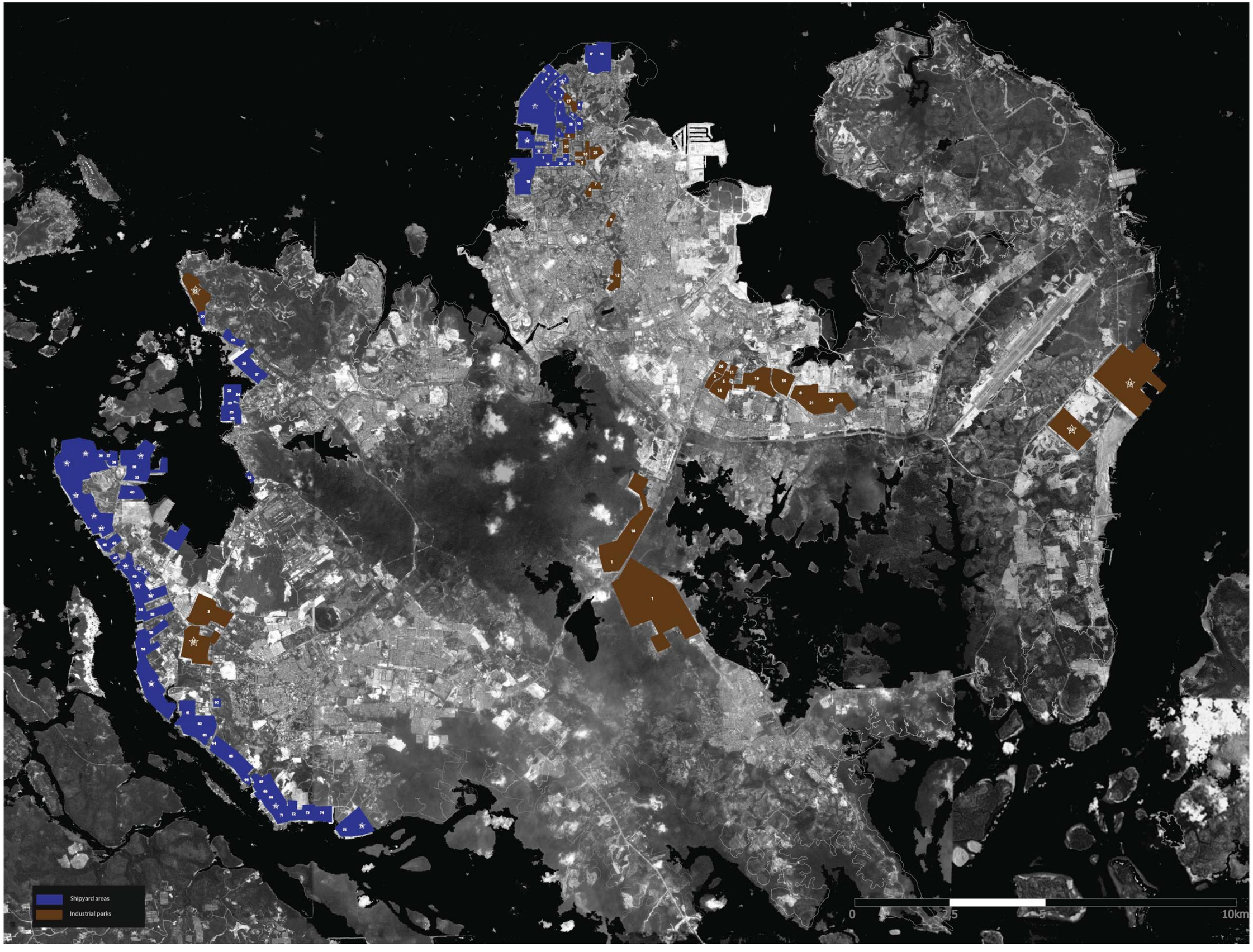
APPENDIX 1

INDUSTRIAL CLUSTER RESEARCH IN BATAM
THE MAP AND DATA OF OIL & GAS COMPANIES AND INDUSTRIAL PARKS


Shipyard areas
Industrial parks
0
2.5
5
10km

BATU AMPAR DISTRICT

	Name company	Category	Year	Area (m2)	Subsidiary (yes/no)	Int'l market	Products	Link
1	McDermott *	oil&gas equipment	1974	1,373,613	yes (to Singapore)	yes	oil&gas platforms, pipes, steel works	http://www.mcdermott.com/Pages/Home.aspx
2	Sumber Samudra	offshore services	2003	56,960	no	no	renting and maintaining oil&gas equipment	
3	Heat Exchangers**	oil&gas services	1994	30,955	no	yes	supplying equipment for oil&gas procedures	http://www.heibatam.com/
4	Kaefer	offshore services		19,933	yes (to Singapore)	yes	thermal and fire insulations, scafolding, painting, b	http://www.kaefer.com/Indonesia.html
5	Profab Indonesia	oil&gas equipment	1998	98,446	yes	yes	specialized maintenance, bulding and repairing fo	http://www.profab-group.com/pt_profab/equip.html
6	Utraco Batam	oil&gas services	2002	59,937			steal work for oil rigs and such, renting and handli	http://offshore.utraco.com/
7	Toyo Kanetsu Indonesia	oil&gas equipment	1978	35,544	yes	yes	oil&gas storage tanks and underpressure vessels	http://www.toyokanetsu.co.jp/global/company/group.html
8	Aker Solutions	oil&gas equipment		11,499	yes	yes	drilling solutions	http://www.akersolutions.com/en/Utility-menu/About-us1/Corporate-structure/Subsea/PT-Aker-S
9	Schenker Indonesia	oil&gas services	1974	10,880	yes	yes	specialized shipping services	http://www.dbschenker.co.id/log-id-en/start/services/oilandgas.html
10	Vetco Gray	oil&gas equipment		60,059	yes	yes	oil&gas drilling systems and equipments	http://site.ge-energy.com/businesses/ge_oilandgas/en/our_brands/vetcogray.htm
11	Baker Petrolite Batam	oil&gas equipment		17,411	-	-	specilized drilling supplies	
12	Batu Ampar Harbour / Persero Ba	goods harbour		503,456	no		main trading harbour in Batam	http://www.perserobatam.com/en/home/
13	Karti Yasa Sarana IMECO	oil&gas services		33,761	yes	yes	cameron surface systems, tuboscope pipe inspection	
14	Pertamina	oil&gas services	1974	68,927	no	-	the largest oil&gas operator in Indonesia (state company)	
15	Megaron Semestra	oil&gas services		29,665	yes (Malaysia)	yes	engineering services	
16	Tat Hong	shipyard		307,052	yes (Singapore)	yes	cargo barges and tugboats	
17	Bintang Intipersada Shipyard	shipyard		250,000			cargo barges and tugsboats	
18	PT Y&T	offshore services		31,357	yes (China)	yes	specialized sealers for ships and offshore projects	
19	Petrotech	oil&gas equipment		10,823			wellhead control panels	
20	Citra Tubindo	oil&gas equipment		9,899	yes (Singapore)	-	pipe installation for oil rigs	
21	Hyundai Metal IND	oil&gas services		27,479	yes	yes	design and execution services offshore platforms	
		TOTAL AREA:		**3,047,656**				

*McDermott: The biggest offshore fabricator in Indonesia and one of the largest offshore construction companies in the world requires proficient and highly motivated individuals for the following position

**PT Heat exchangers Indonesia known as PT. HEI was established on 16th May 1994, and is located at Jalan Bawal, Batu Merah Batam Island 29432, Indonesia. The Company is also located in a Free Trade Industrial Zone adjacent to Singapore which is about 20 km away and is strategically sited to service clients in Indonesia, Singapore, Malaysia and other parts of Asia and Middle East. PT. HEI specializes in the design and manufacture of heat transfer equipment of all types, pressure vessels and process skids, piping, and other specialized fabricated equipment. Since its establishment in 1994, PT. HEI has designed and fabricated over 5,000 units within the refining, petrochemical, power generation and general industries throughout South East Asia

SEKUPANG DISTRICT

	Name company	Category	Year	Area (m2)	Subsidiary (yes/no)	Int'l market	Products	Link
22	Britoil Indonesia	shipyard		92,182			tugboats, cargo barges, conversions, automated welding	
23	Ninda Pratama Vriesindo	oil&gas services		76,697			offshore services	http://wikimapia.org/13079681/Ninda-Pratama-Vriesindo
24	Pacific Atlantic Batam	shipyard		74,019			cargo barges, repairs	
25	Nongsa Jaya	shipyard		83,433			tugboats, repairs	
26	Kim Seah shipyard	shipyard		53,788	yes (Singapore)	yes	passngers ferries, aluminum work	http://www.penguin.com.sg/our-subsidiaries/pt-kim-seah-shipyard-indonesia/
27	Cahaya Samudra Shipyard	shipyard		77,134	yes(Singapore)	yes	tugboats, repairs, steel work	http://www.cahayasamudrashipyard.com/index.html
28	Bandar Victory	shipyard		191,811			cargo barges	
29	Persero Batam	shipyard		123,273			cargobarges	
30	Sekupang Harbour	goods harbour		27,739				
22(31)	Sekupang Industrial Park*	industrial park	1984	244,889	yes		specialized in oil&gas services and suppliers	http://businessinbatam.com/
32	Megacipta shipyard	shipyard		72,196	Singapore		cargo barges, tugboats	http://www.technicsgrp.com/about_yards.html
		TOTAL AREA:		**1,117,161**				

*Sekupang Industrial Park is one of the oldest industrial parks in the island specialized in oil&gas. The park has 10 tenants which provide services and specialized equipment such as well cementing services (Halliburton Indonesia), design and built oil&gas process facilities (GPS), oil&gas exploration and production (Medco Energi), and others

BATU AJI & SAGULUNG DISTRICTS

	Name company	Category	Year	Area (m2)	Subsidiary (yes/no)	Int'l market	Products	Link
33	Selecta shipyard	shipyard		100,980			cargobarges, tug boats	
34	Drydocks World - Nanindah*	oil&gas equipment		570,000	yes (Singapore, UA	yes	vessels for offshore drilling (AHTS, PSV)	http://www.drydocks.gov.ae/en/portal/nanindah.yard.map.aspx
35	Hansa Engineering Indonesia	oil&gas equipment		19,514		yes	pipes for offshore constructions and ships	
36	Trikarya Alamat Shipyard	oil&gas equipment		82,250			oil tankers, bulk carriers	http://trikaryaalam.com/index.php
37	Dermaga bea cukai	shipyard		25,022			cargobarges	
38	Pan Batam Island Shipyard	shipyard		23,000			cargobarges, tugboats	
39	Drydocks World - Graha	oil&gas equipment		520,000	yes (Singapore, UA	yes	drilling jack up rig, service jack up rig	http://www.drydocks.gov.ae/en/portal/nanindah.yard.map.aspx
40	Persero Batam	oil&gas equipment		220,268			cargobarges	
41	Drydocks World - Pertama	oil&gas equipment		280,000	yes (Singapore, UA	yes	tankers, tugs	http://www.drydocks.gov.ae/en/portal/nanindah.yard.map.aspx
42	Batamec shipyard*	oil&gas equipment	1985	495,936		yes	drilling barges (well stimul), repair, tankers, large	http://www.batamec.com/
43	ASL Shipyard Indonesia PT*	shipyard		297,246	yes (Singapore)		tugboats, repairs, conversions	http://www.aslmarine.com/
44	Loh & Loh Shipyard*	oil&gas equipment		125,528	yes (Singapore)	yes	cargobarges and shiprepair	http://www.lohnloh.com/lohnloh/shipyard/index.html
45	Pandan Bahari Shipyard	shipyard	1997	82,505	yes (Singapore)		tugs and barges	http://easternnavigation.com/
46	Asia Foundry & Engineering	offshore services	1995	33,112	yes (Singapore)		steel works (propellers, rudders)	http://www.asiafoundry.com/
47	Dharma Sentosa Marindo	shipyard		80,000				
48	Nipon steel	oil&gas equipment	1995	188,810	yes (Japan)		pipes and stell work for drilling platforms	http://www.nisconi.com/index.php?option=com_content&view=article&id=11&Itemid=21
49	Tat Hong Offshore	oil&gas services		54,548	yes (Singapore)		90 people	http://www.tathongoffshore.com/thoms_aboutus.html
50	Jaya Asiatic Shipyard*	oil&gas equipment		161,038		yes	AHTS (2515, 2744) PSV (4500, 4330) ROV/sub (3000, 3864)	
51	Bina Kreatif Swakarsa	offshore services	1991	19,859			design and build engineering services	
52	Batam Scrap Indonesia	offshore services	2004	20,000			specialized scrap collection and reselling	http://www.chinacsky.com/co/77448/about.htm
53	Hyunday	offshore equipment		203,116	yes (South Korea)		ship engines and turbines, other steel equipment	
54	Cahaya Gemilang Shipyard	shipyard		92,545				
55	Global Industries Asia	offshore services		211,579				
56	Rotary Engineering	oil&gas services		229,002	yes (Singapore)		engineering and design services in oil&gas	http://www.rotaryeng.com.sg/aboutus.html
15(57)	Latrade Industrial Park**	industrial park	2000	674,520	yes (Singapore)		specialized companies in oil&gas, marine technolo	http://www.latrade.com.sg/index_eng.html
58	Tam Shipyard	shipyard		189,364				
59	Sintai Shipyards	shipyard		602,236			cargo boats and barges, tugs,	http://indonetwork.co.id/kumalaindoshipyard/profile
60	Duta Karya Teknologindo	oil&gas services	2007	40,000			design, engineering, oil & gas services	http://dkteknologindo.indonetwork.net/848119/
61	McConnell Dowel	oil&gas equipment	1990	193,319	yes (Singapore)		design, engineering, oil & gas services	http://www.macdow.com.au/corporate/regions/macdow-singapore
62	Palma Progres Shipyard	shipyard	1989	300,360			tugboats, cargobarges and ships	http://www.palmashipyard.com/
63	POE Shipyard	oil&gas equipment		140,038			cargo barges	http://www.einindonesia.com/project/4/pt.-poe-shipyard.html
64	Pec Anugerah Sejahtera PT	oil&gas equipment		37,722				
65	Bumi Indah Shipyards	shipyard		341,461			cargo barges, tugboats	
66	Tunas Karya Bahari Indonesia	shipyard		55,532			cargo barges, tugboats	
67	Palmindo Marine Shipyard	shipyard		131,413			cargo barges, tugboats	
68	Perkasa Melati Shipyard	shipyard		129,166			cargo barges, tugboats	http://www.manta.com/ic/mxxxtl6/id/perkasa-melati-pt
69	Karya Sindo Samadura Shipyard	shipyard		148,266			cargo barges, tugboats	
70	Sentek Marine Shipyard*	oil&gas equipment		194,587			cargo barges (PSV), tugboats (AHTS)	http://sentek-indonesia.com/sylocation.php
71	Citra Shipyard	oil&gas equipment		111,622			cargo barges, tugboats	http://www.cssgroup-batam.com/ind/index.php
72	Pertama Pacific Shipyard	shipyard		200,000				
73	Venture Technology I'sia	shipyard		239,796				
74	Galangan PutraTanjungpura	shipyard		239,778				http://galanganputratanjungpura.blogspot.nl/
75	Delta shipyard	oil&gas equipment		89,583			oil & chemical tankers, dredgers, cargo boats and	http://deltashipyard.com/
76	Marco Polo Shipyard*	oil&gas equipment		697,410	yes (Singapore)	yes	cargo barges, tugs (AHTS), offshore structures	http://www.marcopoloshipyard.com/
		TOTAL AREA:		**8,892,031**				

*These shipyards appear in the World Shipyard Monitor Database, July 2012. Indonesia has 9 shipyards which appears in this international guide 6 of which are located in Batam (link: http://www.clarksons.net/wfr)
**Latrade industrial park contains 16 tenants among which: Berger Batam, Universal Laboratory, Bioworld Biosciences, Brandsmart Textiles, Wearsmart Textiles, Kings Safety Wear, Technicast Indonesia, Power Foam, Tomoe Valve Batam, Furnplus Asia, Green Resources Materials, Swagelock Indonesia, SKP Marine Engineering, Latrade Batam Indonesia.

KABIL DISTRICT

	Name company	Category	Year	Area (m2)	Subsidiary (yes/no)	Int'l market	Products	Link
13(77)	Kabil Industrial Park	industrial park	1979	1,350,584	yes(Singapore)		specialized companies in oil&gas services	http://www.kabilindustrialestate.com/
23(78)	Taiwan indsutrial Park	industrial park		545,409			specialized companies in oil&gas services	
79	Pertamina	oil&gas services		1,722,389			national oil&gas operator in Indonesia	
		TOTAL AREA:		**3,618,382**				

Definition categories:

1) oil&gas equipment	Specialized in building and repairing oil&gas equipment including drilling platforms and rigs, oil tankers and specialized cargo barges (such as PSV, drilling barges - Well stimul) and ships, tugboats (AHTS), submarine exploration vessels (ROV/sub) pipes and under pressure installations, etc.
2) oil&gas services	Providing specialized oil&gas services such as engineering design, special sealing and testing works, specialized shipping for oil&gas, etc.
3) offshore services	General services such as ship and other specialized design, supply and shipping, insulation and other for offshore structures and vessels.
4) shipyard	Building new, repairing, maintaining and conversing a broader range of ships not only for oil&gas. In Batam most of the times these ships are cargo barges and ships, tugboats and passengers' ferries.

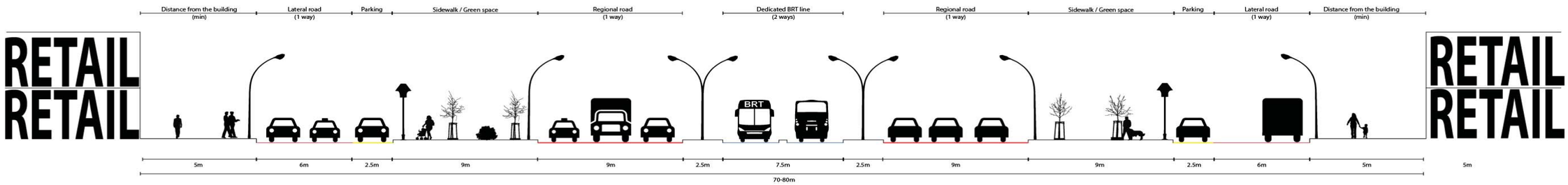
Legend (only for the shipyards in the World Shipyard Monitor Database)

AHT(S)	Anchor handling tug supply
PSV	Platform supply vessel
Well stimul	Special oil drilling barge
ROV/sub	Remotely Operating Vessel / subsee

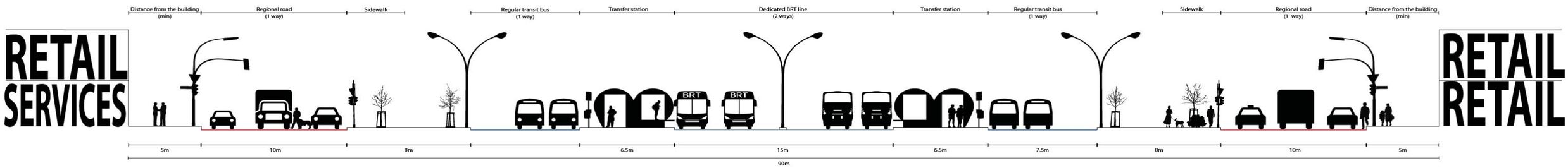
APPENDIX 2

BRT SYSTEMS COMPARATIVE RESEARCH
URBAN AVENUES

PROFILE WITHOUT STATION



PROFILE WITH STATION



CURITIBA

POPULATION (REGIO): 3.2 MIL. (2010)

TYPE: TRUNK AND FEEDERS
TRUNK WIDTH: 7.5 M
STATION SIZE: 6.5 X 30 M (LATERAL STATIONS)

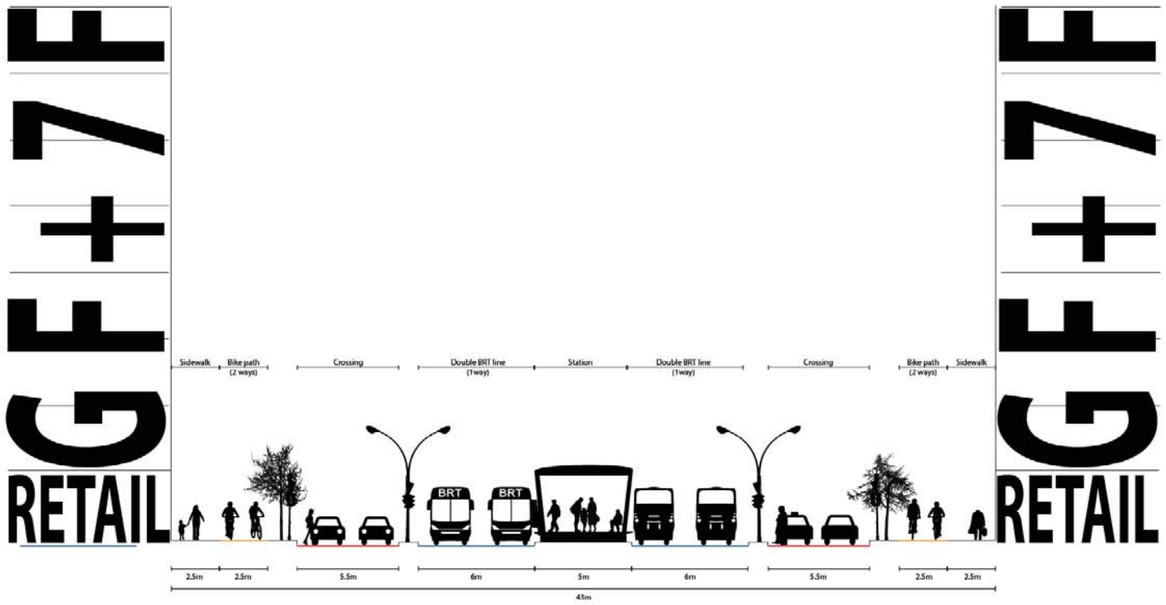
WHOLE STREET PROFILE WIDTH: 90M

PASSENGERS / DAY: 2.3 MIL. (80% OF TOTAL)
AVERAGE DISTANCE BTW. STATIONS: 0.6 KM
TOTAL BRT SYSTEM LENGTH: 70 KM
AVERAGE SPEED CENTRE: 20 - 32 KM/H

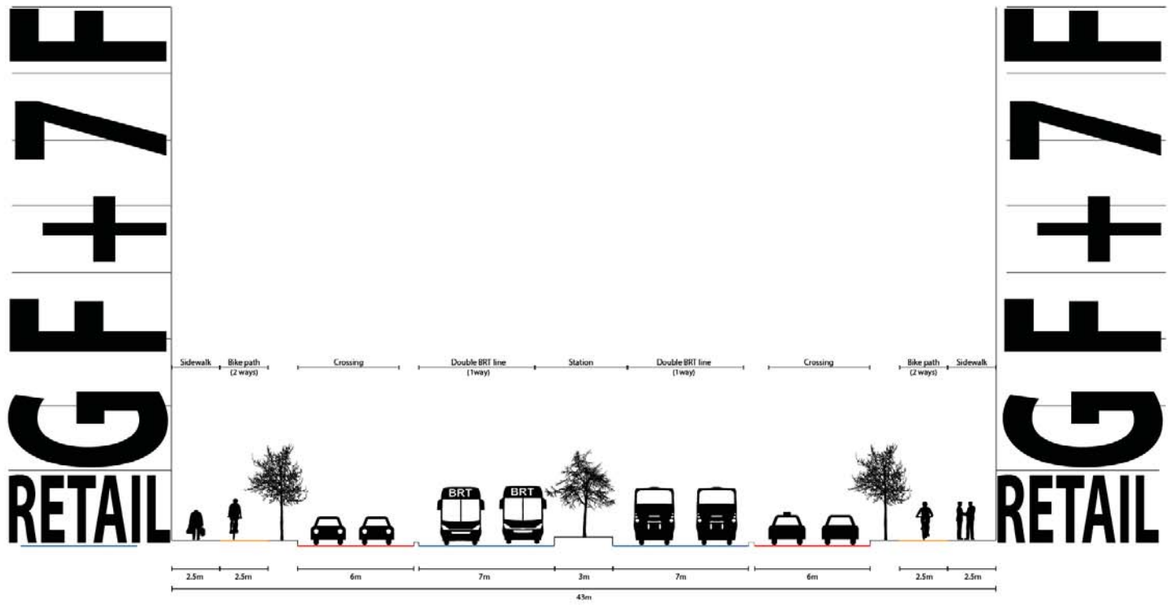
(SOURCE: ITDP)

(SOURCE: GOOGLE MAPS)

PROFILE WITH STATION



PROFILE WITHOUT STATION



BOGOTA

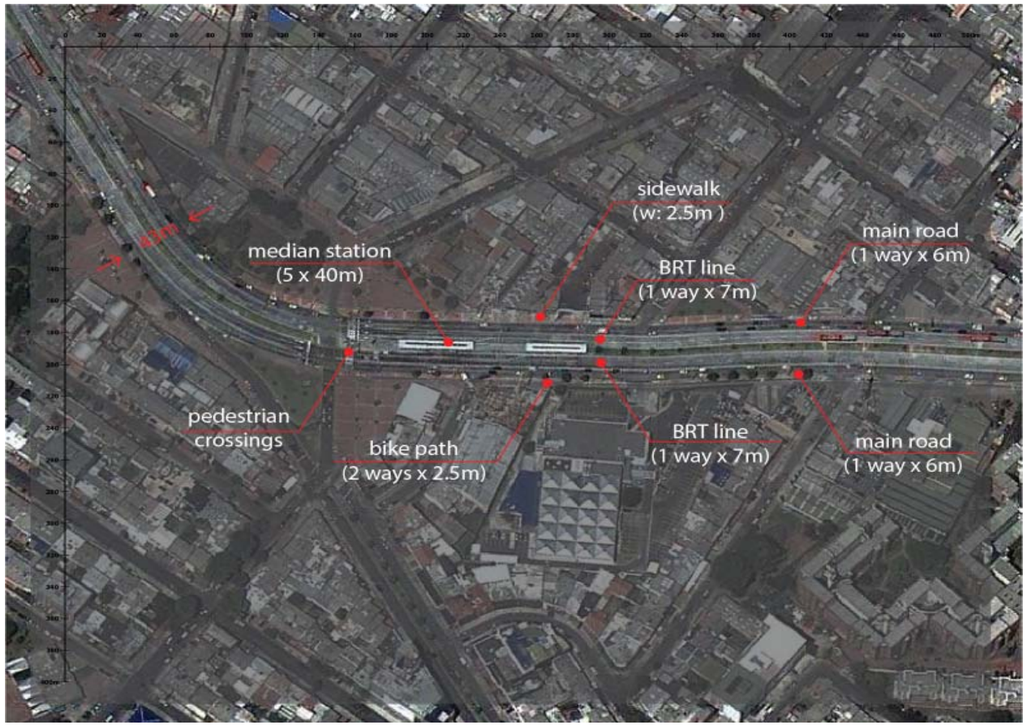
POPULATION: 7.6 MIL. (2013)

TYPE: TRUNK AND FEEDERS
TRUNK WIDTH: 17 M (INCLUDING ISLAND)
STATION SIZE: 5 X 40 M (ISLAND STATIONS)

WHOLE STREET PROFILE WIDTH: 43M

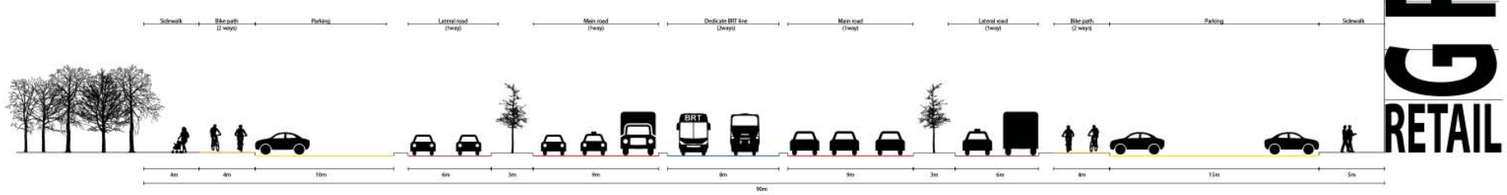
PASSENGERS / DAY: 1.6 MIL.
AVERAGE DISTANCE BTW. STATIONS: 0.79 KM
TOTAL BRT SYSTEM LENGTH: 105 KM
AVERAGE SPEED CENTRE: 16 - 30 KM/H

(SOURCE: ITDP)

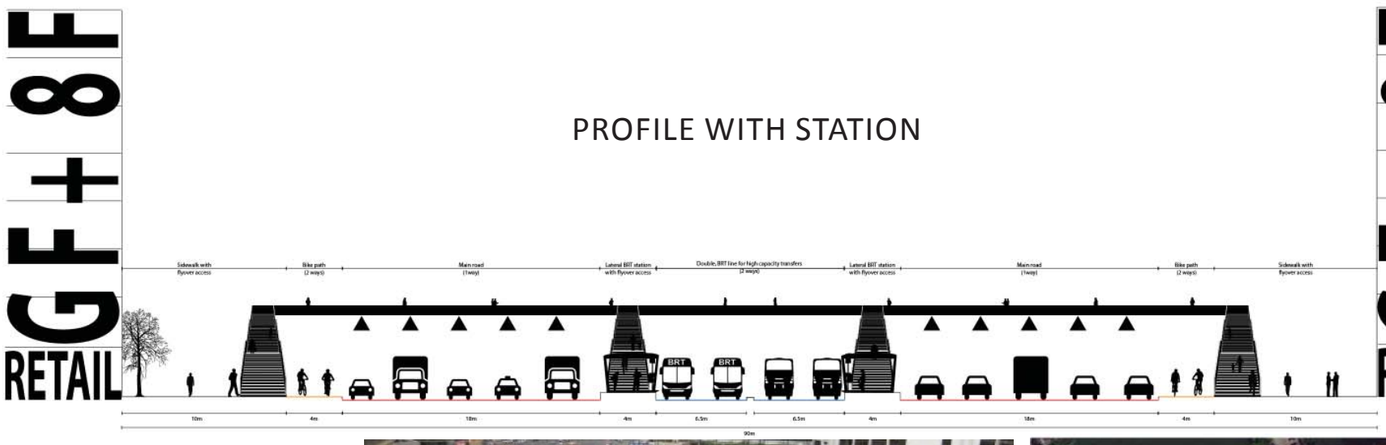


(SOURCE: GOOGLE MAPS)

PROFILE WITHOUT STATION



PROFILE WITH STATION



GUANGZHOU

POPULATION: 12 MIL (2010)

TYPE: DIRECT SERVICE
TRUNK WIDTH: 9 M
STATION SIZE: 4 X 55 M (LATERAL STATIONS)

WHOLE STREET PROFILE WIDTH: 90M

PASSENGERS / DAY: 843,000
AVERAGE DISTANCE BTW. STATIONS: 0.88 KM
TOTAL BRT SYSTEM LENGTH: 273 KM
AVERAGE SPEED CENTRE: 17 - 19 KM/H

(SOURCE: ITDP)

(SOURCE: GOOGLE MAPS)