A STUDY ON THE DETERMINANTS OF INDUSTRIAL LOCATION THE CASE OF WESTERN PROVINCE OF SRI LANKA

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Master of Science

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Dissertation submitted in partial fulfillment of the requirements for the degree
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DECLARATION

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I certify herewith that M.M. Chandima Swarnamali Wijayaratne, Index Number: 108975 F of the Masters in Town & Country Planning 2010/2012 Group has prepared this research project under my supervision.

……	……
Signature of the of Principal Supervisor	Head of the Department Town & Country Planning
Date …….	Date …….

ACKNOWLEDGEMENT

First and for most, I would like to express my deepest gratitude to my supervisor, ***Mrs. Malani Herath***, Senior Lecturer, Department of Town and Country Planning, Faculty of Architecture, University of Moratuwa for offering me a inspiring guidance, constructive discussion, suggestions and numerous support during this period.

I am very much grateful to ***Dr. Jagath Munasinghe*** Former Head, Department of Town and Country Planning, Faculty of Architecture, University of Moratuwa, for offering me valuable advices, suggestions and the precious guidance and productive discussions to complete this study.

I am grateful to ***Professor P.K.S.Mahanama***, Former Dean of the Faculty of Architecture of Moratuwa University for providing his important Advices and encouragement.

I also thankful to the Head of the Department, other academic and non academic staff of the Department of Town and Country Planning, Faculty of Architecture, University of Moratuwa, who helped me during this period.

I am thankful to all the representatives of related organizations and the large scale industries in Colombo for offering their fullest support to make this research success.

Finally, I would like to express my especial acknowledgement to my husband and all my colleagues, who contributed in numerous ways to make my study success.

ABSTRACT

The selection of a location for a manufacturing plant is a foremost decision which has to be made by an industry. This decision is influenced by numerous location determinants such as raw materials, transport labor, utility and infrastructure, etc. Elevated magnitudes of the exerting powers and the collective effects of different location determinants in a particular locality create economic agglomeration and it generates numerous positive and some negative externalities in their economies. Even if the number is less, the influences are more awful with the negative externalities. Western Province of Sri Lanka is also experiencing this.

Therefore, any plan introduce to the region should crop up with effective planning activities to achieve the expected industrial development. At present, a development project named "Western Region Megapolis Project" (WRMPP) which hopes to complete in 2030 and estimated to spend 40 billion US$, is at the planning stage. With this, two industrial cities will be developed in Horana and Meeerigama. Thus, it is very much important to find the major location determinants and to investigate whether this project is compatible with them, at this planning stage of it.

Hence, this study was carried out to diagnose the major determinants of industrial location in the Western Province of Sri Lanka and then to investigate whether the WRMPP is compatible with those. For that, the district of Colombo which shows the highest industrial agglomeration was selected as the case study area. Considering different types of industries, disproportionate stratified sampling method was used to select the sample. After reviewing the literature, a number of determinants were identified and a questionnaire was prepared by including those. Questionnaire and Key Informant Interviews were used to collect the primary data from the representatives of the selected industries and the relevant organizations. A Frequency Distribution Analysis was conducted to identify the key determinants of industrial location. Then a context analysis was conducted to investigate the compatibility of the project with those major location determinants.

According to the results; utilities/ infrastructure, market, transportation and quality of life were identified as the major determinants. Existing and the planned developments for the two industrial cities at Horana and Meerigama under the WRMPP were considerably compatible with most of the sub factors of the major location determinants, but according to the available facts, some factors belong to utilities/ infrastructure such as the attitudes of the utility agents and the cost of fuel, some factors belong to transportation such as water way transportation in the industrial area and some sub factors belong to the marketing facilities such as income trends, consumer characteristics, location of competitors, etc. have not been considered. Therefore, it is impossible to state that the WRMPP is highly compatible with the major location determinants of the industries in the Western Region of Sri Lanka. To obtain more precise results, further studies should be carried out by increasing the sample size and the number of determinants or by sub dividing the major determinants and also assessing the compatibility of the WRMPP after completing the project.

Keywords: Industrial location determinants, Western Region Megapolis Project, Industrial city.

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CHAPTER – 01

INTRODUCTION

1.1 Background of the Study

Along with the industrialization, the activities related to the industrial development have started to play a predominant role in the global economy. Industrial sector is defined by the United Nations as the secondary sector of an economy consisting with four broader categories such as mining, manufacturing, construction and utilities. It is believed that there has been a significant growth of manufacturing sector within the process of industrialization (Szirmai, 2009). According to Peter (2006) with the industrial revolution, in the eighteenth and nineteenth centuries, technological and economical progress continued with an increasing adoption of the large-scale manufacture in the factories and spatially concentrated in certain locations.

The selection of a location for a manufacturing plant is a foremost decision which has to be made by an industry. Also a major consideration is paid on that by the cities and the communities who are seeking economic development. On the other hand, understanding the forces of location in particular localities is very important for the decision makers of the firms to select the appropriate site for an anticipated new facility or expansion. Additionally, it is important for the communities to diagnose the type of industry which can and should be attracted to yield the maximum benefit to the community from given sources and for the authorized persons to devote estate resources to area development as efficiently as possible, because capital facilities of industrial firms are most commonly immobile after their initial location has been chosen. As well as it is vital for the planning agencies to produce industrial zones, zoning laws and local tax benefits for and to enhance the economic development of the region or the country (Latham, 2012).

The location choice of a firm is a set of strategies that it uses to acquire a maximum profit. The optimum location may offer a competitive advantage to it (Fedderke and Wollnik, 2007). A very wide range of factors may potentially influence firms in deciding the location site. Location and the distribution of economic activities received a remarkable attention from very early stages and a great deal of attention was paid on the critical factors of industrial location by the scholars over the last century (Jungthirapanich and Benjamin, 1995 cited in MacCarthy and Atthirawong, 2003). Prior to the Second World War, conservative views identified transport, raw materials, labor and market as the predominant location determinants of industries. However, the recent studies signify that, though the traditional factors are still vital, their dominancy has been reduced due to the identification of the influence of the other factors like education, quality of life, government policies, taxes, etc. (Blair and Premus, 1987)

In view of spatial evolution of the industrial development in Sri Lanka, Rasanayagam (1972) expressed that, even during the colonization period, most of the industries have shown a tendency to locate closer to Colombo. This drift was continued with the time and even today it is obvious. Distribution of the industries among the regions of the country provides the evidences for that (Figure: 1.1.1.). There, the highest concentration of industries can be found in Colombo district and then Gampaha and Kalutara districts respectively, which are the three districts; belong to the Western Province of Sri Lanka. Accordingly, a significant difference in agglomeration of manufacturing industries is visible in the Western Region, compare to the other regions of the country. The percentage of industries (Establishments with 25 or more persons engaged in) in the western province is 94% in year 2012 (Department of Census & Statistic, 2014) and thus the percentage of GDP contribution by the western province is 45% (Economic Data 2014, Central Bank of Sri Lanka).

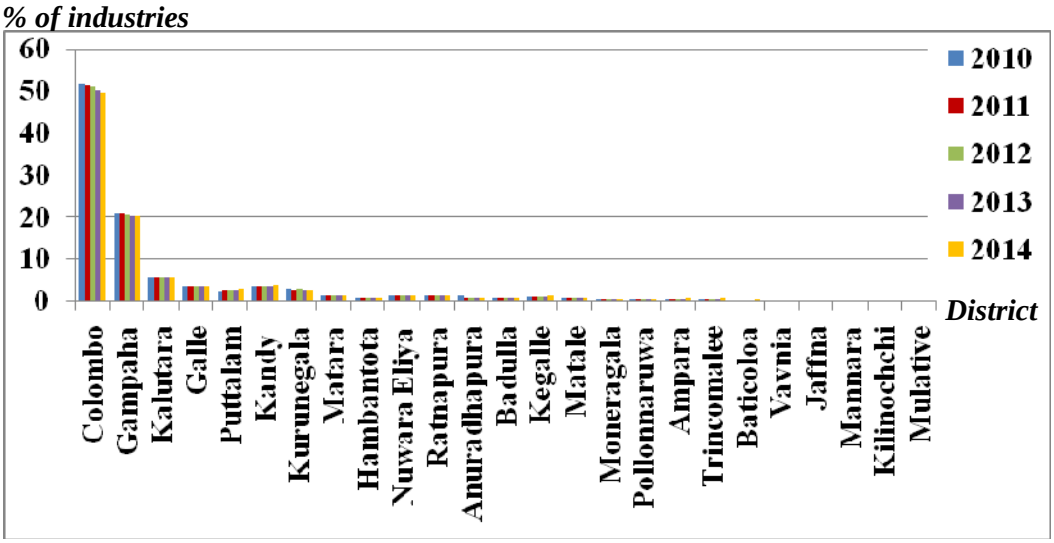

Figure: 1.1.1. District wise distribution of the industrial enterprises - 2014
Source: Annual Report – 2014 - Central Bank of Sri Lanka.

1.2. Research Problem

Ileperuma (2000) stated that, Sri Lanka has undergone a rapid industrialization since early 1980's and with that air and water pollutions have become serious problems in Colombo. Kelani River which flows via the Western Region is highly polluted with the industrial effluents. As well as congestion, traffic problems, overcrowding, etc. are resulted as the other problems of the agglomeration.

Though, different regional plans have being introduced time to time, to regulate the development of the Western Region, they have not much contributed to standardize the spatial development of the industries. Hence, the lack of planning involvement in industrial development has created social, economic, physical, environmental and institutional problems in Colombo (Waidyasekera, 2000).

Thus, the development plan introduced to the Western Region should inevitably concern about the required spatial developments regarding the industries. A substantial attention paying for the crucial requirements or in other wards the key

location determinants of the industries will assist a more effective planning process. Recent times, the government is going to develop Sri Lanka into a high income developed country with spatial alterations of the urban agglomerations in the Western Region and structural alterations of the whole National Economy, by introducing the Western Region Megapolis Project (WRMPP). Cost of the project is 40 billion US$ according to the estimations. On the other hand, there is a shortage of studies conducted on the location factors of the industries in the Sri Lankan context. Hence, it is very vital to identify the major determinants which influenced the location of existing industries in the Western Region, and the compatibility of the project with the determinants of industrial location, at this planning stage of the WRMPP. That will help to make the necessary amendments if required, to achieve the optimum economic development with the maximum satisfaction of the industrial sector with amplifications of the future establishment opportunities too.

1.3. Objectives of the Study

This study was carried out with the following objectives.

1. To identify the determinants of industrial location in the global context
2. To discover the major determinants of industrial location in theWestern Province of Sri Lanka
3. To identify the development activities which are planned to put into practice in Horana and Meerigama industrial cities planned under the WRMPP, relevant to the major location factors of industries in the western region
4. To investigate the compatibility of the developments of two industrial cities with the major location determinants of industries in the Western Region of Sri Lanka

1.4. Method of the Study

This research was carried out as a case study and it was conducted as a qualitative study. According to the objectives, to identify the determinants of industrial location in the global context, a literature survey was conducted. The District of Colombo in Sri Lanka was selected as the case study area to identify the determinants of industrial location in the Western Region. Colombo was selected as the case study area. Disproportionate Random Stratified Sampling was used as the sampling method to choose the sample. As well as the large scale industries (Industries consists with 200 or more employees were considered as Large Scale Industries according to the classification of the department of Senses and Statistics, Sri Lanka) were considered for the sample preparation.

Subsequently, with a questionnaire (Appendix A) and key informant interviews, primary data were collected from 75 representatives of the large scale industries in the area. The collected data were analyzed by using the frequency distribution analysis to identify the major industrial location determinants of the Western Province in Sri Lanka. Afterward, secondary data were collected from the related institutions, to find the development activities which are planned to put into practice in two industrial cities, under the WRMPP, relevant to the major location factors. Lastly, a context analysis was carried out to investigate the compatibility of those two selected locations with the major location determinants of industries in the Western Region of Sri Lanka.

1.5. Scope and Limitations of the study

- **Literature;** a limited number of journal articles, eBooks, theses, etc. were reviewed as literature during the study, due to time and accessibility constraints.
- **Sample;** sample size of the research is small.

- **Time;** reason for all most all the above constraints, is the time limitation.
- **Ethical Considerations;** number of questionnaires which could be collected and the interviews which could be conducted were limited due to this.
- **Subjectivity;** outcome of the study depends on the views and ideas of the respondents and the interpreter.

1.6. Framework of the Study

According to the aim, the study was planned to conduct as shown in figure 1.5.1.

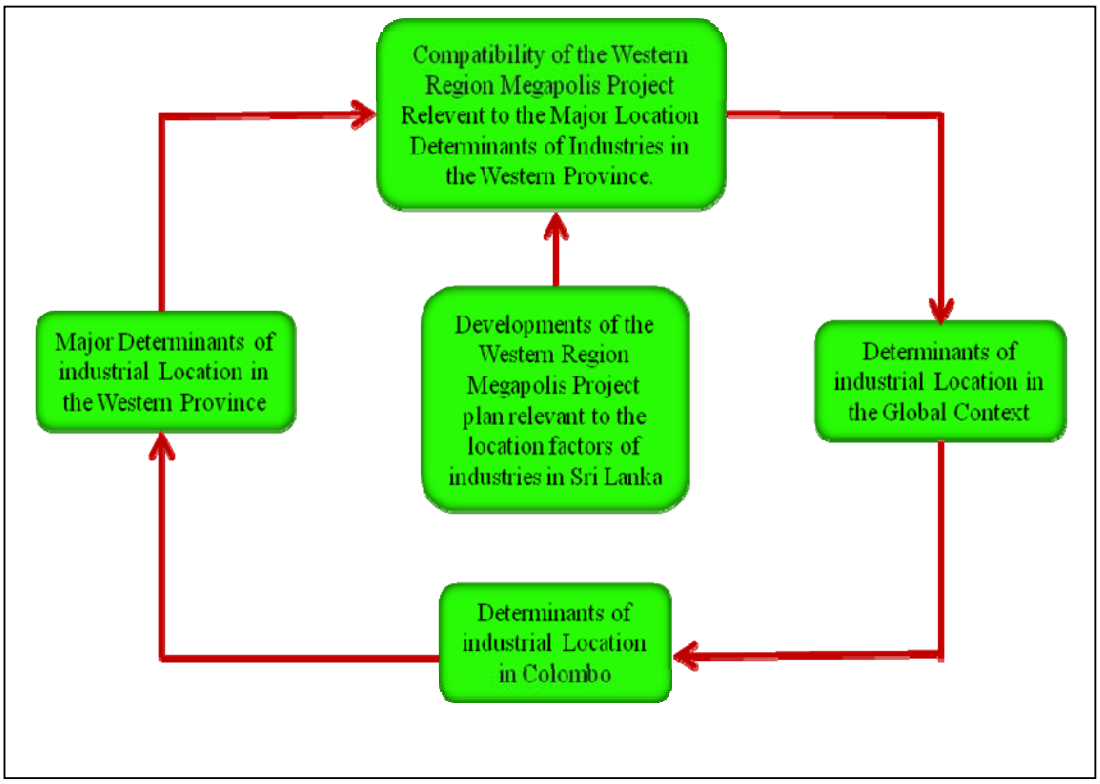

Figure: 3.5.1.: Framework of the Study
Source: Author

1.7. Flow of the study

Different steps of the process of the study are illustrated in figure 3.9.1.

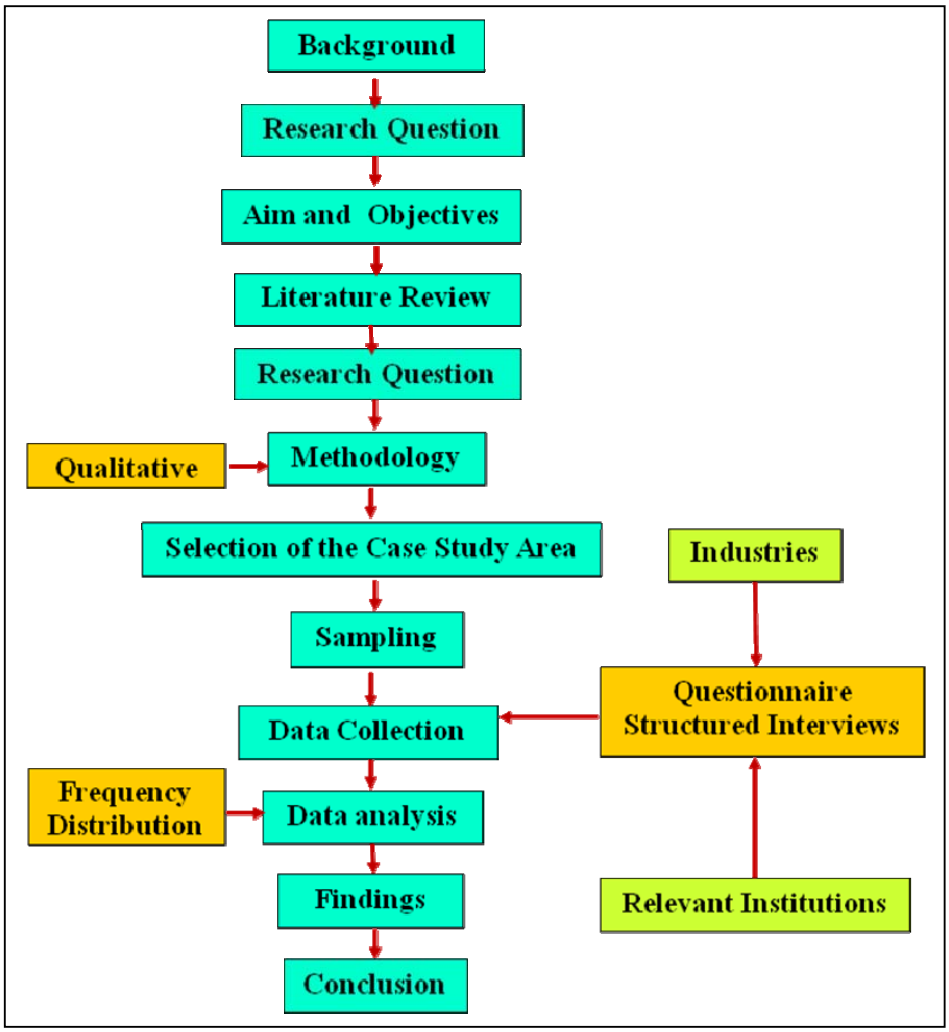

Figure: 3.9.1.: Flow of the study
Source: Author

1.8. Summary

A larger number of industrial location determinants have been identified under the global context. However, under the Sri Lankan context, there is a lack of studies conducted on this. Western Province of Sri Lanka demonstrates the highest industrial concentration and number of environmental problems caused with that. This implies that the regional development plans which have been introduced to the region, have not adequately considered about an appropriate spatial development regarding the industries. Presently, the government is going to another regional plan called WRMPP. Still it is at the planning stage.

Therefore, this study was conducted to identify the major location determinants of the industries in the Western Province and the compatibility of the WRMPP with those location determinants. Accordingly, the objectives were formulated. Then the most appropriate methodology to conduct the study was selected. Also the scope and limitations of the study, the framework and the different steps of the study were formulated. Thus, those are discussed in this chapter and the next chapter will explore the literature reviewed to find the location determinants for the study.

CHAPTER – 02

LITERATURE REVIEW

2.1. Introduction

Earlier chapter illustrated the background, research problem, objectives, method, scope and limitations, framework and the flow of the study. Accordingly, to achieve the first objective, previous studies were reviewed. Different researches have been conducted to identify the factors affecting the location of industries in different parts of the world and those are explained by the next segments of this chapter.

2.2. Factors Considered in the Conventional Theories of Industrial Location

Different location theories have attempted to explain the process of locating and distributing of economic activities over the space. Introduction of those theories have been started in early 18th century. Some of the theories which were introduced during the initial stage, a considerable attention have been paid towards the factors affecting the cost of production. Consequently, the influence of transportation costs and proximity to raw materials as well as markets were included into cost minimizing theories. Finally, the concepts of competition, profit maximization and personal factors, etc. were incorporated to modern location theories (Jones and Woods, 2002).

2.2.1. Von Thünen's Theory

According to O'Kelly and Bryan (1996) one of the earliest theories regarding the location of industries was introduced by Johann Heinrich von Thünen who was both a farmer and a scholar, in 1826 by analyzing the land rent and use around an isolated city. Thünen used the least cost approach for selecting the location. His aim was to maximize the agricultural profit. Hence, more concern was given on the factors which affect on agricultural prices such as land uses and distance. He explained the influence of transportation cost on the location of crop production by assuming that all the other factors are constant. According to him, the distance from the central market place was the major determinant of land use. As distance increased from the center, transportation costs increased and land rent or the land prices decreased. Thus, concentric rings, each dominated by a separate economic activity were created around the city center by him.

Still the validity of the theory has not been declined, because even today modern cities consist with different zones for different economic activities and the land rent or the land prices spanning out from the market centers. However, at present the location of firms is affected by many more factors than Thünen concerned.

2.2.2. Weber's Theory

The next famous and a major location theory has come out in 1909. He considered mainly about manufacturing. According to Tellier and Vertefeuille (1995) many location studies have used the Weberian theory for better understanding of the decision making process. In his theory, Weber argued that industries select a location based on minimization of raw material cost, transport cost and labor cost (Barthwal, 2007).

(Weber, 1909) divided the raw materials into three categories, as weight losing, pure and ubiquitous. Weight losing materials are the materials which decreases their weight considerably after processing. Therefore, the transportation cost of finish goods is lesser than that for the unprocessed materials. In this situation plant tend to locate closer to the source of raw material than to the market. Sugar cane factories are an example for this. Pure materials do not reduce their weight considerably during the processing. Therefore, the plant location is not affected by the location of raw material or the market. Rubber and cloth factories are examples for this. Ubiquitous materials are the materials which can be found in everywhere. Sand and water are examples for this. There the plant tends to locate closer to the market or market oriented. Beverage plants are examples for this.

According to Weber (1909) industry locates at the point where the total transport cost per unit output is minimized and according to him, transport cost consists with two major parts such as weight to be transported and the distance. He expressed an index called "Material Index" (MI). When the MI is lesser than 1; industry locate closer to the market and when the MI is greater than 1; industry is oriented towards the raw material source.

$$\text{Material Index (MI)} = \frac{\text{Weight of the raw materials}}{\text{Weight of finish products}}$$

Weber (1909) pointed out that, companies tend to find the locations where having cheap labor, if the price of labor justifies the higher transportation cost. However, in his theory a number of assumptions have been made by Weber, such as firms seek to maximize profits with respect to costs, prices are perfectly competitive, transport rates are homogenous and the cost of transportation consists only with two components such as weight and distance. According to him, there is a defined buying center and a demand and raw materials source are at fixed locations. As well as, he has not considered about the variations in demand at different locations. Freight rates are also not always directly proportionate to distance and it is not usually same on finished products and raw materials as he assumed. Regarding the labor cost, Weber (1909) argued that this may vary spatially, but labor can migrate

and not always available in unlimited quantity at a particular location. Also large manufacturing industries do not use one single raw material and do not produce one single product. They may use number of raw materials and may produce a number of products. Further, most industries tend to find the location where they can maximize the profit rather than minimizing the cost. Though there considerable number of drawbacks in Weber's Theory, it is considered as the leading theory of industrial location.

2.2.3 Additions of the Conventional Industrial Location Theories

In 1929, Harold Hotelling also stated that industries tend to locate toward the center of the market area rather than disperse. He introduced the idea of competition in location decisions. Lerner and Singar (1937) also carried out their studies based on Hotelling's opinion, but they disagreed with the idea of that, "producers always tend to cluster together". According to Lerner and Singar (1937) three factors involve in determining the location of firms such as the size of the market, the cost of transportation, and the price buyers are willing to pay for a delivered commodity.

Hoover (1948) tried to promulgate the least cost theory of Location as Weber and he attempted to overcome some of the weaknesses of Weber's theory. He expressed that the factors of production, land, labor and capital are not totally movable or dividable. According to him, the producer will seek to minimize processing costs comparing weight loss with transfer costs. Hoover (1948) also stated that, industrial Location is determined by the production and transport costs, because the price paid by the consumer for the product of the firm is a sum of those two.

Lösch (1939) considered about the market area and argued that an industry will select the market area that offers the maximum profit. That was called the Central Place Theory. There are some assumptions in his argument such as homogeneous distribution of raw materials, equal costs of transportation and an even distribution

of population. This implies his negligence of spatial cost variations. Therefore, there were some main negative aspect too, though he considered about an opposite aspect when compare with Weber.

However, "the common assumption of all the early theories is that firms will select a location which maximizes profit or minimizes cost" (Epping, 2006). Blair and Premus (1987) pointed out that, most of these theories have been introduced even before the Second World War and the dominancy of the factors which have been identified in those theories was decreased to a certain extent, after identification of the other factors of industrial location with the time. Though, the new factors immerged, the importance of the early conservative factors such as raw materials, market, labor and transportation is still remaining.

2.3. Industrial Location Factors Considered in Industrial Location Theories and the empirical Studies

Even though the factors considered in earlier industrial location theories are still important, those are not sufficient to explain the location decisions of modern industries. Hence, the Modern Location Theories were developed. As well as empirical studies have identified some more factors which act as determinants of industrial location (Jones and Woods, 2002).

Introducing the Maximum Profit Location Theory**,** Greenhut (1959) considered transportation as a major determinant of plant location and he pointed out that it should be distinguished from other factors without confusing. According to him, when transportation cost varies in a significant manner at different locations, entrepreneurs tend to economize on transportation if freight costs consist of a large part of total cost. Also Greenhut (1959) considered several factors which affect the location of industries such as cost factors of location (transportation, labor and processing costs), demand factors of location (location interdependence of firms or attempts to monopolies certain market segments), cost reducing factors, revenue

increasing factors, personal cost reducing factors, personal revenue increasing factors and purely personal consideration.

Renner (1947) introduced a Factor Oriented Location Theory. He identified six factors such as capital, transport, raw material, market power and labor. According to him these factors directly influence the industrial location, but the impact of each factor is different and the relative importance of each of the factors, depending upon the characteristics of the industry (Ramachandran, 1986).

According to Jones and Woods (2002) the Location Factors Approach was first introduced by Fredrich Hall when he included his "List of Location Factors" in the Census of Manufacturers in 1900. Thereafter, different factors were evaluated and added. The next segments of this chapter describe the different industrial location determinants described in location theories and the empirical studies.

2.3.1. Raw Materials

Raw Material was considered in early location theories too. The regional differences in the processing cost such as labor and power act as the major determinant of some industries, but the other firms are established between the raw material source and the market. Factories that significantly reduce the bulk of the raw materials during the processing minimize their total costs by locating near the raw material source. Sugar factories, cheese factories, sawmill, and canneries are some examples for them (Harris, 1954). This shows a similarity to Weber's idea. Weber (1909) explained about three types of raw materials, but Harris (1954) considered only about the weight losing raw materials. However, Renner (1947) considered about the perishable and condensable materials and pointed out that, with those materials, industries tend to locate closer to the raw material source.

Considering light industries such as electronic industries, Jones and Woods (2002) expressed that the raw materials are less important than labor and market. Badri

(2007) pointed out that proximity to supplies, availability of raw materials, nearness to component parts, availability of storage facilities for raw materials and components, location of suppliers and freight cost have been found as the factors which can influence the location determinants of industries under the determinant of raw material.

However, according to Jones and Woods (2002) in recent years, raw materials have become less important than labor and market, in attracting industry to a particular site. This is because most industrial growth has been in light industry such as electronics and in service industries. Moreover, modern efficient transportation systems have increased the feasibility of transporting raw materials over longer distances.

2.3.2. Transportation

Weber (1909), Laundhardt (1885) and Hoover (1937) explained the influence of transportation cost by paying a considerable attention in their theories. According to Greenhut (1959) transport cost varies significantly at different locations only when the freight cost consists with a larger portion of total cost. Krugman, (1991), Fujita et al. (1996), Fujita et al. (2002) stated that especially the transport costs still take a vital role in the new economic literatures as they link it to the spatial differences in goods price index that represents the impact of agglomeration economies.

Berwick et al. (2002) also pointed out that the industries locate where the cost of supplying raw materials and distributing produce are minimized. So when choosing a location, companies consider about the existence and the proximity to highways, rail tracks, trucking facilities, air service and water systems . Blair and Premus (1999) stated that the Industries more sensitive to transport cost, but the other cost factors such as wages, energy, etc. should be considered. According to them, if the

wages are low in a particular site and the low wages could offset extra transportation cost associate with that particular site, then the firm will select the law wage site. In United States, the truck transportation development has had a revolutionary impact on transport costs and the pattern and the industries have been decentralized as a result of it. Coughlin et al. (1990) and Smith and Florida (1994) found that the creation of more industrial establishments in every rural town with the introduction of the National Interstate Highway System in America.

Guimarães et al. (1998) identified a negative correlation between manufacturing activity and distance to highways. According to Coughlin and Segev (2000) road infrastructure is the key to attract local manufacturing plants. All of those findings reasonably support the positive of role of infrastructure to the new formation of plants. These provide evidences for the existence of transportation as a determinant of industrial location even at present. However, the quality and dependability of transportation services are sometimes more important in the location of industry than achieving lowest possible transportation costs. As well as the importance of mode of transportation may change with the time and the situation.

Badri (2007) identified pipeline facilities, airway facilities, highway facilities, railroad facilities, trucking services, waterway transportation, shipping cost of raw material, cost of finished goods transportation, availability of postal services, warehousing and storage facilities and availability of wholesale outlets as the critical sub factors belong to transportation which influence the location determinants of industries.

2.3.3. Market

According to Nagpal (2013) market is a place where finished products finally go. Some industries are more likely to be located near markets; examples for these are fragile products, perishable products, bulky and low value products and the products which need to Keep close contact with consumers. However today with high tech equipments, infrastructural facilities, etc. influence of this factor can be changed.

Market also included into the traditional determinants of industrial location, but the importance is highlighted in recent studies too. As mentioned earlier, Renner (1947) introducing his factor oriented location theory identified market as a determinant of industrial location. Kieschnick (1981) conducted a mail survey by using a sample which consisting with new firms and firms seeking sites for expansion, to identify the factors that are important in determining the location of industries. Accesses to the present customers and to the growing market were found among the highest important factors when deciding the location of new firms. Premus (1982) carried out a survey for 691 high tech company executives. Those executives too had considered the market as an important determinant.

Brennan et al. (2011) explained about two types of markets such as consumer and industrial and according to them, consumer markets tend to locate in highly populated areas and industrial markets tend to locate in manufacturing centers. As explained by Blair and Premus (1987); an empirical study has been conducted by Morgan (1963) to identify the determinant factors of industrial location. According to the findings; markets had become the primary significant factor, which decide the firm location. Those findings obtained are summarized in table 2.3.3.1.

Table2.4.3.1. Relative Importance of Location Factors

Relative Importance of Location Factors in 17 Surveys

Factor	*Number of surveys in which a factor was described as of:* Primary Significance	Some Significance	Little Significance
Markets	16	1	0
Labor	10	7	0
Raw Materials	10	6	0
Transportation	7	10	0
Taxes	1	3	13
Financial Incentives	0	0	13

SOURCE: Table 2, "The Effects of State and Local Tax and Financial Inducements on Industrial Location," Morgan, W. unpublished Ph.D. dissertation, University of Colorado, 1964.

Source – Major factors in industrial location (Blair and Premus, 1987).

In United States, industries have been concentrated into the areas having comparatively higher population density. "Initially, market oriented industries were concentrated in the Northeast and the Atlantic seaboard. As the population center of the United States shifted westward, manufacturing followed" (Jones and Woods, 2002). However, the consumer markets tend to locate in comparatively highly populated areas, while the industrial markets tend to locate at the centers of manufacturing a specific product.

Lindsey et al. (1995) and Young (1994) suggested that the international markets have become more open as a consequence of a reduction in local trade barriers. They suggested that the "increased openness is likely to have deep implications for location decisions".

Existing consumer market, existing producer market, potential consumer market, anticipation of growth of markets, shipping costs to market areas, marketing services, favorable competitive position, income trends, population trends, consumer characteristics, location of competitors, future expansion opportunities, size of

Market and nearness to related industries have been recognized as the critical sub factors related to the market (Badri, 2007).

2.3.4. Labor

Total number of employee man-days worked and their salaries or wages are considered as labor. Availability of skilled or unskilled man power is important for labor oriented industries. For high tech industries technically qualified labor is exceedingly important (Lall and Chakravorty, 2005). As the components of labor low cost labor, attitude of workers, managerial labor, skilled labor, wage rates, unskilled labor, unions, educational level of labor, dependability of labor, availability of male labor, availability of female labor, cost of living and worker stability have been recognized (Badri, 2007).

MacCarthy and Atthirawong (2003) conducted a study to identify the critical determinants of industrial location in international level. According to that, the largest number of the panelists identified the major motivation for manufacturing outside national borders as the ability to gain access to low labor costs and to access labor skills in order to reduce the cost of production. It is shown in figure: 2.3.4.1.

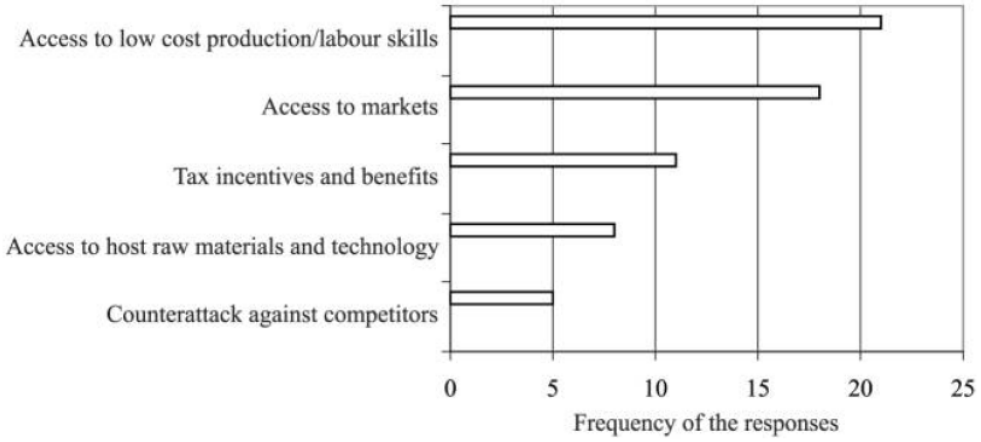

Figure2.3.4.1. Determinants of international industrial location
Source: Factors affecting location decisions in international operations
(MacCarthy and Atthirawong, 2003)

Bartic (1983) stated that increasing unionization of the labors decreases the number of locations of industries. In contrast, the supply of labor is a major requirement of most of the manufacturing industries, because they consider about the adequate supply of required type of labor. As well as, by locating in an area with an existing labor pool, the employer also gets the other indispensable amenities such as housing, schools and community services. Not only the wages but also the labor attitude, turnover rates, fringe benefits, absenteeism and competition from other employers should be considered by the employers when making an effective industrial location decision.

2.3.5. Personal Preferences

According to Fujita (2005) human beings are social animals and there are interactions among individuals and they prefer that. So the investors also have a desire to locate their new industries or relocate existing industries in industrial clusters. Bass et al. (1977) stated that even personal reasons may dictate where a plant should be located in abroad. So the personal factors have become a vital determinant in industrial location decisions at present.

An investor's home bias in industrial location decisions may curtail from personal factors. Home matters for variety of reasons. The investors have everything they need in the surrounding. Also, the personal ties and friendships attach investors to their existing business localities (Figueiredo et al., 2002).

When selecting an appropriate location by an industry, detail analyses are conducted on the factors contributing to production requirements and also on the characteristics of a community as a place to live and work. The influences of personal factors are higher when the owner or the employer is personally involved in selecting the plant location Mueller and Morgan (1962). Carrier and Shriver (1968) analyzed the

factors influencing plant location decisions of large corporations. They concluded that most location decisions were based on cost and profit considerations with extraordinary attention being directed toward intangible personal factors and characteristics of the site.

2.3.6. Community

Blair and Premus (1987) stated that community attitudes toward business are important determinants of present industrial location. Attributes of the community have more weight given today's industrial organizations and corporate structures than earlier. Attitude of community residents, quality of schools, religious facilities, library facilities, recreational facilities, attitude of community leaders, medical facilities, shopping centers, hotels and motels, banks and credit institutions and community position of future expansion were found as the sub factors which come under the determinant of community.

According to Dziembowska-Kowalska and Funk (2000) and Galan and Gonzalez-Benito (2006) "cities and regions are competing to attract foreign direct investment and creative talents". Therefore, the socio-cultural factors, diversified cultural offerings, quality of life and life style also affect the location decisions. Culture has become an important soft location factor and a key factor for enhancing the local and regional attractiveness.

In 1977, McGregor and Walters identified area reputation as a main determinant of industrial location. Especially, the larger industries which are seeking a location may need to consider the attitudes of the managers and the workers, because they are the people who are going to live and work in the selected location. Further, these considerations go well beyond the operation of the plant and include all those community factors that affect the lifestyles of the plant operators and their families. On the other hand, industries tend to locate in the areas where having a comparatively higher population that have a greater demand for finish products and

a greater supply of labor for production (McGregor and Walters, 1977 cited in Badri, 2007)

2.3.7. Utilities and Infrastructure

Badri (2007) pointed out that, at the present time, quality and reliability of utilities are very much important to establish and to carry out the activities of an industry. They can be listed as; attitude of utility agents, water supply, disposable facilities of industrial waste, availability of fuels, cost of fuels, availability of electric power, cost of electric power and availability of gas, medical facilities, shopping centers, hotels banks and credit institutions, colleges and research institutions, etc. when the transportation is taken out as a separate factor.

Blair and Premus (1987) compared high tech and other industries. According to them, high tech industries concern more about the availability of utility and infrastructure. Further they stated that, with the time and the locality the level of impotence may vary. As an example, earlier industries showed a tendency to located closer to the power source, but nowadays, there are cables carrying electricity power even to a distance location, so it is not essential to locate closer to the power source.

Krugman (1998) introduced a model and stated that the public infrastructure has a complex role in regional development in as much as its effects are sensitive to factors like population density and geography that may affect the process of industrial agglomeration and the efficiency of investment. According to Martin and Rogers (1995) poor infrastructure imposes cost on trade within and between countries. Better infrastructure in a particular locality implies comparatively lower prices and higher demands for the good produced in the industries located in that area. So, the industries tend to locate in the regions where having good infrastructural facilities. Further, when industries are agglomerated in such areas, the tax revenues increased and due to that the possibility of improving the infrastructure increases.

Also in China, infrastructure investment as a whole has a significant positive effect on productivity among the provinces. The difference in infrastructure availability (only including transportation network, electricity generating capacity and telephone) accounts for around 31 percent of the regional variation in output per worker during the period of 1986–1997 and 9.5 percent from 1998 to 2003. There, the effect of infrastructure investment has shown sensitivity to geographic location and demographic change (Yumei et al., 2013).

2.3.8. Tax incentives

Many states and local governments offer tax incentives in order to motivate the business growth and then to create number of job opportunities (Gabe and Kraybill, 2002). Offering of tax incentives is mainly influence on the Foreign Direct Investments (FDI) of a country. The majority of tax incentives granted by developing countries relate to investment in manufacture, exploration and extraction of mineral reserves, promotion of export, tourism and leisure sector (Maffini et al., 2006).

Ballance (1987) analyzed the effect of incentives in location decisions and identified that the cash grants, tax holidays, low interest loans and accelerated depreciation can make a considerable impact on the location decisions of firms.

2.3.9. Quality of Life

In people intensive organizations; economic success depends on the work force of those organizations. The ideas and skilled workforce are the main assets of them rather than the inventories and capital equipments. Therefore, if an industry selects a site, which meets the socio-psychological needs of the workforce, the workers will be ready to meet the targets of it (Scanlan and Lewthwaite, 1986). This reasoning

was also supported by Dalton and Todor (1993) who asserted that the quality of employees' lives has a direct impact on absenteeism, loyalty, turnover, productivity, and health-care costs.

Kieschnick (1981) conducted a mail survey by using a sample which consisting with new firms and firms seeking sites for expansion, to identify the factors that are important in determining the industrial location. Quality of life was highly considered in the location decisions of new industries. Industry week survey (1984) carried out with 1000 executives of various businesses and recognized the quality of life and education as important determinants of industrial location.

Premus (1982) carried out a survey for 691 high tech company executives. According to the findings, quality of life factors were more important for the high tech company executives when making firm location decisions.

2.3.10. Government intervention

The international literature on industrial location comes from empirical studies and works developing theoretical concepts. According to both categories, realizing the reactions of host governments is very important for the long term investors in foreign countries (Premus, 1968). Ballance (1987) analyzed the effect of incentives in location decisions. The study provides information on such incentives as cash grants, tax holidays, low interest loans and accelerated depreciation. He noted that firms expecting only the financial advantages of locating in these areas have a propensity to suffer from negative consequences. The same views are reflected in an article in the Economist in 1979, which recommend the consideration of political and social issues too when selecting a site for an industrial location.

Carod (2005) studied the main determinants of industrial location processes by giving attention to the location of new industrial establishments, at the regional level

in Span. The results showed that the characteristics of a municipality strongly affect the location decisions of industrial establishments and these decisions depend on the sector and the size of the firm. Cheng and Kwan (2000) estimated the effects of the determinants of foreign direct investment (FDI) in 29 Chinese regions from 1985 to 1995. They found that large regional market, good infrastructure, and preferential policy have a positive effect but wage cost has a negative effect on FDI in site selection.

MacCarthy and Atthirawong (2003) identified the factors that may influence international location by analyzing the existing literature. They identified the top five major factors that may strongly influence the international location decisions. Those were costs, infrastructure, labor characteristics, government and political factors and economic factors. As well as, they studied the international location decisions and identified government and political factors as an important determinant in international location decision making. According to Badri (2007) in 1977, McGregor and Walters identified the factors that had guided management's decision to invest abroad. The main determinants identified in that study were the nature of the host government and its policies.

According to the analysis carried out with the existing literature, nature of the host government and its policies, building regulations, land use zoning, compensation laws, insurance laws, safety inspection and pollution laws were identified as the main determinants of industrial location which belong to the attributes of the government and affect on the location of industrial activities (Bass, McGregor and Walters, 1977, cited in Badri 2007). Government of the Philippines (1999) expressed that "industrial policy has affected the rate of growth, the sectoral composition and the location of industries in the Philippines". Schmenner (1982) identified that the government financial aid were anticipated by the companies, but was not that much important, with a survey conducted for fortune 500 companies.

However, Wasylenco (1985) expressed that, high personal income tax rates create detrimental effects on employment growth and then to the industrial location.

Carlton (1983) stated that the business policies can improve the business climate. Further, the wages are more important factors influencing the industrial location, but it can be controlled by the policies. However, Nagpal (2013) identified the role of a particular government on industrial location as illustrated in figure: 2.3.10.1.

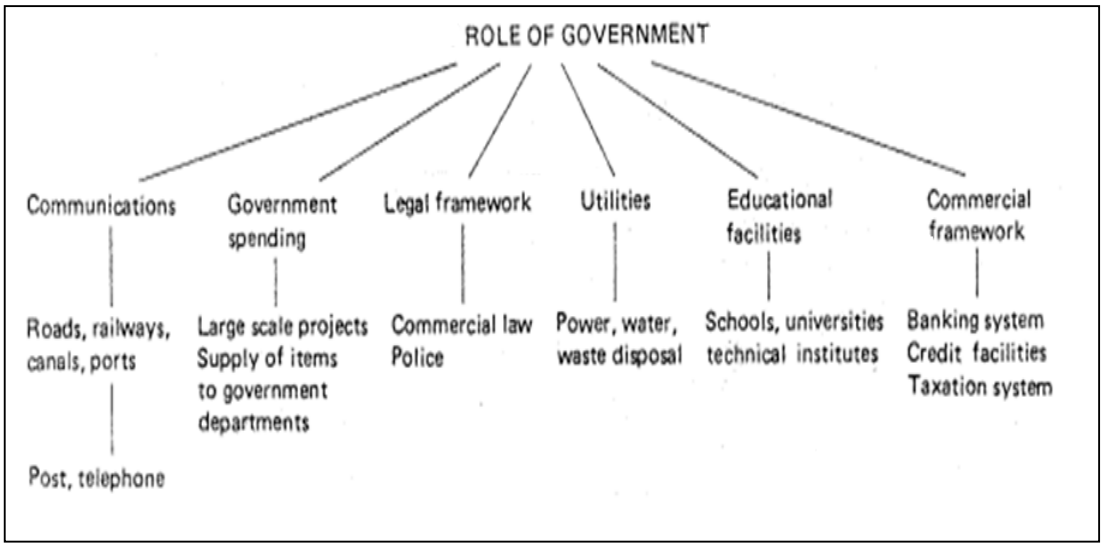

Figure: 2.3.10.1: Role of the government on industrial location
Nagpal (2013)

2.3.11. Existing Industries/ Industrial Clusters

According to Kadokawa (2011) the concept of industrial clusters has attracted substantial research in the last three decades. During this time Marshall's industrial cluster theory has been refined and rediscovered largely by economic geographers. Especially private sector investments are seen to favor existing industrial clusters, providing support for the idea that the already leading industrial regions would benefit most. So they showed that new private sector industrial investments in India are biased toward existing industrial and coastal districts (Lall and Chakravorty, 2005).

According to Jones and Woods (2002), Weber (1909) introduced an agglomeration factor that is defined as an advantage that lowers the cost of producing or marketing a product at a particular place or area. Due to this, especially, the industries which require ready access to communication, transportation and other utilities attracted to the areas where having agglomeration advantages. On the other hand, through agglomeration demand for lands are increased and with that land prices and taxes are raised. That makes again industries to decentralize. Paci and Usai, (1999) pointed out; that exchange inputs, expertise and information as the other benefits included in agglomeration.

According to Slaper and Ortuzar (2015) "developing industry clusters has become a key goal for regional economic development", because it strengthens the competitiveness by increasing productivity, stimulating innovative new partnerships, even among competitors, and presenting opportunities for entrepreneurial activity. Studies on agglomeration economies amongst firms have largely focused on the advantage of geographical proximity of industries. Hence they tend to locate as clusters (Porter, 1990; Feser, 2001; Forgarty and Garofalo, 1988; Herderson, 1986; Moomaw, 1988; Wheeler and Mody, 1992; Storper and Walker, 1989; Maskell and Malmberg, 1999; Wiig and Wood, 1997; 1987, Grossman and Helpman, 1991a; 1991b; Aghion and Howitt, 1997; Lucas, 1988, cited in Fagbohunka, 2012).

However, the rapid industry-led growth has resulted with serious environmental issues (Rock et al., 1999) and this was more enhanced and collectively affected with their agglomeration. Though there are some evidences of the negative effects of agglomeration of industries, the reporting of harmful effect to the environment is very less, since most of the countries have strict environment regulations and less environment cost when compare with the total cost of the industries (Cole, et al., 2014). Fagbohunka (1857) pointed out that, industrial agglomeration has impacted negatively on the immediate environment, in form of pollution, traffic problems, overcrowding and increase crime rate.

2.3.12. Less Stringent Environmental Regulations

Javorcik and Wei (2003) studied the determinants of actual and planned investments by 534 major multinational firms in Central and Eastern Europe and in the former Soviet Union. They found that more pollution-intensive firms are less likely to locate in more regulated countries. Broner et al. (2012) expressed the same fact by analyzing the effects of environmental regulation on international trade and found that countries with weaker environmental regulation attract more polluting industries.

Cole et al., (2004) also pointed out the same ides. According to them, pollution intensive industries relocate from high regulation countries to developing states due to less stringent environmental regulations. In 1977 Bass, McGregor and Walters identified that environment as a major determinant of industrial location in his study carried out with 118 plants in Latin America, Europe and Asia (Alon, 2014).

2.3.13. Water Availability

According to Chan (2005) for industries, water is the most commonly used natural resource. In processing it may be incorporated into the product, used for processing, steam generation, power generation, cooling and in normal sanitary uses, hence both the quality and the quantity of water supply are very important determinant for location of an industry. Regarding the quality, groundwater source is preferred to use by the industrial plants such as beverage industries. Iron and steel industry, textile industries and chemical industries require large quantities of water, for their proper functioning. Also industry releases their waste water to open water sources, such industries locate closer to rivers, canals, lakes, sea, etc.

In Indian context, Surface water is the major source used for industries (41%) ground water usage is (35%) and municipal water (24%). Availability of water is becoming a factor of major concerning for location of the industries. “Water use in

the iron and steel industry varied widely and depended on the availability of water, age and condition of plants and equipment, kinds of processes, and plant operating procedures" (Walling and Otts, 1967).

2.3.14. Land

During the initial stage, a major concern was directed towards the factors affecting the production costs when selecting a particular location for an industry. By that time land rent was considered as an important factor in the location of economic activity. As well as the characteristics of the land, especially the topography of the land is important to be considered, since it may affect on the construction costs. The cost of the land is also important and there should be enough space for future expansions. The land must be accessible, ideally flat, well drained and should have load-bearing characteristics. Sometimes a full site evaluation may need depending on the requirements. However, now a days, Land availability and developed industrial park are also major determinant of industrial location (Fox, 1980; Badri, 2007).

According to Deichmann et al. (2008) both theory and empirical evidence suggest that agglomeration benefits, market access, and infrastructure endowments in large cities offset higher land prices. Thus, many countries have tried to encourage industrial firms to locate in secondary cities or other lagging areas. Alamá-Sabater et al. (2011) stated that in Spanish NUTS 2 Region of Murcia; agglomeration economies and industrial land availability are the main forces driving location decisions of industries with estimates on the spatial component of the model showing that inter-territorial externalities or spatial effects have a remarkable influence on firms' location decisions.

2.3.15. Safety

Blair and Premus (1987) expressed that even though the early literature assumed that the industries locate where they can maximize the profit and minimize the cost, most of the owners highly concern about the safety. So, they tend to find a safe location with satisfactory profits. Accordingly, if the place generates a high profit and minimize the cost while having a high risk, it would not be selected. He explained this considering the location of both local and international industries.

Levinson (1996) studied the effects of the safety regulations, which are formulated to save the environment including the human lives of a country or a region and stated that, in some cases, trade agreements restrict domestic environmental laws. So the countries having free trade economies be bothered that, their environmental laws may act as barriers to trade and they lessen the strictness of their environmental regulations. Then, the safety of the environment and the work force are decreased. This reduces the safety but attracts more industries.

2.3.16. Climate

Climate is usually considered as the average state of weather condition prevailing in any place or area. This should be favorable for a particular industry to locate. Component parts of it includes temperature, precipitation, humidity, wind velocity, the level of ground, topography of the region, water facilities, drainage facilities and disposal of waste products. Climate is ordinarily regarded as a minor factor of location, but people often tend to give it more significance than it deserves. There are four ways of affecting climate physically on industrial location such as;

- Labor - Influence on human Efficiency and behavior
- Equipments - May be maintained in moderate climatic conditions
- Process - May be maintained in moderate climatic conditions
- Building - May need extra facilities with extreme climatic conditions

(Harada, 1964; Jain and Khanna, 2010)

2.3.17. Capital

Capital is the money that is invested to start the business. The amount of capital will determine the size and location of the factory. Considering the Indian context Chand (2015) stated that modern industries are capital-intensive and require huge investments. Capitalists are available in urban centers. Big cities like Mumbai, Kolkata, Delhi, and Chennai are big industrial centers, because the big capitalists live in these cities.

Industries require capital and some workers to produce its goods. Flow of capital occurs towards the regions having highest rate of return. "This means that a region's share of total capital is identical to the region's share of industrial firms" (Baldwin, 2005).

2.3.18. Other Factors

Some economic reasons, such as cost of operations, custom duties, tariffs, inflation, strength of currency against US dollar, business climate, country's debt, interest rates/exchange controls, GDP/GNP growth and sales growth are usually seen as dominant factors for decision making to locate an industry in abroad (Vernon, 1968, 1971;MacCarthy, and Atthirawong 2003; Belli, 1970).

Audretsch et al. (1996) proximity to schools, colleges and universities, Degryse (1996) interaction between location and taste for remote access, (Venables, 1996; Carod, 2005) type of linkage between vertically linked industries, (Braid, 1996; Mayer, 1996; Mazzarol and Choo, 2003) characteristics of population trends, Drezner and Drezner (1996) percent of market share or expected market share, Hansen and Roberts (1996) changes in the location of users, Wojan and Pulver (1995) amount of expected development potential in the region, (Mai and Hwang, 1994; Leitham et al., 2000; Mazzarol and Choo, 2003) changes in transport rates,

(Serra and ReVelle, 1994; Cieslik, 2005; Siebert, 2006), location of other competitors, (Vaughn, 1994; Chan, 2005) types and availability of resources, (Justman, 1994; Figueiredo et al. 2002) effect of changes in local demand and Groothuis and Miller (1994) hazardous waste and pollution laws too have been identified as the determinants of industrial location. According to Badri (2007) there are numerous factors affecting the location of industries depending on the situation.

However, Alexander Grant and company (1985) stated that, at present location decision of an industry has become a part of a corporate planning process. Organization of the company decides the structure of the site selection team. Generally, it consists with representatives of the key areas such as transportation, distribution, personal, Engineering, real estate, planning, etc. Then the site selection is accomplished considering all the relevant economic and non economic factors with some engineering and feasibility studies, telephone and leg works, usage of some advanced technological methods, etc. Blair and Premus (1987).

2.4. Summary

This chapter explained the theoretical and empirical findings related to the determinants of industrial location in the global context. According to the literature, there are number of location determinants and sub factors relevent to them. Though those determinants were considered separately, according to Blair and Premus (1987) they interrelate and interdependent. Also those factors can make collective influences on the location decisions of the firms. Only in some cases, one determinant may play a predominant role such as personal factors.

Industrial location determinants and the sub factors of them, identified through the literature survey were used to formulate the questionnaire to find the Industrial location determinants in the Western Province of Sri Lanka. The next chapter will explain the data collection, analysis and the findings of the study.

CHAPTER – 03

RESEARCH DESIGN

3:1. Introduction

Earlier chapter explained the location factors of the industries in the global context. This chapter draws attention to the research question, aim, objectives, research strategy, sampling method and the methodology followed when carried out the study.

3:2. Research Question

Main Question –

How Western Region Megapolis Plan is compatible with the determinants of industrial location in the Western Province of Sri Lanka?

Sub Questions –

1. What are the determinants of industrial location in the global context?
2. What are the determinants of industrial location in the Western Province of Sri Lanka?
3. How compatible is the Western Region Megapolis Plan, related to the major location determinants of the industries, located in the Western Province of Sri Lanka?

3:3. Aim of the Study

To examine of the compatibility of the WRMPP Plan related to the major location determinants of industries in the Western Region of Sri Lanka.

3:4. Objectives of the Study

1. To identify the determinants of industrial location
2. To discover the major determinants of industrial location in the Western Province of Sri Lanka
3. To identify the development activities planned for the two industrial cities under the WRMPP, relevant to the major location factors of industries in the western region
4. To investigate the compatibility of the two selected locations with the major location determinants of industries in the Western Region of Sri Lanka

3:5. Research Strategy

Among several methods, the most appropriate research method was chosen to conduct this research depending on their suitability. That will be discussed in this section with the appropriateness of them to handle the research.

Wabwoba and Ikoha (2011) described the research methodologies as a set of organizing principles or strategies regarding how data is collected and analyzed. According to Biggam (2011) several research methodologies are available to conduct a research. Therefore, a discussion on them is important to identify the best suited approach to carry out this research.

An action research is conducted with the primary intention of solving a specific, immediate and concrete problem in the local setting. Since it develops solutions, which have practical values to the organizations where the researcher is working with. Due to the time limitations, usage of a primary data source and the interactive processes, action research was deemed unsuitable in this context (Sjøberg *et al* 2007, in Wabwoba and Ikoha, 2011).

Biggam (2011) described that experimental research tends to be the domain of the scientist where he attempts to test his hypothesis. Thus, this is not an appropriate

methodology. In addition to that, he expressed another methodology called "Historical Research" which deals with primarily, in events that occurred in the distance past. This method is also not suitable.

Survey method is an attempt to collect data from member of populations in order to determine the current status of that population with respect to one or more variables. This is a study that investigates relationships and outcomes, which is very useful in studying a large number of variables using a large sample size and rigorous statistical analysis (Mugenda and Mugenda, 2003, in Wabwoba and Ikoha, 2011).

Biggam (2011) described various methods to collect the primary data such as personnel interviews, telephone interviews, postal, email, online and group questionnaire. Due to the time constraints and the requirement of more ethical consideration, survey method is considered as an average level appropriate methodology. According to him case study is a study of one example of a particular type of something. The main purpose of the case study is to determine the factors and relationships among the factors that resulted in the behavior under study (Jabar *et al* 2009; Mugenda and Mugenda, 2003; Sjøberg *et al* 2007 in Wabwoba and Ikoha, 2011).

Quantitative research method is based on the quantities and measurements and is linked to in-depth exploratory studies (Biggam, 2011). The qualitative methods involve designs techniques and measurements that do not produce discrete types of data. The most commonly utilized methods in this category are observation, interview and participation. These methods permit the researcher to go beyond statistical results (Wabwoba and Ikoha, 2011).

According to Jebreen (2012) the inductive approach of research generally associates with qualitative researches. It can be considered as a philosophical approach to human understanding. "As a mode of analysis, it suggests a way of understanding textual data. Within the philosophy underpinning inductive approach, researchers

need to design a research strategy that flows directly from the research questions and goals of the research project".

Literature survey is used secondary source such as books, eBooks, journals and conference proceedings. Therefore the researcher did not need to gather data from the primary sources, by spending a lot of time, cost and more ethical considerations. Mugenda and Mugenda, 2003, in Wabwoba and Ikoha (2011) have given the main strength of this approach:

> *...Its ability to economies on time and money as well as the easiness with which one can be able to detect and correct errors hence minimizing the chances of drawing incorrect and misleading conclusions as a result of biases in the primary study or from the review itself. The method has no effect on what is being studied.*

Yin 2003, in Rainer (2011) explained that any research strategy could in principle to be applied to the different types of research questions, but certain research strategies are more suited to certain types of research questions. Also Crowe and Sheppard (2012) described the participant and the researcher related ethical maters when conducting a research.

Based on the appropriateness of different research methods, appropriate level of the selected methods are shown in table 3.6.1.

Table: 3.6.1: Appropriateness of different research methods

Methodology	Question types	Required controls of events in evaluation?	Source Types	Contemporary events being considered?	Time	Ethical Consideration	Appropriate Level
Experimental	How, why	Yes	Primary/ Secondary	Yes	Short	Average	Less
Survey	Who, what, where, how many, how much	No	Primary/ Secondary	Yes	Long	More	Average
Literature Based Survey	Who, what, where, how many, how much	No	Secondary Only	Yes	Short	Less	Average
Case study	How, why	No	Primary/ Secondary	Yes	Long	More	High
History	How, why	No	Primary/ Secondary	No	Long	More	Less

Source: Tailored from the Yin 2003, in Rainer (2011)

In view of that, at the beginning of this study, a literature based survey was conducted to gather the secondary data and then it was conducted as a qualitative research.

3:6. Sampling

Disproportionate Stratified Random Sampling Method was used as the sampling technique for this study. Stratified sampling is a probability sampling procedure. In this procedure, the target population is separated into segments (strata), and then a simple random sample is selected from each segment (stratum). The samples selected from the various strata are then combined into a single sample. Two major subtypes of stratified sampling are proportionate stratified sampling and disproportionate stratified sampling. In proportionate stratified sampling, the number of elements allocated to the various strata is proportional to the representation of the strata in the target population, but in disproportionate stratified sampling is a sampling procedure in which the number of elements sampled from each stratum is

not proportional to their representation in the total population. There the strata have different sampling fractions, and as such.

In this study, only the large scale industries located in the district of Colombo were selected to choose the sample. Those industries could be divided into several categories such as food and beverages, textile and apparel, paper and paper products, wood and wood products, chemical / petroleum / rubber/plastics, metal products, non metal products and other, considering the final products of them. Mainly due to that and the time and ethical considerations, Disproportionate Stratified Random Sampling Method was selected as the most appropriate sampling method for this study.

3:7. Methodology

This was carried out as a case study and a qualitative research According to the aim of the research, several objectives were formulated and they were achieved step by step.

The determinants of industrial location were identified by collecting the secondary data through a literature survey. For that, search engines such as Google Scholar and some digital libraries were used to gather data. For an example digital library and the associated online libraries such as 'Science Direct' was used to collect the reference literature consisting of journals and eBooks.

Then, Colombo District was selected as the case study area to identify the industrial location determinants in the Western Province. District of Colombo located in the Western Province was selected as the case study area. Industries consist with 200 or more employees were considered as Large Scale Industries according to classification of the department of Senses and Statistics, Sri Lanka. Required background knowledge and the necessary secondary data regarding the large scale

industries in Colombo were collected from the relevant institutions in Sri Lanka. Industries consist with 200 or more employees were considered as Large Scale Industries according to the department of Senses and Statistics, Sri Lanka. In view of that, the sampling was done by using the disproportionate random stratified sampling method.

A questionnaire was formulated including the location determinants found from reviewing the literature (Appendix A). With the questionnaire and the Key Informant Interviews primary data were collected from 75 representatives of the large scale industries belong to eight categories in the sample. Those collected data were analyzed by using the frequency distribution analysis to achieve the second objective or to find the major industrial location determinants of the Western Province of Sri Lanka. To identify the development activities which are planned to put into practice in Horana and Meerigama industrial cities, relevant to the major location factors of industries in the Western Region, through WRMPP, secondary data were collected from the related institutions. Finally, to investigate the compatibility of the two industrial cities relevent to the major location determinants of industries in the Western Region of Sri Lanka, a context analysis was carried out with the secondary data collected to achieve the fourth objective and the findings of the frequency distribution analysis.

3:8. Summary

Based on the surveyed literature; research question, aim and the objectives were created. Aim of the study was to examine of the compatibility of the WRMPP Plan related to the major location determinants of industries in the Western Region of Sri Lanka. Accordingly, this study was carried out as a case study and a qualitative research. Considering the different industries in the case study area, Disproportionate Random Stratified Sampling method was selected the most appropriate methodology for sampling. These particulars were explained in this chapter and the next chapter will be focused on the case study area, data collection, analysis and findings of this study.

CHAPTER – 04

DATA COLLECTION, ANALYSIS AND DISCUSSSION

4.1. Introduction

Last chapter explained the research question, aim, objectives, research strategy, sampling method and the methodology of the study. This chapter contains the particulars on the study area, data collection, data analysis, results and the interpretations of the results of the study. Here, the most influencing major determinants of industrial location in the Western Region of Sri Lanka and the compatibility of the Western Region Mega Polis Project related to those were investigated. Next segments of this chapter will describe it in detail.

4.2. Case Study Area

Colombo is the commercial capital and the largest city of Sri Lanka. According to the Department of Census and Statistics, Sri Lanka (2015), its existing population is 2,375.000. Geography of the area is a mix of land and water. Land area is 65 hectares. The city consists with a natural harbor. The Northern and North-Eastern border of the city of Colombo is formed by the Kelani River and there are many canals and in the heart of the city. It is the Administrative Capital of the Western Region and the Legislative Capital of the country is located within the area. Gampaha and Kalutara are the other two districts which are located in the Western Province with Colombo. Location of Colombo District in Sri Lanka is shown in figure 4.2.1.

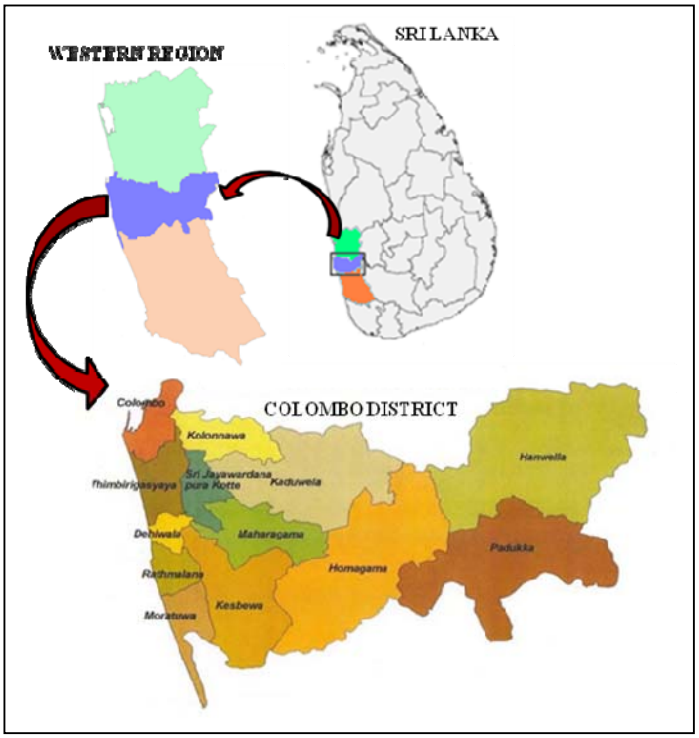

Figure: 4.2.1: Location of Colombo in Sri Lanka
Source: Urban Development Authority, Sri Lanka.

Rasanayagam (1972) studied the spatial evolution of the industries in the country and expressed that, even during the colonization period, most of the industries have shown a tendency to locate closer to Colombo, which is the commercial hub of the country. Portuguese captured the Muslim trading settlement in Colombo and the first factory was established in 1518. Then Dutch established several industries in the settlements of Colombo such as boat making and repairing, coir and rope making, bakeries, tannery, carpentry, distilling and shoe making (Rasanayagam, 1985). During the British period, besides the development of the trading and commercial activities, additional industries like plumbago curing, metal working, production of coconut oil, desiccated coconut, production of tea, cardamom, arecanut etc. were started in Colombo. Due to this larger numbers of people were attracted into the city.

Industrialization of a planned manner was evident in Sri Lanka during the period just prior to the World War II. At this stage, certain amount of mechanization and

private investments on industries was initiated. Sri Lanka started to expand the industrial development particularly in the Public Sector in 1960's (Gunaratna, 2001; Dias. 1987). Then several factories were established with the sponsorship of the government. Those factories were also located closer to Colombo, because of their dependency upon the materials imported through Colombo harbor and the markets available in Colombo area.

According to Abeywickrama (1991) in 1977 with the liberalization of the economy of Sri Lanka, the government encouraged the foreign investments. Dias (1987) pointed out that by that time, the Greater Colombo Economic Commission (GCEC) later named as the Board of Investment (BOI), was established with the main task of establishing and operating Investment Promotion Zones (New Free Trade Zones). Subsequently, the Katunayake Investment Promotion Zone was established and started its operations in 1978. Then the Biyagama zone was established. Both of these zones were located in the Western Region of the country. Consequently, Industrial sector became one of the fastest growing sectors of the economy.

Though, the economic policies too inspired the decentralization of the economic development, it was not that much spread to the other regions of the island as expected (Dias, 1987). According to the available figures, in 2007, over 80 % of industrial enterprises were concentrated in the Western Province while very few industries could be found in the other provinces of the country (Uduporuwa, 2007). In 2014; % of contribution by the industrial sector for Gross Domestic Production (GDP) is 32.7 and the % of contribution for GDP by the manufacturing sub sector, which gives the highest contribution, is 54.3% according to the Department of Census and Statistics, Sri Lanka. Even at present, the Western province contributes for around half of total GDP of the country and it is considered as the engine of growth of Sri Lanka. It is obvious when observe the district wise distribution of the industries in Sri Lanka from 2010-2014 (table 4.2.1).

Table: 4.2.1.: District wise Distribution of the Industries in Sri Lanka 2010-2014

District	Industries registered under the Ministry of Industry and Commerce					Industries registered under the Board of Investment					Total				
	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
Colombo	1219	1247	1272	1293	1325	1185	1213	1184	1159	1152	2404	2460	2456	2452	2477
Gampaha	325	342	349	360	370	655	662	644	637	654	980	1004	993	997	1024
Kalutara	100	105	107	108	110	154	168	166	163	169	254	273	273	271	279
Galle	35	36	37	37	37	123	128	129	135	139	158	164	166	172	176
Puttalam	35	38	38	40	51	79	87	92	92	99	114	125	130	132	150
Kandy	71	74	78	82	87	86	93	92	96	96	157	167	170	178	183
Kurunegala	32	35	35	37	44	96	95	98	92	93	128	130	133	129	137
Matara	34	36	39	40	41	32	32	30	30	31	66	68	69	70	72
Hambantota	14	15	15	15	15	25	25	29	30	34	39	40	44	45	49
Nuwara Eliya	6	6	6	6	6	58	59	64	64	64	64	65	70	70	70
Ratnapura	12	12	12	12	12	54	53	53	56	58	66	65	65	68	70
Anuradhapura	9	9	9	10	13	61	22	21	25	25	70	31	30	35	38
Badulla	6	7	7	7	13	31	27	29	34	31	37	34	36	41	44
Kegalle	13	15	15	16	18	41	44	44	45	49	54	59	59	61	67
Matale	14	14	14	15	18	23	24	27	27	31	37	38	41	42	49
Moneragala	2	2	2	2	2	7	9	9	9	10	9	11	11	11	12
Pollonnaruwa	3	3	3	4	5	12	12	14	14	14	15	15	17	18	19
Ampara	4	4	4	6	11	10	10	13	14	19	14	14	17	20	30
Trincomalee	3	3	3	3	4	13	17	18	18	23	16	20	21	21	27
Baticoloa	0	0	0	2	2	2	3	4	4	8	2	3	4	6	10
Vavnia	0	0	0	1	1	1	2	3	4	6	1	2	3	5	7
Jaffna	2	2	2	3	4	2	3	4	4	4	4	5	6	7	8
Mannara	1	1	1	1	1	0	0	0	3	4	1	1	1	4	5
Kilinochchi	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2
Mulative	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Total	1940	2006	2048	2100	2192	2709	2788	2768	2772	2814	4649	4794	4816	4872	5006

Source: Annual Report – 2014 – Central Bank of Sri Lanka

Considering all these, district of Colombo was selected as the case study area and the large scale manufacturing industries were considered when selecting the sample to find the major location determinants of the industries located in the Western Region. The spatial distribution of industries within Colombo District in year 2015 is illustrated in figure 4.2.2.

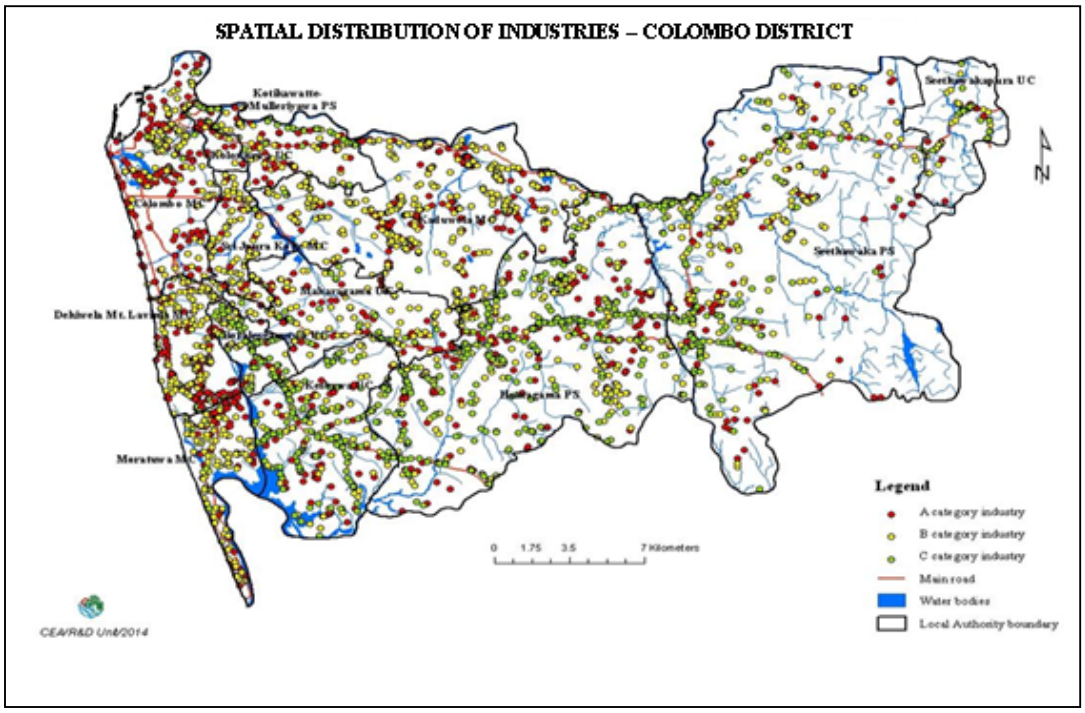

Figure: 4.2.2: Location of Industries in Colombo District- 2015
Source: Central Environment Authority, Sri Lanka

4.3. Data Collection

The data needed for the study were collected by using questionnaires and key informant interviews. The questionnaire was formulated by using the industrial location determinants and the sub factors of them, found through the literature survey. As well as the Key Informant Interviews were carried out based on those location factors, with the representatives of the relevant organizations in Sri Lanka, such as Urban Development Authority, Central Environment Authority, Board of Investment, National Intellectual Property Office, Ministry of Industries and Industrial Development Board to gather the background knowledge and the required secondary data, regarding the Large Scale Industries in Colombo.

Disproportionate Stratified Random Sampling Method was used for sampling, considering the different categories of industries such as, food and beverages, textile and apparel, paper and paper products, wood and wood products, chemical / petroleum / rubber/plastics, metal products, non metal products and other, located within the case study area. Then, the Key Informant Interviews were carried out and the responses for the questionnaires were collected from the representatives in the higher management staff of the selected industries, belong to the above categories. Respondents were aware to make their responses, considering the related sub factors and the severity of influencing the location decision of their industries. After that, their responses were recorded by using the Likert Scale. Subsequently, 75 responded questionnaires could be collected and the raw data were used for the analysis.

4.4. Data Analysis

Frequency Distribution Analysis Method was applied to analyze the data and to obtain the results with Simple Descriptive Statistics. Responded questionnaires belong to several industry categories were gathered and analysis was carried out considering only the factors which have highly influenced the location decisions of the firms. Relative frequencies were calculated as,

$$\text{Relative Frequency} = \left(\frac{\text{Frequency of the highly influenced determinants}}{\text{Total number of industries in the category}} \right) \times 100$$

4:5. Results and Discussion

The relative frequencies of the responses for each and every determinant were calculated based on different categories of industries, to find the most influencing major location determinant/s of each category.

4.5.1. Food and Beverage Industries

Responses, frequencies and the relative frequencies obtained related to the category of food and beverage industries are shown in table 4.5.1.1 and the figure: 4.5.1.1 shows its graphical illustration.

Table: 4.5.1.1: Relative frequencies of the determinants which have highly influenced the location of Food and Beverage Industries

FOOD AND BEVERAGES	IND1	IND2	IND3	IND4	IND5	IND6	IND7	IND8	Frequency	Relative Frequency
Raw Meterials									0	0
Transpotation	1	1		1	1	1			5	63
Market	1		1				1		3	38
Labour		1		1		1			3	38
Personal Preferences									0	0
Community									0	0
Utility/Insfrastructure	1	1	1		1	1	1		6	75
Tax Incentives									0	0
Quality of Life	1			1		1		1	4	50
Government Interventions									0	0
Exisiting Industries									0	0
Less Stringent Environmental Regulations									0	0
Water	1		1	1		1	1		5	63
Land		1			1			1	3	38
Safety									0	0
Climate									0	0
Capital	1					1			2	25
Others									0	0

Source: Author

According to the total responses obtained for food and beverage industries, maximum number of responses has been obtained by the utility and infrastructure. Transportation and water were the next in the rank and quality of life has become the third important factor which has been considered when selecting the location of

them. Labor, market and land have come as the subsequent factors. Other factors have not been major determinants for these industries. Accordingly, utility and infrastructure, transportation, water and quality of life are the major location determinants for the food and beverage industries.

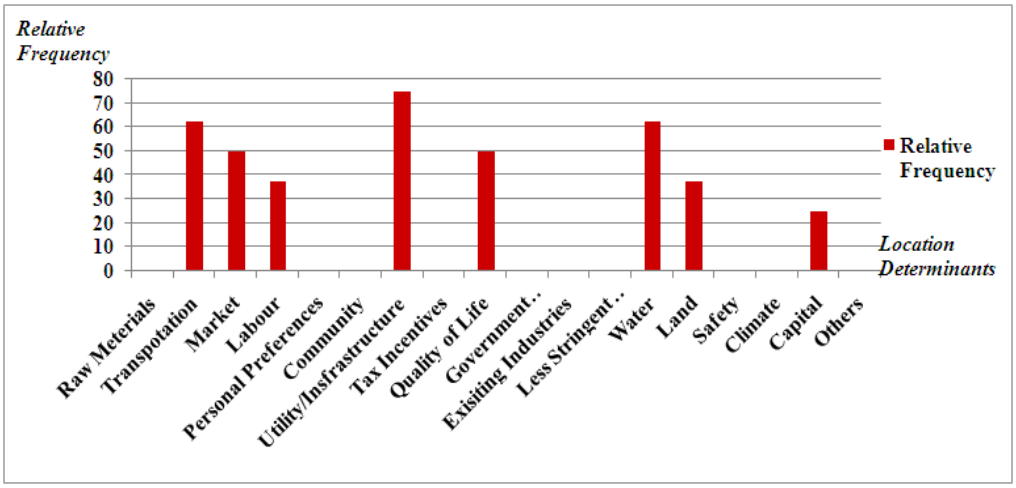

Figure: 4.5.1.1. Relative Frequencies of the location determinants – Food and Beverage Industries

Source: Author

4.5.2. Textile and Apparel Industries

In this category, utility and infrastructure has become the most influencing determinant. Transportation and quality of life have acquired the next positions respectively. Table consists with the data is in the appendix B.1 and figure: 4.5.2.1 illustrates the relative frequencies of the responses, acquired by the textile and apparel industries, for different location determinants.

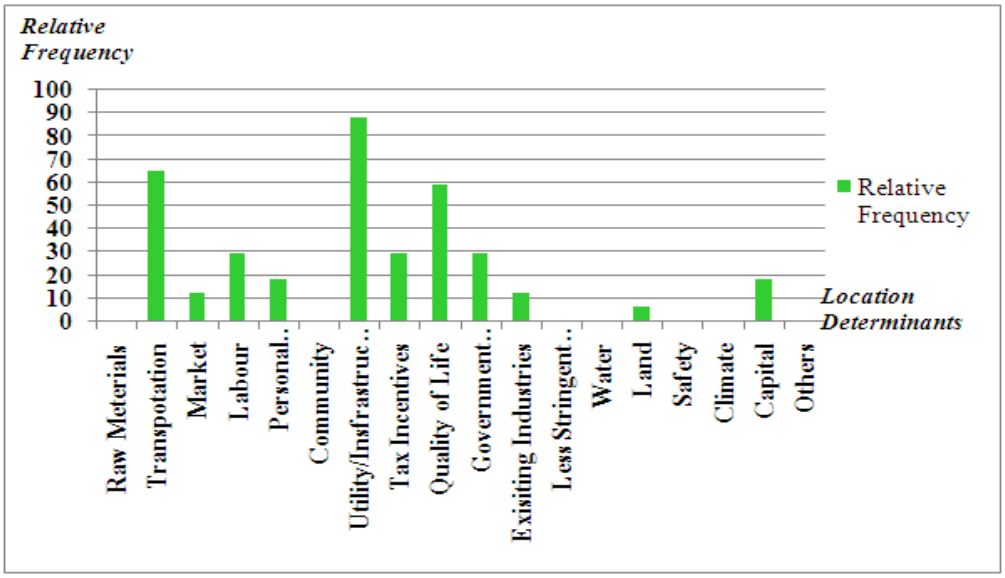

Figure: 4.5.2.1. Relative Frequencies of the location determinants – Textile and Apparel Industries

Source: Author

4.5.3. Paper and Paper Products Industries

In this category, transportation and utility/ infrastructure are the most influencing major location factors. Market has also made a considerable influence on the location determinants of the paper and paper products industries. Quality of life and the existing industries have affected on 40%. However, the other factors have not affected as major factors on their location decisions. Figure: 4.5.3.1 shows it and the table is in appendix B.2 presents more details.

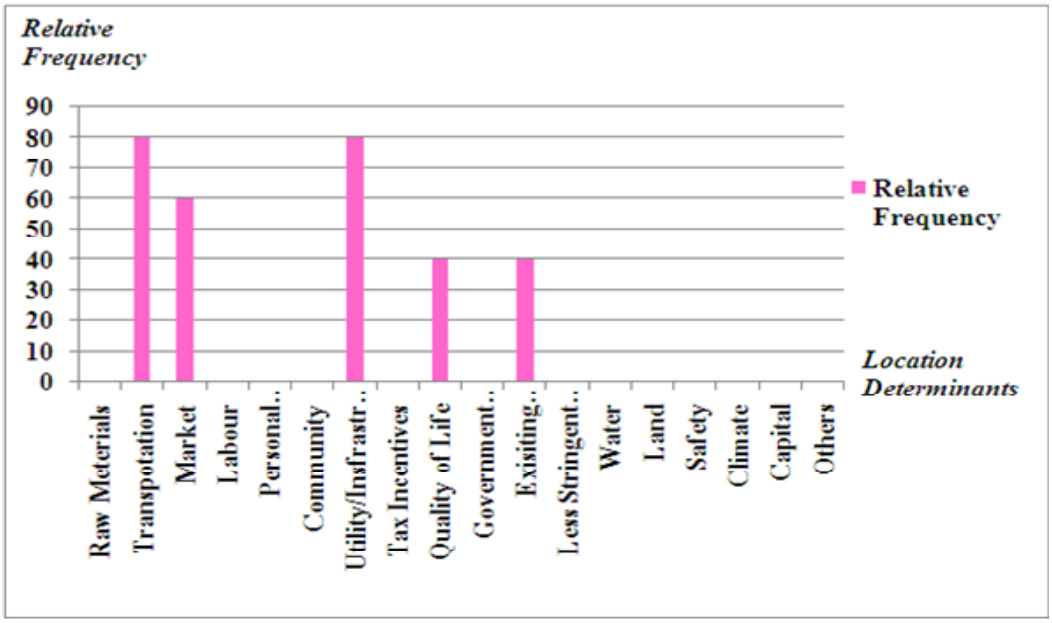

Figure: 4.5.3.1. Relative Frequencies of the location determinants – Paper and Paper Products Industries

Source: Author

4.5.4. Wood and Wood Products Industries

100% of wood product industries have been influenced by the market as a location factor. 75% of them have been established considering the labor. Utility/ infrastructure, raw materials, transportation have affected on 50% of location decisions. Therefore, these five factors can be considered as the most influencing location determinants of wood product industries. Table in appendix B.3 illustrate the data and Figure: 4.5.4.1 shows the graphical illustration of it.

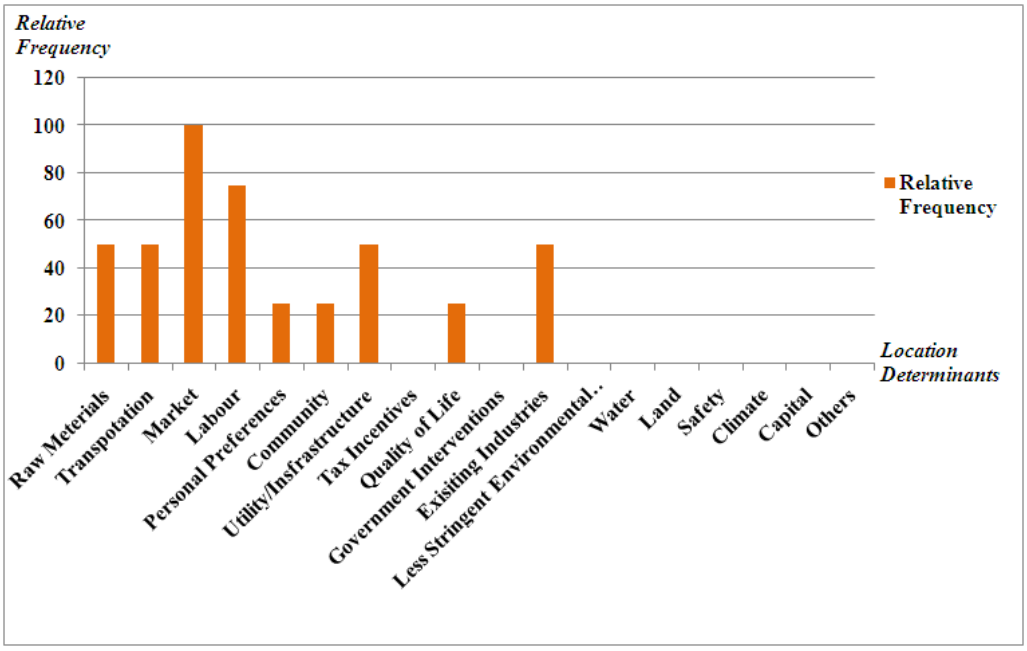

Figure: 4.5.4.1. Relative Frequencies of the location determinants – Wood and Wood Products industries
Source: Author

4.5.5. Chemicals /Petroleum/ Rubber /Plastic Industries

In this category, transportation, utility/ infrastructure and market have become the most considerable major determinants (Figure: 4.5.5.1.and table in appendix B.4).

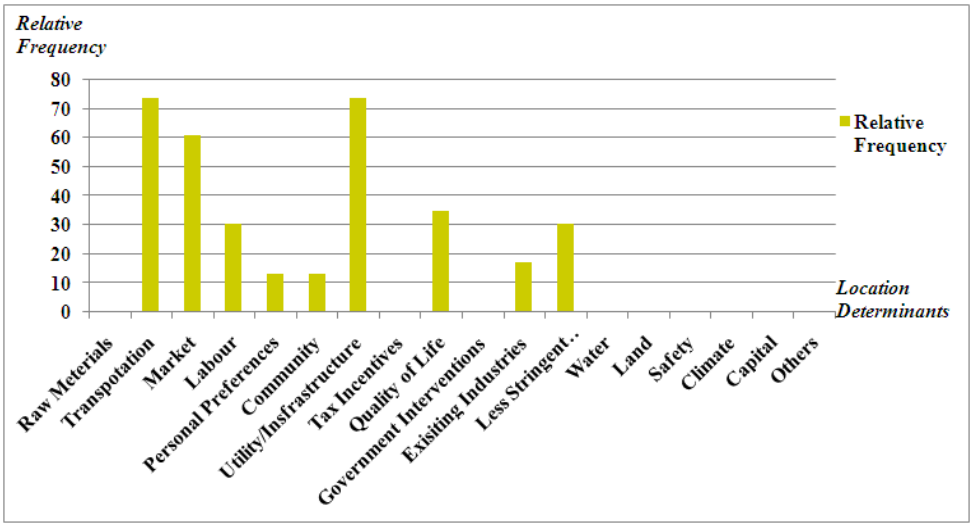

Figure: 4.5.5.1. Relative Frequencies of the location determinants – Chemicals /Petroleum/ Rubber /Plastic Industries.

Source: Author

4.5.6. Metal Products Industries

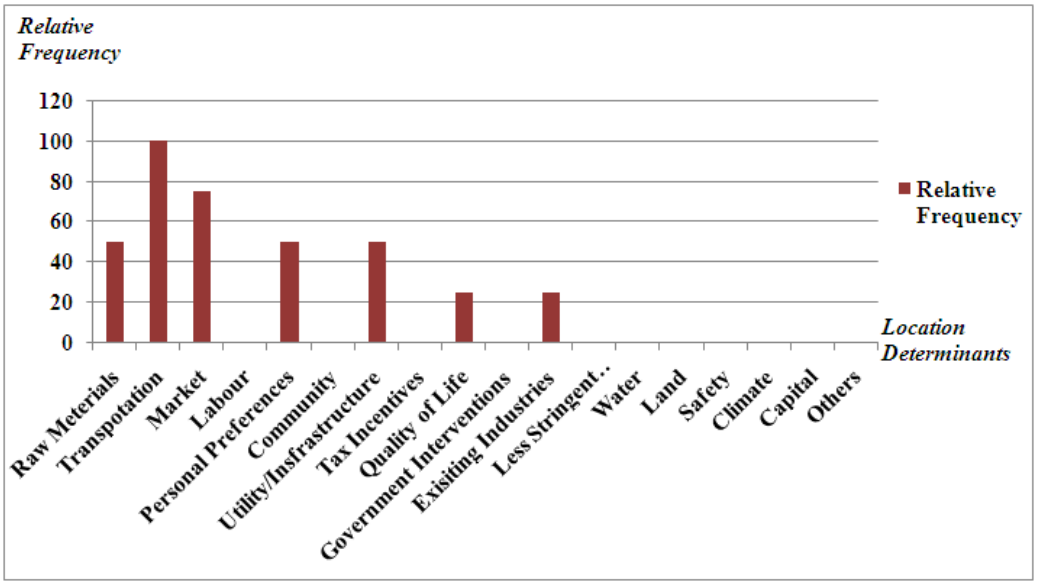

Figure: 4.5.6.1. Relative Frequencies of the location determinants – Metal Products Industries

Source: Author

According to figure 4.5.6.1, transportation has act as the most influencing location determinant and it has affected the location decisions of all the industries in this category. Market comes as the second factor. Raw materials, personal preferences, utility/ infrastructure are the next factors. Except quality of life and existing industries, other factors have not affected on the location of these industries (table in appendix B.5).

4.5.7. Non – Metal Products Industries

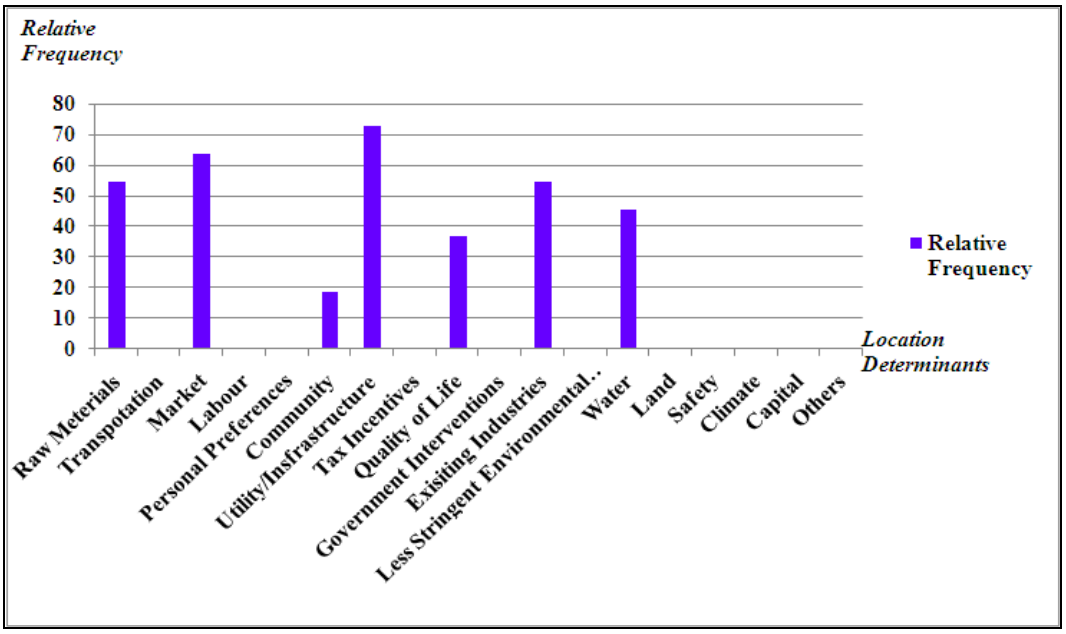

Figure: 4.5.7.1. Relative Frequencies of the location determinants – Non- Metal Products industries
Source: Author

Utility/ infrastructure, market, raw materials and the existing industries have exerted power on more than 50% of industries in this category at their locations. Water has become the next factor (Figure: 4.5.7.1.and the table in the appendix B.6).

4.5.8. Other Industries

Industries which were not included in the above categories were considered under this. As shown in figure 4.5.8.1., here, the most considerable main location factors are the raw materials, market, utility/ infrastructure and the quality of life. Labor has affected 33% of location decisions as a key factor (table in appendix B.7).

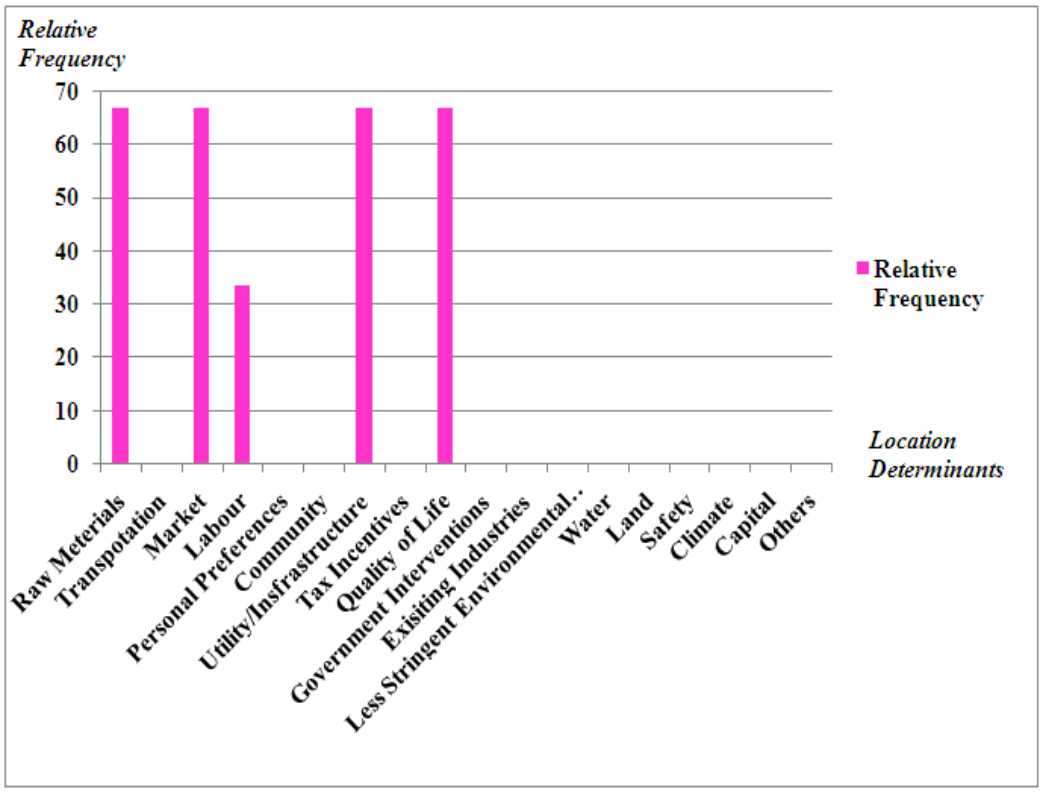

Figure: 4.5.8.1. Relative Frequencies of location determinants – Other industries
Source: Author

4.5.9. Major Determinants of Industrial location

Averages of the relative frequency values of different industrial location determinants linked to various industrial categories were calculated to identify the Major Determinants of Industrial location in the area. Those data are illustrated in table: 4.5.9.1.

Table 4.5.9.1: Influence Levels of different Determinants on Industrial Location

Industrial Location Determinant	Food and Beverages	Textile and Apparel	Paper & Paper Products	Wood & Wood Products	Chemical/Petroleum/Rubber/Plastic	Metal Products	Non Metal Products	Other Industries	Average
Utility/Insfrastructure	75	88	80	50	74	50	73	67	70
Market	50	12	60	100	61	75	64	67	61
Transpotation	63	65	80	50	74	100	0	0	54
Quality of Life	50	59	40	25	35	25	36	67	42
Raw Meterials	0	0	0	50	0	50	55	67	28
Labour	38	29	0	75	30	0	0	33	26
Exisiting Industries	0	12	40	50	17	25	55	0	25
Water	63	0	0	0	0	0	45	0	13
Personal Preferences	0	18	0	25	13	50	0	0	13
Community	0	0	0	25	13	0	18	0	7
Land	38	6	0	0	0	0	0	0	5
Capital	25	18	0	0	0	0	0	0	5
Less Stringent Environmental Regulations	0	0	0	0	30	0	0	0	4
Tax Incentives	0	29	0	0	0	0	0	0	4
Government Interventions	0	29	0	0	0	0	0	0	4
Safety	0	0	0	0	0	0	0	0	0
Climate	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0

Source: Author

According to the findings, utility and infrastructure was the most influencing determinant of industrial location in the case study area. In the tested sample, 70% of industries have been influenced mainly by the utility and infrastructure as a major location determinant. Except wood and wood product manufacturing industries more than 65% of industries belong to all the industrial categories have been influenced by the utility and infrastructure as a major location determinant. Especially, textile and apparel industries and paper and paper product manufacturing industries have been significantly influenced by this particular determinant as a major determinant of location. Wood and wood products industries shows the minimum influence and 50% of industries in this category have been influenced by utility/ infrastructure.

The next location factor which has exerted more power on industrial location is the market. 61% of industries in the sample have been highly influenced by the market. Also it has been a major location determinant for all the wood related industries and 75% of metal related industries. For most of the textile and apparel industries it has not been a main factor which determines the location.

The Third major factor or the major location determinant which has influenced the location determinants of the industries in the case study area is transportation. This has been a major determinant for 54% of industries in the sample. 100% of metal related industries have been influenced by the transportation as a major factor. However, transportation has not been a major location determinant regarding the non metal and other industries, but the location of 80% of paper and paper product industries, 74% of chemical/ petroleum/ rubber/ plastic industries, 65% of textile and apparel industries, 63% of food and beverage industries and 50% of wood and wood products industries have been influenced by the transportation as a major location determinant.

According to the ranking, next major location determinant is the quality of life. Regarding the total number of industries, this factor has severely affected only on 42% of industries when selecting sites for location. Here, the highest percentage is shown by the category of other industries. Categories of wood and wood products

and metal products show the lowest percentages as 25%. Other categories show intermediate percentages as shown in table 4.4.1.

Raw material has act as a major location determinant for 28% of industries in the sample. 67% of other industries and 55% of non metal industries have considered it as a major location factor. 50% of wood and wood products industries and 50% of metal related industries have considered it as a main location determinant but the other categories have not considered it as a major location determinant.

According to the ranking, next major location determinant is the labor. 26% of industries out of total have been affected by that. However, the location decisions of 75% of wood and wood products industries have been affected by labor. Existing industries comes as the next major location determinant in the area. It has made a major influence on 25% of the industries in the case study area.

Frequency distribution of the average percentage of industries belongs to all the eight categories relevant to various location determinants are graphically illustrated in figure: 4.5.9.1.

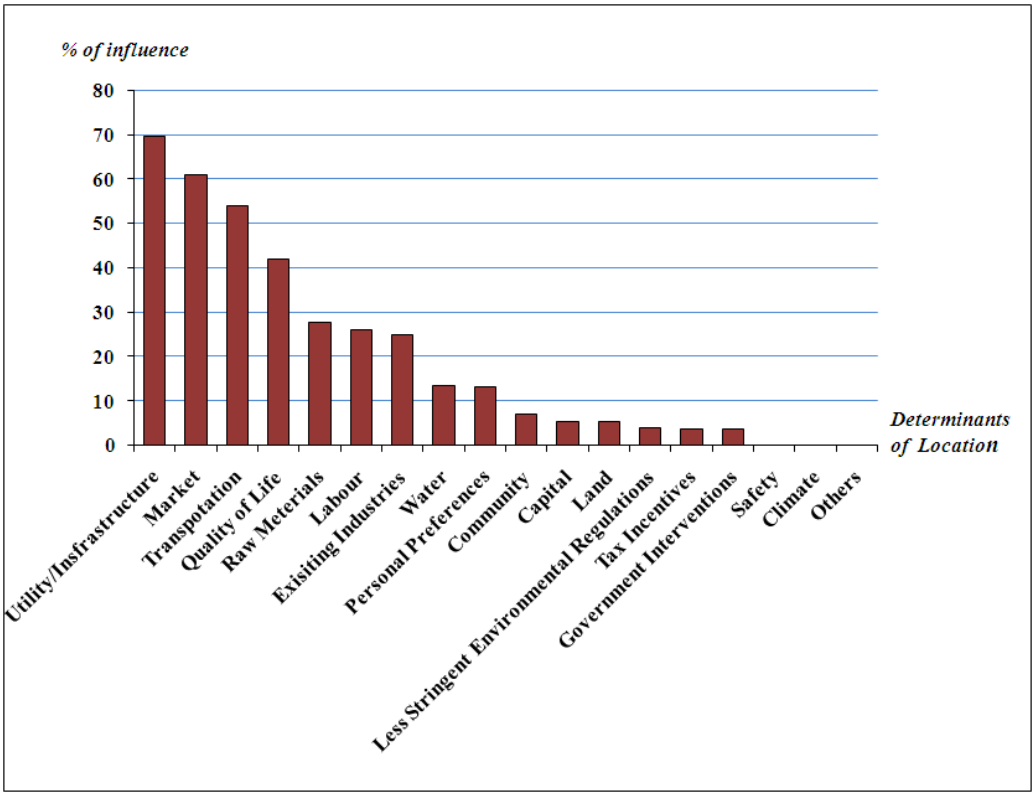

Figure 4.5.9.1: Average frequencies of the responses related to different location determinants

Source: Author

Accordingly, utility and infrastructure, market and transportation have highly influenced the location decisions of more than 50% of industries in the case study area. Quality of life has been a major location determinant of more than 40% of industries. As the next factor, raw material has exerted their power for 28% of industries. Labor has become the next major factor affecting the location decisions of 26% of industries and the existing industries has been considered as a main factor by 25%, but the influence of the other factors as major determinants is comparatively low. However, safety, climate and the other factors have not act as major location determinant of the industries in the area.

4.5.10. Compatibility of the WRMPP with the Major Industrial Location Determinants in the Area

4.5.10.1. Western Region Megapolis Plan (WRMPP)

In recent times, the government of Sri Lanka is going to create a High Income Developed Country with spatial alterations of the urban agglomerations in the Western Region and structural alterations of the whole National Economy, by introducing the WRMPP to Sri Lanka. According to the estimations, it will require an investment of 40 billion US$ and it is intended to achieve its objectives in year 2030.

The WRMPP is planned to create the spatial transformation in 3 ways: firstly by way of enabling the national economy to leverage the benefits of economies of agglomeration brought about by urbanization. Secondly by way of eliminating the congestion pressures on urban infrastructure, services and environment brought about by messy urbanization and thirdly by way of reduced per unit capital cost of infrastructure provisioning. Under the WRMPP, ten Mega Projects have been identified and all these will help to establish the integrated development in the region and to upgrade the determinants which affect the location of industries in the region according to the Master Plan of it. Among those one mega project is there to establish two Industrial Cities at Horana and Meerigama.

4.5.10.2. Industrial City at Horana

Horana has been identified as a middle order town in Sri Lanka. Its land use is still dominated by agriculture. It is a major transport hub that connects the Western coastal area with the Sabaragamuwa and Uva Provinces. When the present situation is considered, a substantial number of industries including a BOI zones are located in the area and some infrastructure and other services with a sufficient amount of developable lands. Figure: 4.5.10.3.1 and 4.5.10.3.2 illustrate the existing facilities and the location of industries in the area respectively.

Area belongs to it will occupy approximately 85 sqkm consisting of existing towns and scattered villages. The estimated cost for it the development of this industrial city is SLR 45,000 mn (US $ 319 mn). Horana Industrial City will be developed to facilitate transforming of industries to high value added, innovative industries, utilizing regional resources. The project aims to accommodate the large numbers of large scale industries especially agro based industries, associated SME's, gem & jewelry industries , tyres and tubes, electronic products, pharmaceuticals, etc. As well as it is expected to attract both industrial and real estate developers to this Industrial City.

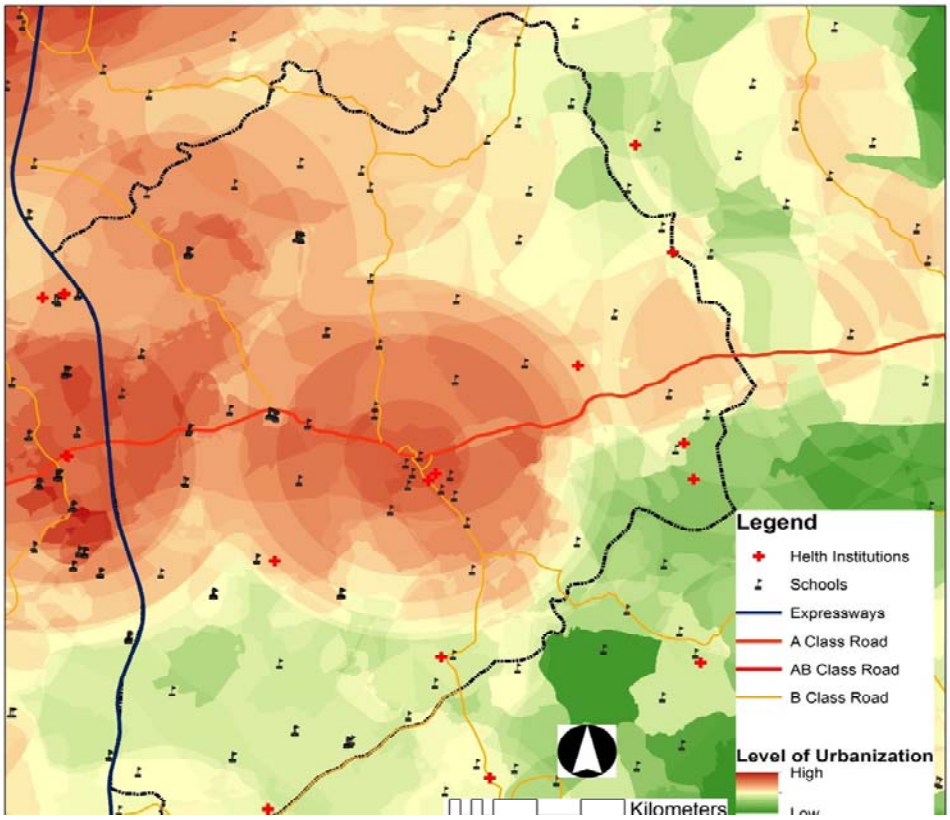

Figure: 4.5.10.2.1.Existing situation of the selected area for Horana Industrial City.
Source: WRMPP

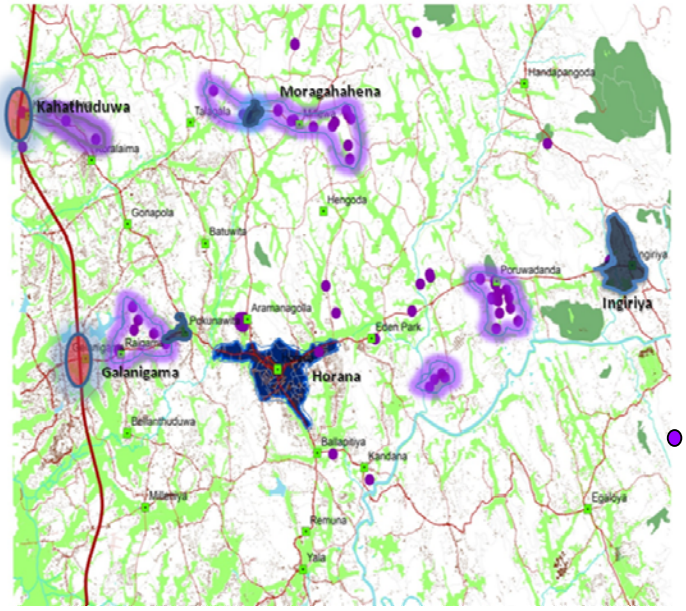

Figure: 4.5.10.2.2. Existing industries in Horana
Source: WRMPP

WRMPP is going to develop three industrial clusters in Moragahahena, Poruwadanda and Millaniya in Horana Industrial City (figure: 4.5.10.3.3).

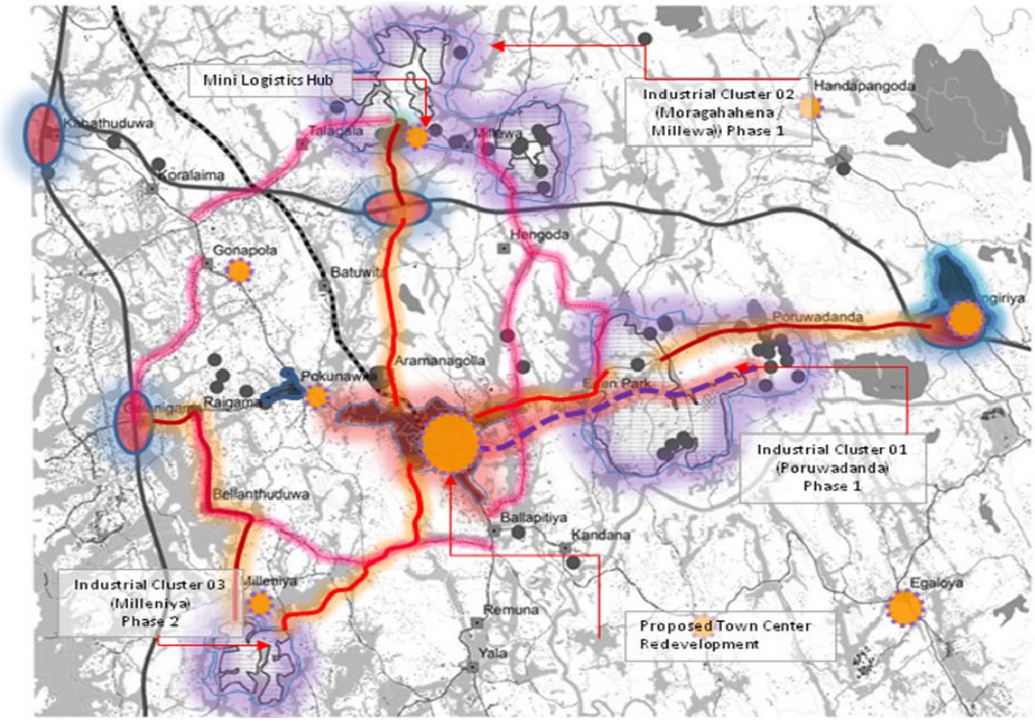

Figure: 4.5.10.2.3. Conceptual Plan of the Horana Industrial City
Source: WRMPP

4.5.10.3. Industrial City at Meerigama

Under the Megapolis Development project, Meerigama has been identified to develop as the other industrial city. Two specialized large scale industrial clusters will be developed there. At present there are 41 industries in the Mirigama Industrial Park. Mirigama to be well connected to the rest of the country through proposed expressway network and the main railway lines that links to north, east and central part of the country and Colombo, run through Mirigama. Also there are adequate amount of flat lands for large scale developments. Figure: 4.5.10.5.1 exemplifies the existing situation in the area.

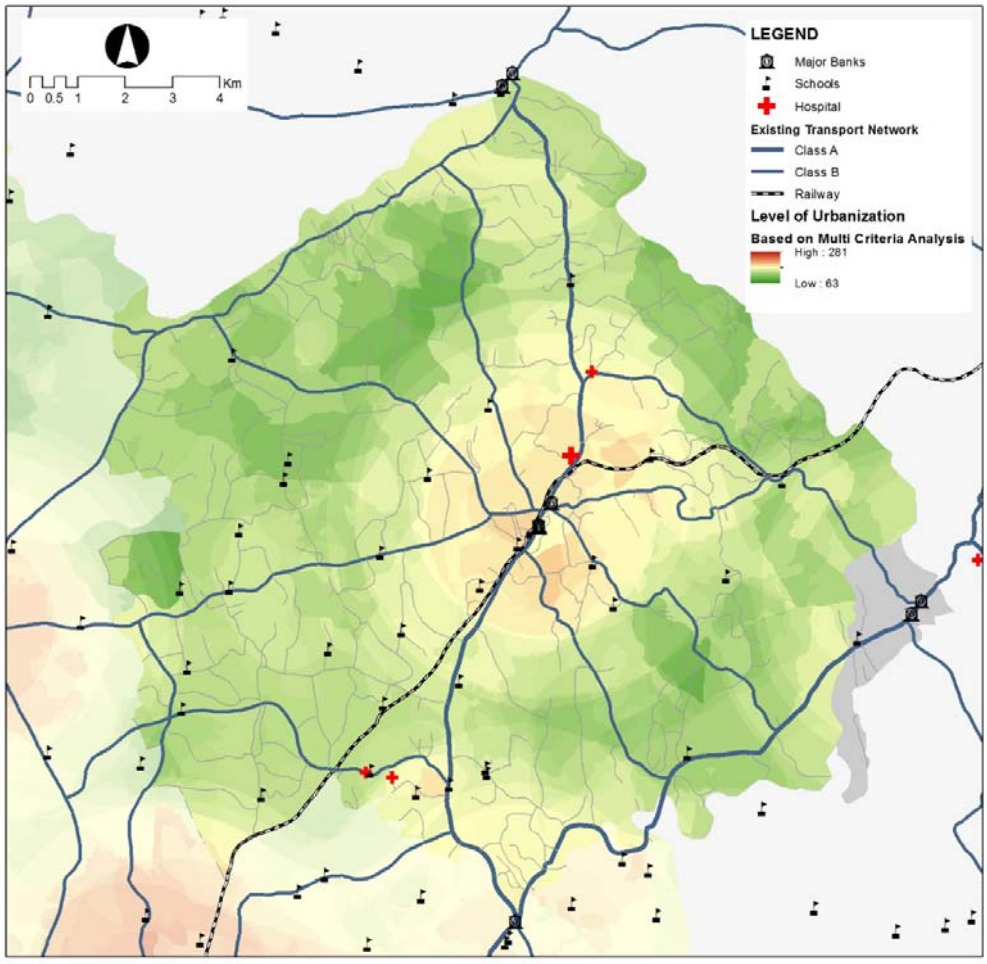

Figure: 4.5.10.3.1. Existing situation of the selected area, to develop the Industrial City at Meerigama.

Source: WRMPP

Industrial City of Meerigama will be occupied in 18,389 Ha of land area and in Meerigma and Divulapitiya Divisional Secretariat Divisions. The estimated cost for it the development of the industrial city is SLR 35700 mn (US $ 246 mn). Meerigama Industrial City will be develop to facilitate development of high value added, technology based industries, agro base products and aviation industry related products by providing modern industrial and other infrastructure and utility services. It is expected that, with the planned developments belong to WRMPP, the town will be the northern gateway transport hub as the entry point to northern, eastern and central provinces of the country. Two industrial clusters (figure: 4.5.10.5.2.) of the Meerigama Industrial City will consist with high value added technology based industries, agro base products and aviation industry.

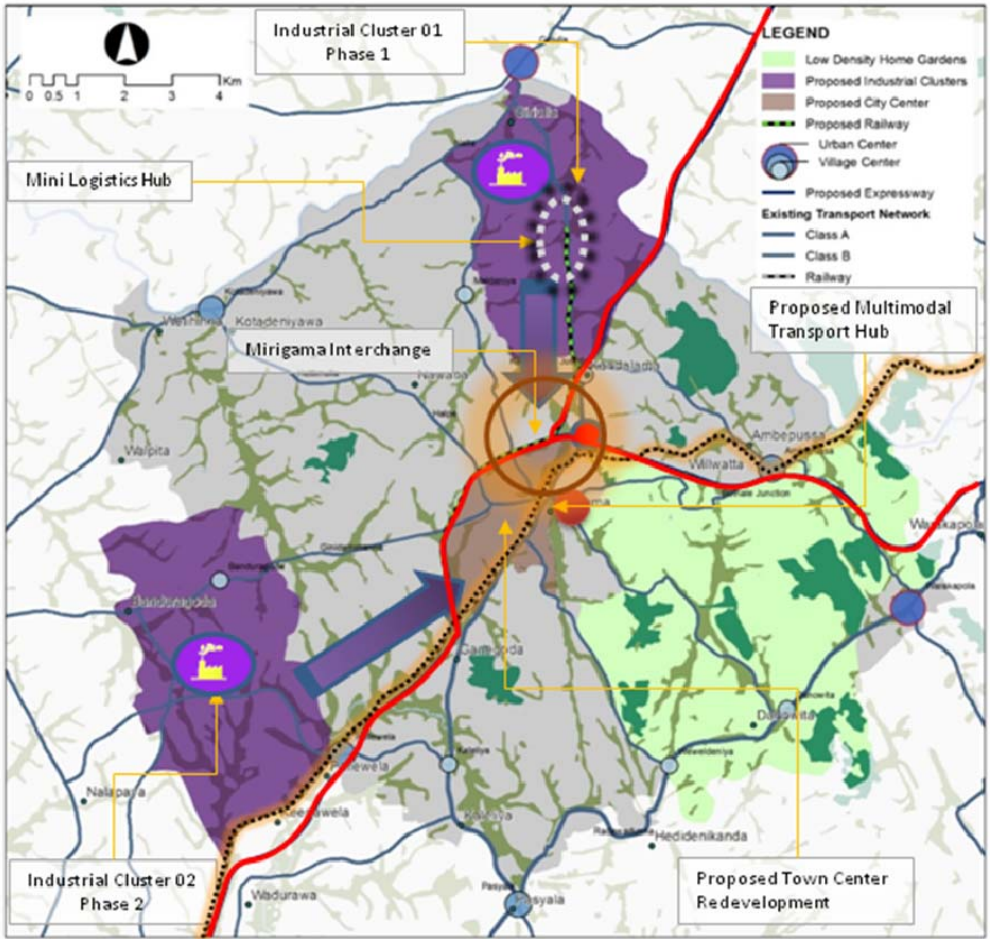

Figure: 4.5.10.3.2. Conceptual plan of the industrial city development at Meerigama
Source: WRMPP

4.5.10.4. Compatibility of the WRMPP, relevant to the Major Location Determinants of Industries in the Western Province of Sri Lanka

To assess the compatibility of the WRMPP with the major industrial location determinants, existing facilities and the proposed developments related to the WRMPP were considered. According to the findings, major location determinants of industries in the Western Province of Sri Lanka were utility and infrastructure, market, transportation and the quality of life respectively, when consider those in descending order. Accordingly, the table 4.5.10.4.1 points out the availability of existing or planned developments in industrial cities relevant to different sub factors of utility and infrastructure.

Some of the existing facilities and a the planned development activities under the WRMPP have addressed most of the sub factors relevant to utility and infrastructure in a sufficient manner, but there is not any state regarding the attitudes of the utility agents who are responsible for the supply of these utilities and the cost of fuel. Appendix C.2 and D.2 illustrate the development activities planned under the WRMPP to develop the utility and infrastructure in Horana and Meerigama industrial Cities respectively.

Table: 4.5.10.4.1. Availability of existing and planned developments in industrial cities relevant to different sub factors of utility and infrastructure

No.	Sub factor	Availability of Development Activity/ Activities	
		Horana Industrial City	Meerigama Industrial City
01	Water supply	yes	yes
02	Disposable facilities of waste	yes	yes
03	Availability of telecommunication facilities	yes	yes
04	Availability of electric power	yes	yes
05	Availability of fuel	yes	yes
06	Medical facilities	yes	yes
07	Shopping centers	yes	yes
08	Hotels Banks and credit institutions, etc.	yes	yes
09	Colleges and research institutions	yes	yes
10	storm water management	yes	yes
11	fire fighting/ rescue facilities	yes	yes
12	Attitudes of the utility agents	no	no
13	Estimated cost of fuel	no	no

Source: WRMPP

The next major location determinant of the industries in the Western Province is the transportation. Table: 4.5.10.4.2 shows the availability of existing and planned developments in industrial cities, relevant to the sub factors of transportation. In view of that, all the sub factors relevant to transportation have been considered by these industrial city developments, except water way transportation. Western region and the areas which have been selected to develop the industrial cities consist with natural waterways which can be used for water way transportation easily (appendix C.6 and D.5), but there is not any plan to develop these water ways for transportation of raw materials and finish goods.

Table: 4.5.10.4.2. Availability of existing and planned developments in industrial cities relevant to the sub factors of transportation

No.	Sub factor	Availability of Development Activity/ Activities	
		Horana Industrial City	Meerigama Industrial City
01	Roadway/ Highway facilities	yes	yes
02	Railway facilities	yes	yes
03	Airway facilities	yes	yes
04	Shipping cost of raw material	yes	yes
05	Cost of finished goods transportation	yes	yes
06	Warehousing and storage facilities	yes	yes
07	Connectivity	yes	yes
08	Water way transportation	No	No

Source: WRMPP

However, all the other sub factors relevant to transportation have been considered by the WRMPP and those development activities are mentioned in appendices C.2 and D.2. Location of the Industrial Cities and the location of port, air port and the logistic corridors which support less transport costs are illustrated in appendix C.7 and D.8.

Market was the third most important location determinant of the industries in the Western Province of Sri Lanka. Table: 4.5.10.4.3 illustrates the availability of existing and planned developments in industrial cities relevant to the sub factors of market.

Table: 4.5.10.4.3. Availability of existing and planned developments in industrial cities relevant to the sub factors of market

No.	Sub factor	Availability of Development Activity/ Activities	
		Horana Industrial City	Meerigama Industrial City
01	Existing consumer market	yes	yes
02	Potential consumer market	yes	yes
03	Anticipation of growth of markets	yes	yes
04	Population trends	yes	yes
05	Shipping costs to market areas	yes	yes
06	Marketing services	yes	yes
07	Favorable competitive position	No	No
08	Income trends	No	No
09	Consumer characteristics	No	No
10	Location of competitors	No	No
11	Size of market	No	No
12	Nearness to related industries	No	No

Source: WRMPP

According to the available data, some sub factors belong to the market have been addressed in a satisfactory manner with the developments belong to the two industrial cities and the Western Province of Sri Lanka under the WRMPP (appendix C.3, D.3. and E). However, some sub factors such as favorable competitive position, income trends, consumer characteristics, location of competitors, size of market and nearness to related industries have not been addressed.

Fourth major industrial location determinant in the Western Province of Sri Lanka was the quality of life. All the sub factors belong to that were addressed by the WRMPP (table 4.5.10.4.4, appendix C.4 and D.4).

Table: 4.5.10.4.4. Availability of existing and planned developments in industrial cities relevant to the sub factors of quality of life

No.	Sub factor	Availability of Development Activity/ Activities	
		Horana Industrial City	Meerigama Industrial City
01	Local transportation	yes	yes
02	Recreational facilities	yes	yes
03	House hold amenities	yes	yes
04	Good schools and other educational institutions	yes	yes
05	Health and other facilities	yes	yes
06	Security	yes	yes

Source: WRMPP

Conceptual plans of the industrial clusters of the Horana Industrial City (C.8, C.9 and C.10) and one of an industrial cluster in Meerigama Industrial City (D.7) as well as the land use plan in Horana city center (C.5), conceptual plan of a secondary service center (C.6), existing situation in the Meerigama Industrial City area (D.5)

and the zoning plan at the city center of Meerigama (D.6) further exemplify the developments which support the major industrial location determinants of the industries in the area.

4.6. Summary

Even before the colonization industrial activities in Sri Lanka showed a tendency to locate closer to Colombo. As a result, at present the highest concentration of industries can be observed in the district of Colombo and the Western Region of the country. Thus, the district of Colombo was selected as the case study area to identify the industrial location determinants in the Western Province of Sri Lanka. Then the data were collected from the representatives of the selected industries with a questionnaire and key informant interviews and thereafter, those data were analyzed by using the Frequency Distribution Analysis to identify the major industrial location determinants in the region. According to the findings, major location determinants were utility and infrastructure, market, transportation and the quality of life respectively, in descending order.

Then, the compatibility of the WRMPP was assessed by considering the availability of existing developments in the selected areas or planned development activities relevant to those major industrial location determinants under the WRMPP for the two industrial cities located at Horana and Meerigama. For that, a Context Analysis was performed. Findings reveals that the WRMPP has address most of the aspects of these determinants in a sufficient manner, except some of the sub factors such as attitudes of the utility agents, cost of fuel, Water way transportation, favorable competitive position, income trends, consumer characteristics, location of competitors, size of market and nearness to related industries. This chapter explained those in detail and the next chapter focuses on the case study area, data collection, analysis and the findings of the research.

CHAPTER – 05

CONCLUSIONS AND EXTENTIONS

When study the spatial evolution of the industrial development in Sri Lanka, the concentration of industries in the Western Region is apparent. As a result, now it has become the nerve center of the economy in the country. Hence, when introducing any development plan to the region, it should exceedingly concern about the requirements of the existing and future industries. Especially, when relocate and providing opportunities for the new settlements by the development project, thinking about the location determinants is awfully important. At present, to spatially transform the urban agglomerations and to structurally transform the national economy a regional plan called "Western Region Megapolis Plan" which is estimated to spend 40 billion US$ and to realized the benefits at 2030, is at the planning stage and about to launch.

Thus, this study was carried out to identify the major determinants of industrial location in the Western province of Sri Lanka and to investigate whether the WRMPP has considered these location determinants by examine the plans of it. Accordingly, several objectives such as to identify the determinants of industrial location in the global context, to discover the major determinants of industrial location in the Western Province of the country, to identify the development activities which are planned to put into practice in the Horana and Meerigama industrial which are selected as two industrial cities by the WRMPP, relevant to the major location factors of industries in the Western Region and to investigate the compatibility of the WRMPP Plan relevent to the key location determinants of industries in the Western Region of Sri Lanka, were formulated.

This study was conducted as a qualitative research and a case study. To identify the determinants of industrial location, literature were reviewed. Then to identify the major location determinants in the Western Province of the country, the district of Colombo was selected as the case study area and secondary data were collected

from the relevant institutions to find the large scale manufacturing industries in Colombo. Disproportionate Stratified Random Sampling Method was used to choose a sample and questionnaires and Key Informant Interviews were used to collect the required raw data. After analyzing the data, utility/ infrastructure were found as the most influencing major industrial location determinant in the Western Province of Sri Lanka. It has influenced 70% of industries in the case study area. According to the ranking, second major factor was the market. Then as the second major industrial location determinant, 61% of industries in the sample have been highly influenced by the market. Transportation was identified as the third key location determinant and it has been a major determinant for 54% of industries in the sample. Fourth major factor was quality of life and this factor has made a greater influence on 42% of industries when selecting sites for location. Therefore, those four factors were recognized as the major industrial location determinants of the Western Province of Sri Lanka.

As the next factors, raw material had exerted its power on the location of 28% of industries and labor and existing industries have influenced on 26% and 25% of industries at their location decisions respectively. However, the safety, climate and the other factors had not influenced the location of any industry as a major location determinant. Existing water sources and the personal preferences had played a major role at the location decisions of 13% of industries and the other factors such as community, capital, lands, etc. had become the major location determinant, only for few industries.

Finally, compatibility was tested with the planned development activities relevant to the two industrial cities planned at Horana and Meerigama. According to the available data, the plan has not addressed two sub factors of infrastructure and utility, such as the attitudes of the utility agents who are responsible to supply these utilities as well as the cost of fuel. In the aspect of the transportation, it was difficult to find a plan to use the inland waterways for the transportation of raw materials and finished goods but there are some natural water ways which can be developed and used for transportation, in the areas between the Industrial Cities and the commercial

hub (appendix C.6 and D.5). Further, the available facts do not consist with any development activity to address some sub factors belong to the marketing facilities such as income trends, consumer characteristics, location of competitors, etc. have not been considered by the WRMPP. Therefore, it is hard to conclude that the WRMPP is highly compatible with the major location determinants of industries though it is compatible with all the sub factors belong to the quality of life and the majority of sub factors belong to the other major location determinants. However, the attempts taken to overcome these drawbacks may help to prepare a more effective plan and to achieve the expected industrial development in future.

Additionally, findings of this study related to the different industrial groups will be useful when supplying the amenities for different industries in the two Industrial Cities of this project and the future developments associate with the industries not only in the Western Region, but also in the other regions of the island.

For obtaining a more precise result regarding the major industrial location determinants of the Western Province, further studies could be carried out by increasing the sample size and the number of factors or by sub dividing the factors. Still the WRMPP is at the planning stage. Therefore, to obtain a more accurate findings, regarding the compatibility of the WRMPP relevant to the major location determinants, the analysis should be carry out after implementing the project.

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APPENDIXES

Appendix A: Questionnaire to Identify the Major Industrial Location Determinants in Colombo.

Questionnaire to identify the major Industrial location factors in Colombo

This survey is to identify the factors influence the industrial location in Sri Lanka, considering the industries located in Colombo. Findings of this survey are used only for academic purposes. Therefore, your kind cooperation for this highly appreciated.

Note: Please mark ✓ when selecting.

1. Sector engage in:
    1. Government ☐
    2. Semi government ☐
    3. Private ☐
    4. Other ☐
2. Type of the industry:
    ……..……..
    ……
3. Position holding / Designation in the Institute / Organization / Industry:
    ……
    ……
4. Following table consists with different factors which could influence the establishment and continuing your industry at this particular location. Also each factor consists with sub factors which can act as location determinants. Considering these, please mark the influence level of each and every factor in the following table by using √.

No.	Determinant and Relevant Factors	Response		
		High	Moderate	Low
1	**Raw Materials** Proximity to supplies, Availability of raw materials, Nearness to component parts, Availability of storage facilities, Location of suppliers and Freight cost.			
2	**Transportation** Pipeline facilities, Airway facilities, Highway facilities. Railroad facilities, Waterway transportation, Shipping cost of raw material, Cost of finished goods transportation, Availability of postal services, Warehousing and storage facilities and Availability of wholesale outlets			
3	**Market** Existing consumer market, Potential consumer market, Anticipation of growth of markets, Shipping costs to market areas, Marketing services, Favorable competitive position, Income trends, Population trends, Consumer characteristics, Location of competitors, Future expansion opportunities, Size of market and Nearness to related industries.			
4	**Labor** Low cost labor, Attitude of workers, Managerial labor, Skilled labor, Wage rates, Unskilled labor, Unions, Educational level of labor, Dependability of labor, Availability of labor, Cost of living and Worker stability.			

No.	Determinant and Relevant Factors	Response		
		High	Moderate	Low
5	**Personal Preferences** (Desire to locate closer to the Home town of the owner, desire to locate closer to the existing industry/ industries or any other preference.)			
6	**Community** (Attitude of community residents, Religious facilities, Recreational facilities, Attitude of community leaders.)			
7	**Utilities/Infrastructure** (Attitude of utility agents, Water supply, Disposable facilities of industrial waste, Availability of fuels, Cost of fuels, Availability of electric power, Cost of electric power and Availability of gas, Medical facilities, Shopping centers, Hotels Banks and credit institutions, Colleges and research institutions, etc.)			
8	**Tax Incentives** (Cash grants, tax holidays, low interest loans and accelerated depreciation, etc.)			
9	**Quality of Life** (Good schools, local transportation, recreational and house hold amenities and health and other facilities)			
10	**Government Interventions** (Building regulations, Land Use Zoning, Compensation laws, Insurance laws, Safety inspections and Pollution laws, etc.)			

No.	Determinant and Relevant Factors	Response		
		High	Moderate	Low
11	**Existing industries/ Industrial Cluster** (Economies arising from being with the other industries in the same area such as decreased transportation and transaction costs, decrease production cost, strengthen the competitiveness, reduce costs for shared tangibles and intangibles, presenting opportunities for entrepreneurial activity, knowledge spillovers, labor market pooling, input sharing, etc.)			
12	**Less Stringent Environmental Regulations** (Not having strict environment regulations regarding the pollution of the industries)			
13	**Water** (Water availability, Groundwater source, Open water sources to releases waste water)			
14	**Land** (Land availability, Topography, Land cost, Enough space for future expansions, Accessibility, Well drained, load-bearing characteristics and Developed industrial area)			

No.	Determinant and Relevant Factors	Response		
		High	Moderate	Low
15	**Safety** (Safety of the industry, Safety of the employers and the employees.)			
16	**Climate** (temperature, precipitation, humidity, wind velocity, the level of ground, topography of the region, water facilities, drainage facilities and disposal of waste products)			
17	**Capital** (Availability of capital in the area, Availability of capital with the owner)			
18	**Other Factors** (Cost of operations, custom duties, tariffs, inflation, strength of currency against US dollar, business climate, country's debt, interest rates/exchange controls, GDP/GNP growth, sales growth, population trends, etc.)			

Appendix B: Relative frequencies of the major Location Determinants of Different Categories of industries in Colombo

B.1. Relative frequencies of the major Location Determinants of Textile and Apparel industries in Colombo

Table B.1.1: Relative frequencies of the major Location Determinants of Textile and Apparel Industries in Colombo

TEXTILE AND APPAREL	IND1	IND2	IND3	IND4	IND5	IND6	IND7	IND8	IND9	IND10	IND11	IND12	IND13	IND14	IND15	IND16	IND17	Freque	Relative Frequenc
Raw Meterials																		0	0
Transpotation	1			1		1	1		1	1	1	1		1	1		1	11	65
Market								1					1					2	12
Labour	1	1					1					1				1		5	29
Personal Preferences			1	1							1							3	18
Community																		0	0
Utility/Insfrastructure	1	1	1	1	1	1	1	1	1		1	1	1	1	1		1	15	88
Tax Incentives				1					1			1			1		1	5	29
Quality of Life	1			1		1	1		1	1		1		1		1	1	10	59
Government Interventions				1		1	1			1				1				5	29
Exisiting Industries		1														1		2	12
Less Stringent Environmental Regulations																		0	0
Water																		0	0
Land								1										1	6
Safety																		0	0
Climate																		0	0
Capital			1				1							1				3	18
Others																		0	0

Source: Author

B.2. Relative frequencies of the major Location Determinants of Paper and Paper Products industries in Colombo

Table B.2.1: Relative frequencies of the major location determinants of Paper and Paper Products Industries in Colombo

PAPER AND PAPER PRODUCTS	IND1	IND2	IND3	IND4	IND5	Frequency	Relative Frequency
Raw Meterials						0	0
Transpotation		1	1	1	1	4	80
Market	1			1	1	3	60
Labour						0	0
Personal Preferences						0	0
Community						0	0
Utility/Insfrastructure	1	1		1	1	4	80
Tax Incentives						0	0
Quality of Life	1			1		2	40
Government Interventions						0	0
Exisiting Industries			1		1	2	40
Less Stringent Environmental Regulations						0	0
Water						0	0
Land						0	0
Safety						0	0
Climate						0	0
Capital						0	0
Others						0	0

Source: Author

B.3. Relative frequencies of the major Location Determinants of Wood and Wood Products industries in Colombo

Table B.3.1: Relative frequencies of the major location determinants of wood and wood products industries in Colombo

WOOD AND WOOD PRODUCTS	IND1	IND2	IND3	IND4	Frequenc	Relative Frequen
Raw Meterials			1	1	2	50
Transpotation	1			1	2	50
Market	1	1	1	1	4	100
Labour	1		1	1	3	75
Personal Preferences	1				1	25
Community			1		1	25
Utility/Insfrastructure		1		1	2	50
Tax Incentives					0	0
Quality of Life		1			1	25
Government Interventions					0	0
Exisiting Industries	1			1	2	50
Less Stringent Environmental Regulations					0	0
Water					0	0
Land					0	0
Safety					0	0
Climate					0	0
Capital					0	0
Others					0	0

Source: Author

B.4. Relative frequencies of the major Location Determinants of chemicals/petroleum/rubber /plastic industries in Colombo

Table B.4.1: Relative frequencies of the major location determinants of Chemicals/Petroleum/Rubber /Plastic Industries in Colombo

CHEMICLES/PETROLEUM/RUBBER /PLASTIC	IND1	IND2	IND3	IND4	IND5	IND6	IND7	IND8	IND9	IND1	IND1	IND1	IND1	IND1	IND1	IND1	IND1	IND1	IND1	IND2	IND2	IND2	IND2	Frequency	Relative Frequency
Raw Meterials																								0	0
Transpotation	1		1	1	1		1	1			1	1	1		1		1	1	1	1	1	1	1	17	74
Market		1		1	1		1		1	1		1	1	1	1	1			1		1	1		14	61
Labour	1			1				1		1								1	1		1			7	30
Personal Preferences							1									1							1	3	13
Community						1						1									1			3	13
Utility/Insfrastructure	1		1	1		1		1	1		1	1	1	1		1	1	1		1	1	1	1	17	74
Tax Incentives																								0	0
Quality of Life		1		1			1			1			1				1			1		1		8	35
Government Interventions																								0	0
Exisiting Industries			1				1							1							1			4	17
Less Stringent Environmental Regulations	1	1		1		1			1			1								1				7	30
Water																								0	0
Land																								0	0
Safety																								0	0
Climate																								0	0
Capital																								0	0
Others																								0	0

Source: Author

B.5. Relative frequencies of the major Location Determinants of metal products industries in Colombo

Table B.5.1: Relative frequencies of the major location determinants of Metal Products Industries in Colombo

METAL PRODUCTS	IND1	IND2	IND3	IND4	Frequency	Relative Frequency
Raw Meterials	1			1	2	50
Transpotation	1	1	1	1	4	100
Market		1	1	1	3	75
Labour					0	0
Personal Preferences		1	1		2	50
Community					0	0
Utility/Insfrastructure	1			1	2	50
Tax Incentives					0	0
Quality of Life				1	1	25
Government Interventions					0	0
Exisiting Industries		1			1	25
Less Stringent Environmental Regulations					0	0
Water					0	0
Land					0	0
Safety					0	0
Climate					0	0
Capital					0	0
Others					0	0

Source: Author

B.6. Relative frequencies of the major Location Determinants of non metal products industries in Colombo

Table B.6.1: Relative frequencies of the major location determinants of Non - Metal Products Industries in Colombo

NON METAL PRODUCTS	IND1	IND2	IND3	IND4	IND5	IND6	IND7	IND8	IND9	IND10	IND11	Frequenc	Relative Frequenc
Raw Meterials	1	1	1			1				1	1	6	55
Transpotation												0	0
Market	1	1	1	1	1		1	1		1	1	7	64
Labour												0	0
Personal Preferences												0	0
Community				1			1			1		2	18
Utility/Insfrastructure	1	1	1	1	1	1	1	1	1	1	1	8	73
Tax Incentives												0	0
Quality of Life			1	1	1			1		1		4	36
Government Interventions												0	0
Exisiting Industries		1	1	1	1		1		1		1	6	55
Less Stringent Environmental Regulations												0	0
Water	1	1	1		1	1					1	5	45
Land												0	0
Safety												0	0
Climate												0	0
Capital												0	0
Others												0	0

Source: Author

B.7. Relative frequencies of the major Location Determinants of other industries in Colombo

Table B.7.1: Relative frequencies of the major location determinants of other industries in Colombo

OTHER	IND1	IND2	IND3	Frequency	Relative Frequency
Raw Meterials		1	1	2	67
Transpotation				0	0
Market		1	1	2	67
Labour	1			1	33
Personal Preferences				0	0
Community				0	0
Utility/Insfrastructure	1		1	2	67
Tax Incentives				0	0
Quality of Life		1	1	2	67
Government Interventions				0	0
Exisiting Industries				0	0
Less Stringent Environmental Regulations				0	0
Water				0	0
Land				0	0
Safety				0	0
Climate				0	0
Capital				0	0
Others				0	0

Source: Author

Appendix C: Compatibility of the Horana Industrial City with the Major Location Determinants of Industries

C.1. Planned activities under WRMPP to develop utility and infrastructure facilities in Horana Industrial City area

Table: C.1. 1. Planned activities under WRMPP to develop utility and infrastructure facilities in Horana Industrial City area

No.	Sub factor	Planned Activity/ Activities
01	Water supply	With the development of Kaluganga Water Supply Project Phase ii and Ingiriya, Handapangoda Water Supply Project; reliable and safe water will be supplied to the whole area in a sufficient manner.
02	Disposable facilities of waste	Central Effluent Treatment Plant facility, Waste Water treatment and Solid waste management facilities with the introduction of waste water collection, treatment and disposal system for Horana Industrial Zone
03	Availability of telecommunication facilities	Improvement of telecommunication (Telephone, e-mail, internet, Wi-Fi) in the industrial area. Development of information centers/ communication centers in the city center
04	Availability of electric power	Uninterrupted power supply.
05	Availability of fuel	Development of the city center with service industries, filling stations, etc.
06	Medical facilities	Existing Base Hospital, development of health centers in residential areas.
07	Shopping centers	Development of shopping areas/ complexes in the industrial clusters. Development of the city center with retail/wholesale/ merchandise/ marts, shopping malls, open trading areas with required parking facilities.
08	Hotels Banks and credit institutions, etc.	Development of hotels in industrial areas, banking, insurance and other financial institutions in the secondary service areas/ logistic hubs. Development of banks/ commercial offices in the city center. Establishment of business development center and business incubators.
09	Colleges and research institutions	Development of existing collages/ universities /research and other institutions and new establishments in the Secondary Service Areas.
10	Other	Development of storm water management facilities, fire fighting/ rescue facilities in the area.

Source: WRMPP

C.2. Planned activities under WRMPP to develop transport facilities in Horana Industrial City area

Table: C.2. 1. Planned activities under WRMPP to develop transportation facilities in Horana Industrial City area

No.	Sub factor	Planned Activity/ Activities
01	Roadway/ Highway facilities	Multimodal logistics transportation facility, Introduction of shuttle bus services connecting residential areas and industrial parks. Development of wide asphalt concreted internal road network with the existing roads in the area. Improvement of the existing roads by widening into 4 lanes with required intersection improvements. Horana- Meerigama, Negombo- Meerigama and Ja-Ela-Divlapitiya road improvement.
02	Railway facilities	Construction of new electrified railway lines via Horana.
03	Airway facilities	Development of Katunayake air port, aero city and easy and quick access from the industrial areas.
04	Shipping cost of raw material	The planning area is only 35 km away from the city of Colombo Comparatively lesser distances; Distance to the airport is 70 km by rail/ 60 km by road/ 75 km by the expressway. Distance to the port is 38 km by rail/ 50 km by road/ 70 km by the expressway. Distance to the logistic corridor is 53 km by rail/ 45 km by road/ 55 km by the expressway.
05	Cost of finished goods transportation	
06	Warehousing and storage facilities	Development of logistics hubs with container yards, container handling facilities, warehousing, cold storages, office space, inter modal transfer facilities, banking & insurance & etc.
07	Connectivity	Connectivity through E 01Expessway, proposed Ruwanpura Expressway, proposed rail links. Shuttle bus services connecting residential areas and industrial parks. Development of Mini Logistics Hubs at each cluster with access from either expressway or railway network.

Source: WRMPP

C.3. Planned activities under WRMPP to develop marketing facilities in Horana Industrial City area

Table: C.3. 1. Planned activities under WRMPP to develop marketing facilities to assist the Horana Industrial City

No.	Sub factor	Planned Activity/ Activities
01	Existing consumer market	Development of shopping areas/ complexes and open trading areas in the industrial clusters.
02	Potential consumer market	Development of the city center with retail/wholesale/ merchandise/ marts, shopping malls, open trading areas with required parking facilities
03	Anticipation of growth of markets	High density commercial zone in the CBD including the future "Port City" Medium density commercial zones and corridors outside the CBD
04		Medium density commercial corridor (waterfront) along the coastal area High density commercial nodes will be allocated around the RTS stations Development of Mini Logistics Hub at each cluster.
05	Population trends	Expected population in 2030 is 3,81,137

Source: WRMPP

C.4. Planned activities under WRMPP to develop the quality of life in Horana Industrial City area

Table: C.4. 1. Planned activities under WRMPP to develop the quality of life in Horana Industrial City area

No.	Sub factor	Planned Activity/ Activities
01	Local transportation	Wide access roads in the area, Horana- Meerigama, Negombo- Meerigama and Ja-Ela- Divlapitiya road improvement, Development of Multimodal logistics transportation facility, Development of shuttle bus services connecting residential areas and industrial parks.
02	Recreational and house hold amenities	Development of workers quarters, housing units, recreational areas, swimming pools, day care/ nursery, retail shops, hotels and entertainment areas, sport complexes, industrial apartments and play grounds in the industrial clusters. Development of public parks and open spaces in the city center and in the industrial clusters. Development of industrial clusters and the secondary service centers in the existing nodes with shopping complexes, restaurants, super markets, recreation buildings, film halls, hotels, parking areas, mixed development areas, etc. Establishment of multicultural center in Kaluthara and Community Reconciliation Center at Horana
03	Good schools and other and other educational institutions	Development of Good schools and other educational institutions in the secondary service centers except the existing schools
04	Health and other facilities	Development of the existing base hospital, development of health centers, clinics, etc. Redevelopment of the existing Horana town center to cater future demand.
05	Security	Existing police station, existing and immerging security services

Source: WRMPP

C.5. Expected land use of the Horana City center with the planned developments.

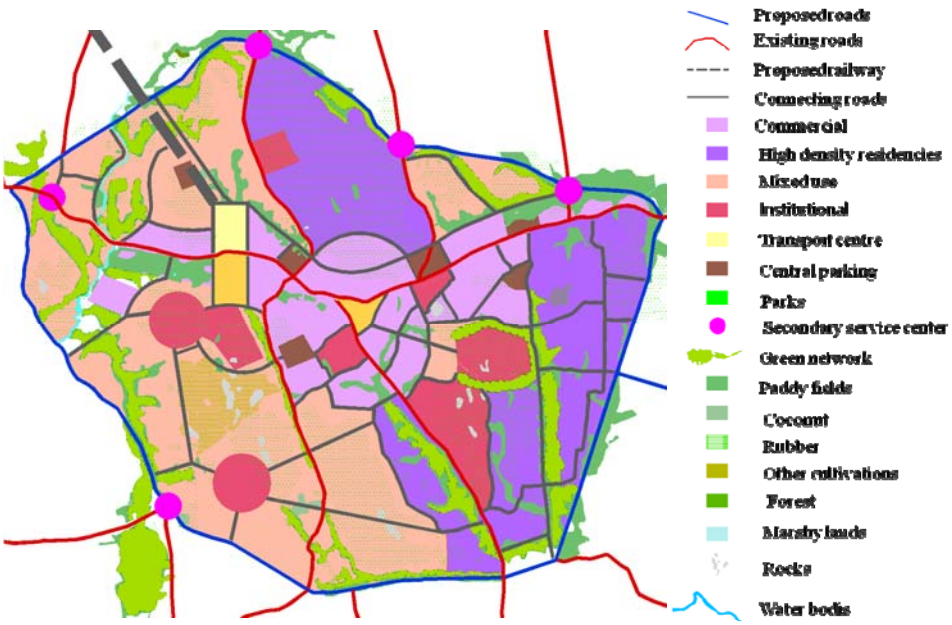

Figure: C.5. 1. Land use in Horana city center with the expected developments
Source: WRMPP

C.6. Locations and a conceptual plan of a Secondary Service Center

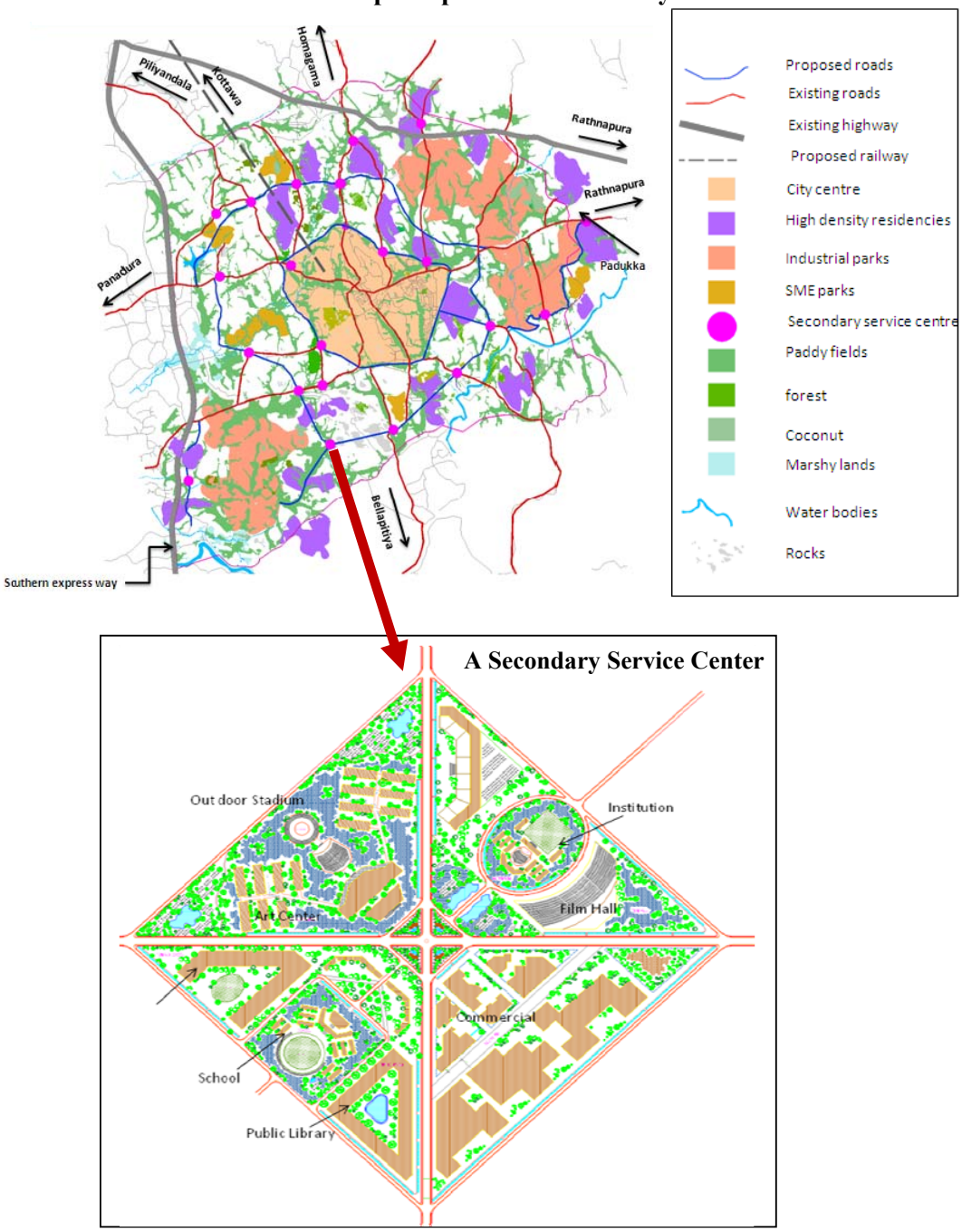

Figure: C.6.1. A conceptual plan of the industrial area at Horana and a Secondary Service Center

Source: WRMPP

C.7. Location of the Horana Industrial City, the Port and the Logistic Corridor.

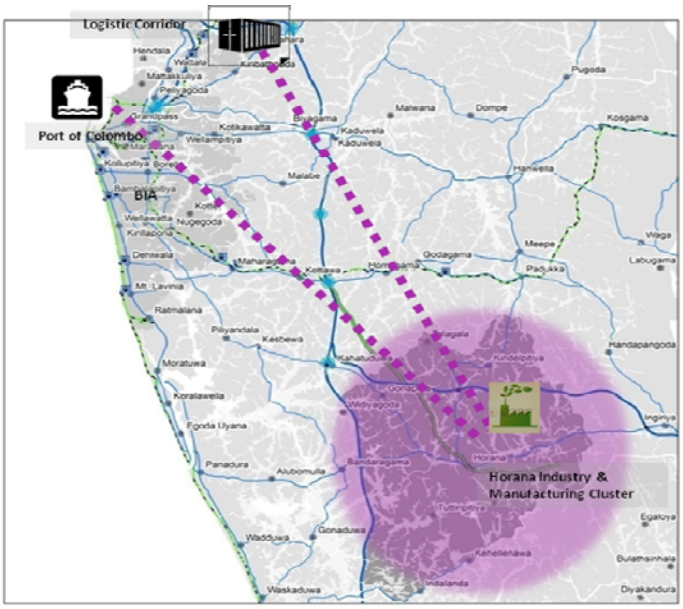

Figure: 4.5.10.4.1. Location of the Horana Industrial City, port and the Logistic Corridor.

Source: WRMPP

C.8. Conceptual land use plan of the Poruwadanda industrial cluster in Horana Industrial City

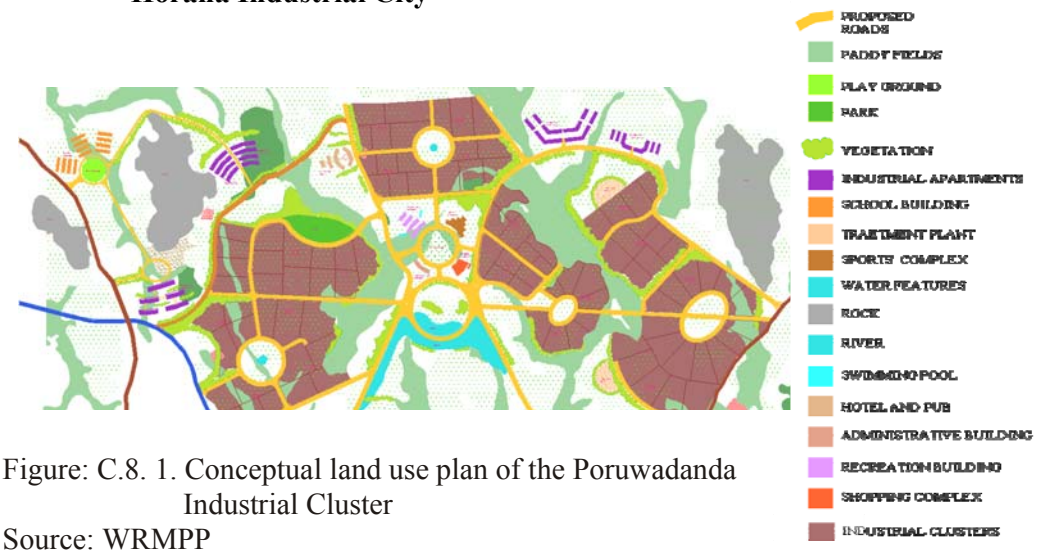

Figure: C.8. 1. Conceptual land use plan of the Poruwadanda Industrial Cluster
Source: WRMPP

C.9. Conceptual land use plan of the Millaniya industrial cluster in Horana Industrial City

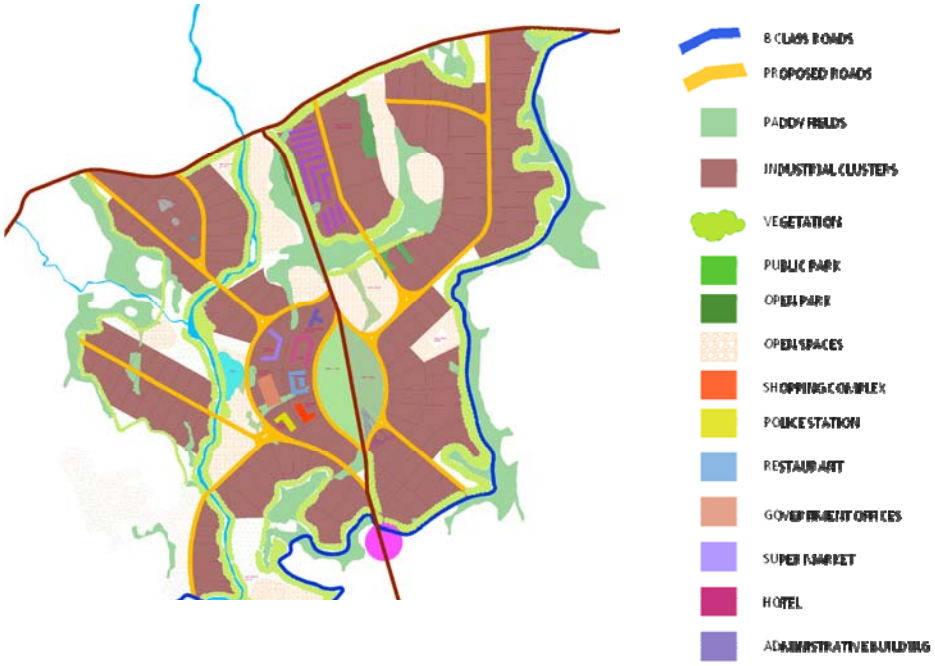

Figure: C.9. 1. Conceptual land use plan of the Millaniya industrial cluster
Source: WRMPP

C.10. Conceptual land use plan of the Moragahahena industrial cluster in Horana Industrial City

Figure: C.10.1. Conceptual land use plan of the Moragahahena Industrial Cluster
Source: WRMPP

Appendix D: Compatibility of the Meerigama Industrial City with the Major Location Determinants of Industries

D.1. Planned activities under WRMPP to develop utility and infrastructure facilities in Meerigama Industrial City area

Table: D.1.1. Planned developments under WRMPP in the Meerigama industrial area relevant to utility and infrastructure.

No.	Sub factor	Planned Activity/ Activities
01	Water supply	Development of Meerigama and Diulapitiya Water Supply Projects and the Development of existing water supply system will fulfill the water requirement.
02	Disposable facilities of waste	Waste Water treatment and Solid waste management facilities with the introduction of waste collection, treatment and disposal system for industrial clusters.
03	Availability of telecommunication facilities	Improvement of telecommunication (Telephone, e-mail, internet, Wi-Fi) in the industrial area. Development of information centers/ communication centers in the city center.
04	Availability of electric power	Adequate power supply.
05	Availability of fuel	Development of the city center with service industries, filling stations, etc.
06	Medical facilities	Existing hospital, development of health centers in residential areas.
07	Shopping centers	Development of shopping areas/ complexes in the industrial clusters. Development of the city center with retail/wholesale/ merchandise/ marts, shopping malls, open trading areas with required parking facilities.
08	Hotels Banks and credit institutions, etc.	Development of hotels in industrial areas, banking, insurance and other financial institutions in the secondary service areas/ logistic hubs. Development of banks/ commercial offices in the city center.
09	Colleges and research institutions	Development of existing collages other institutions
10	Other	Development of storm water management facilities, fire fighting/ rescue facilities in the area.

Source: WRMPP

D.2. Planned activities under WRMPP to develop transportation in Meerigama Industrial City area

Table: D.2.1. Planned activities under WRMPP to develop transportation facilities in Horana Industrial City area

No.	Sub factor	Planned Activity/ Activities
01	Roadway/ Highway facilities	Development of multimodal transport access Development of wide access roads Construction of rail connectivity for cargo Introduction of multimodal logistics transportation facility. Shuttle bus services connecting residential areas and industrial parks. Dedicated rail link Horana- Meerigama, Negombo- Meerigama and Ja-Ela- Divlapitiya road improvement.
02	Railway facilities	Main Railway lines which run through Mirigama links to North, East and Central part of the Country and Colombo.
03	Airway facilities	Development of Katunayake air port, aero city and easy and quick access from the industrial areas. Located in close proximity to Port of Colombo, Bandaranayake International Airport (BIA) and proposed logistics corridor.
04	Shipping cost of raw material	Comparatively lesser distances; Distance to the airport is 52 km by rail/ 35 km by road/ 65 km by the expressway. Distance to the port is 50 km by rail/ 53 km by road/ 50 km by the expressway. Distance to the logistic corridor is 35 km by rail/ 40 km by road/ 32 km by the expressway
05	Cost of finished goods transportation	
06	Warehousing and storage facilities	Development of logistics areas with container yards, container handling facilities, warehousing, cold storages, office space, inter modal transfer facilities, banking & insurance & etc.
07	Connectivity	Rail Connectivity for Cargo. Shuttle bus services connecting residential areas and industrial parks. Dedicated rail link. Development of Mini Logistics Hub with access from expressway and the road network.

Source: WRMPP

D.3. Planned activities under WRMPP to develop Market facilities in Meerigama Industrial City area

Table: D.3.1. Planned activities under WRMPP to develop Marketing facilities in Meerigama Industrial City area

No.	Sub factor	Planned Activity/ Activities
01	Existing consumer market	Development of shopping areas/ complexes and open trading areas in the industrial clusters. Development of the city center with retail/wholesale/ merchandise/ marts, shopping malls, open trading areas with required parking facilities High density commercial zone in the CBD including the future "Port City" Medium density commercial zones and corridors outside the CBD Medium density commercial corridor (waterfront) along the coastal area High density commercial nodes will be allocated around the RTS stations Development of Mini Logistics Hub at each cluster.
02	Potential consumer market	
03	Anticipation of growth of markets	
04	Population trends	Expected population in 2030 is 2,64,277

Source: WRMPP

D.4. Planned activities under WRMPP to develop quality of life in Meerigama Industrial City area

Table: D.4.1. Planned activities under WRMPP to develop the quality of life in Meerigama Industrial City area

No.	Sub factor	Planned Activity/ Activities
01	Local transportation	Wide access roads in the area, Horana- Meerigama, Negombo- Meerigama and Ja-Ela- Divlapitiya road improvement, Development of Multimodal transport access, Development of shuttle bus services connecting residential areas and industrial parks. Dedicated rail link.
02	Recreational and house hold amenities	Development of workers quarters, housing units, recreational areas, swimming pools, day care/ nursery, retail shops, hotels and entertainment areas, sport complexes, industrial apartments and play grounds in the industrial clusters. Development of public parks and open spaces in the city center and in the industrial clusters. Establishment of professional offices Development of Open trading areas, shopping complexes, restaurants, super markets, hotels, parking areas, mixed development areas, etc. in industrial areas and the city center.
03	Good schools and other educational institutions	Development of existing education facilities and establishment of new schools and other educational institutions in residential areas.
04	Health and other facilities	Development of the existing hospital, development of health centers, clinics, etc. Redevelopment of the existing town center to cater future demand.
05	Security	Existing police station, existing and immerging security services

Source: WRMPP

D.5. Existing situation in the Meerigama Industrial City area

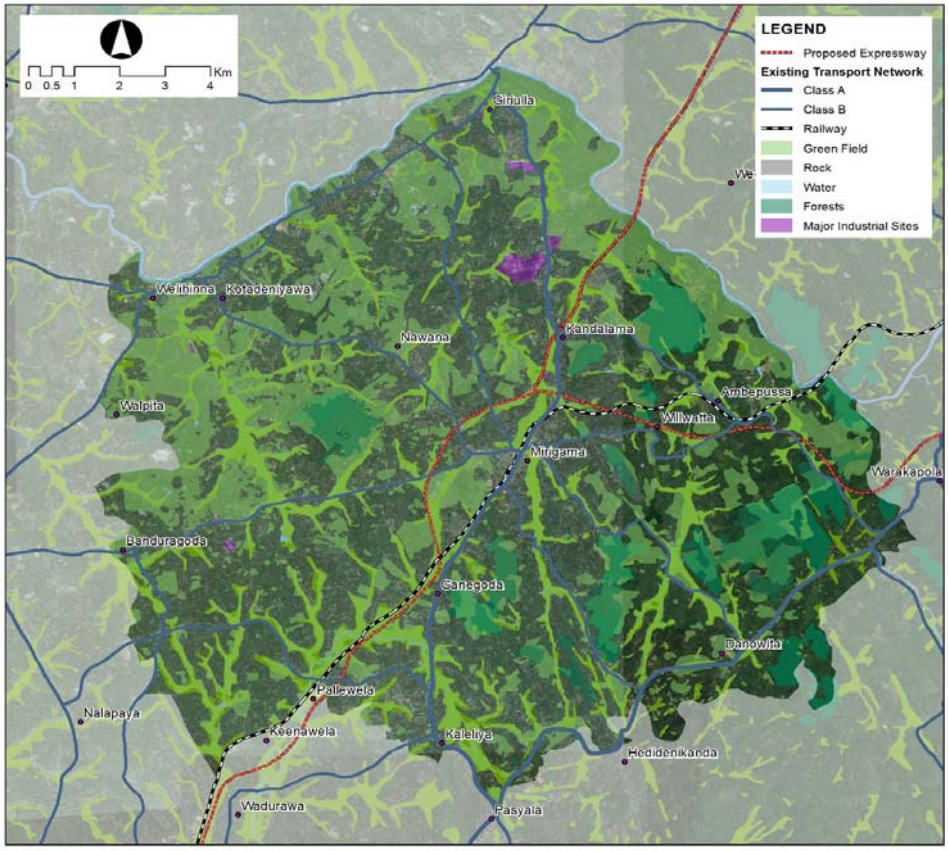

Figure: D.5.1.Existing situation in the Meerigama Industrial City area
Source: WRMPP

D.6. Zoning plan at the city center of Meerigama

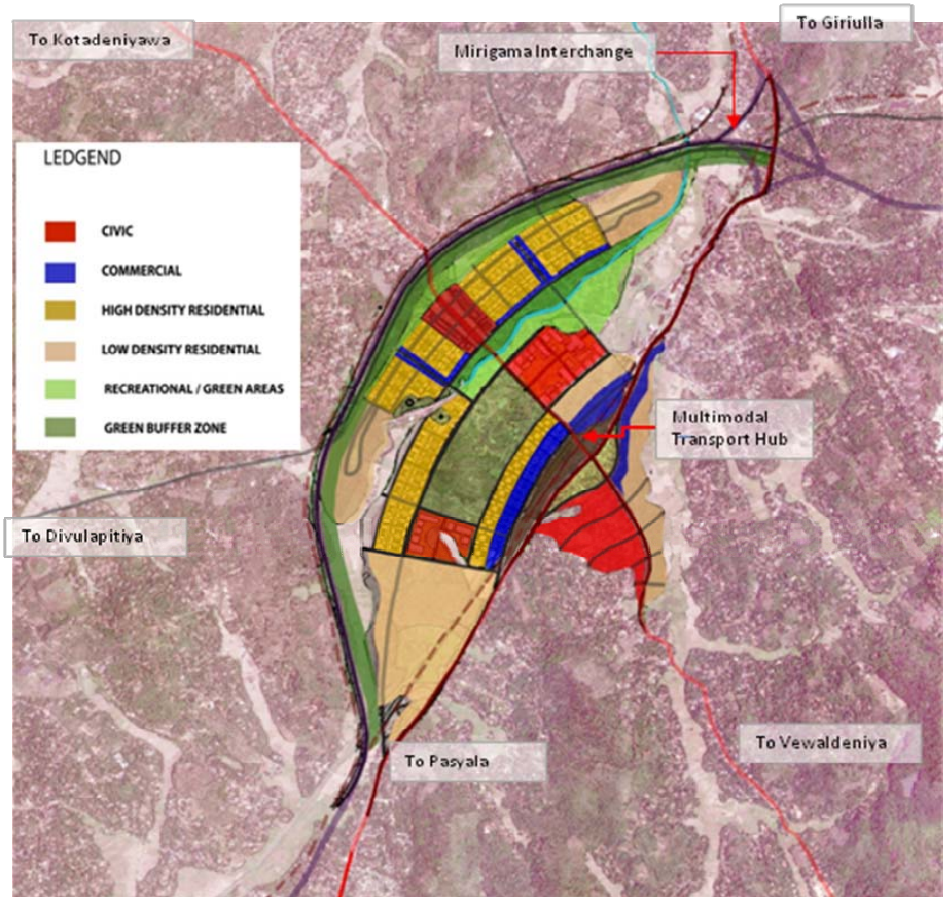

Figure: C.6.1. Zoning plan at the city center of Meerigama
Source: WRMPP

D.7. Conceptual plan of one of the industrial clusters in the Meerigama industrial City

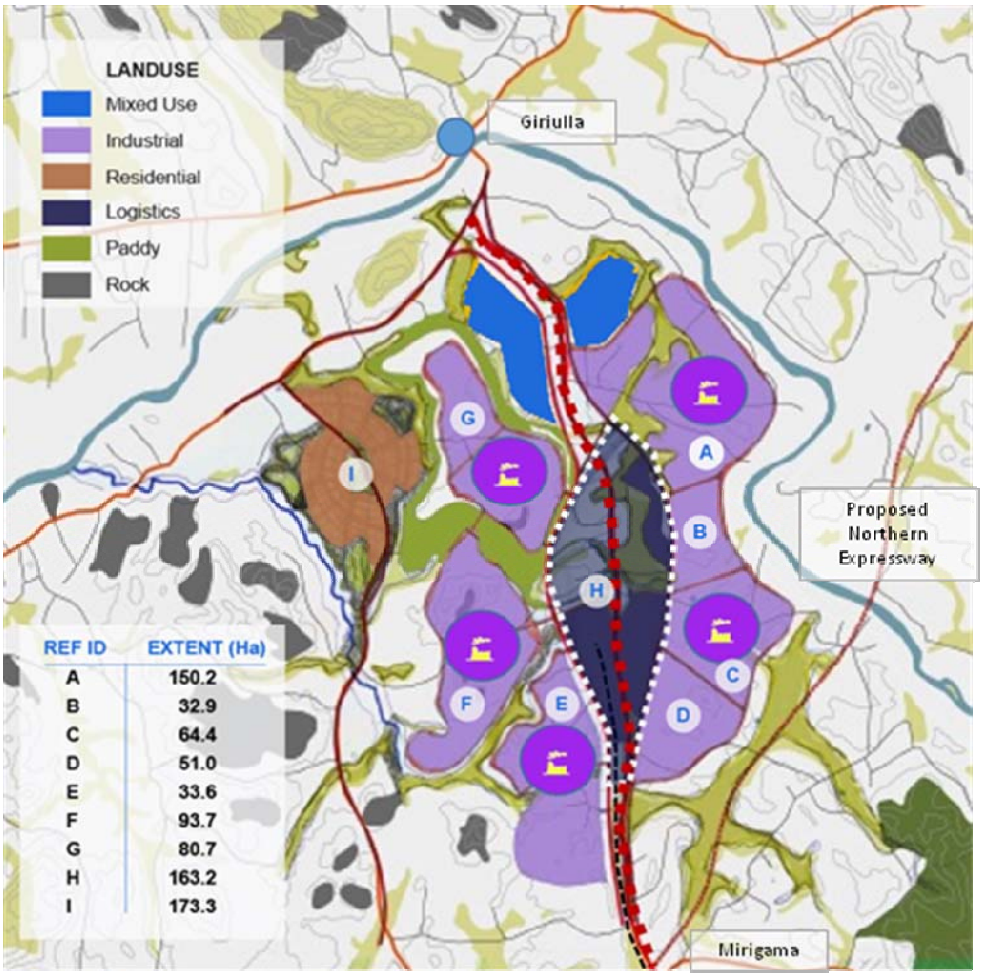

Figure: D.7.1. Conceptual plan of an industrial cluster in Meerigama Industrial City.
Source: WRMPP

D.8. Location of the Meerigama Industrial City, Port, Air port and the Logistic Corridor

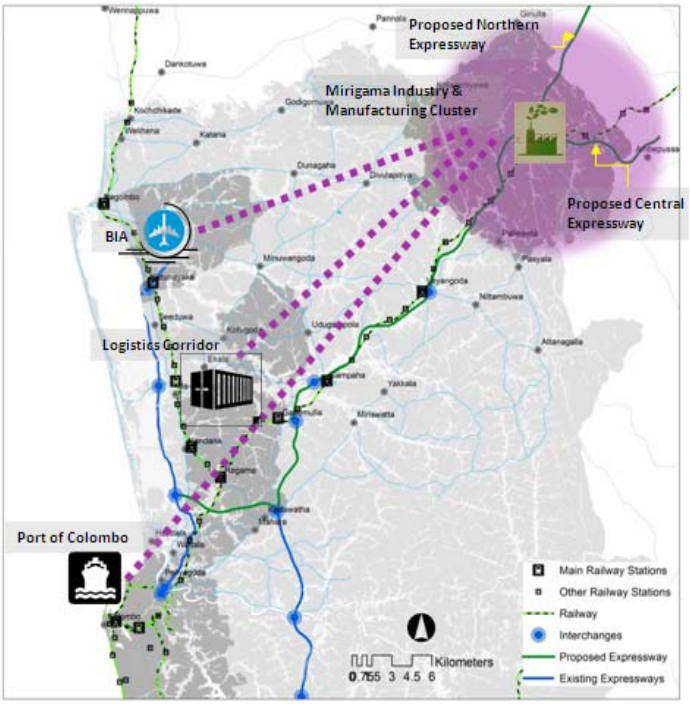

Figure: D.8.1. Location of the Meerigama Industrial City, Port, Air port and the Logistic Corridor.
Source: WRMPP

Appendix E: Planned activities under WRMPP to develop the market facilities in the Western Region

Table: E.1. Planned activities under WRMPP to develop the market facilities in the Western Region of Sri Lanka

No.	Sub factor	Planned Activity/ Activities
01	Expansion of the Market area and opportunities	Development of Aero Maritime Trade Hub - A trading hub for tea, gems, minerals and an oil and gas exchange, development of boat building industry and shipping related manufacturing
		Development of Aero-City Business- Park
		Development of Central Business District (CBD) which will be the hive of international trade, commercial and financial activity, with an attractive environment.
		Development of high density commercial zone in the CBD including the future "Port City" which is the major business and financial hub in South Asia and with that, a medium density commercial zone and corridors outside the CBD and a medium density commercial corridor (waterfront) along the coastal area.
		Establishment of Logistics City which is aimed at tapping into this strategic opportunity to grow logistics industries
		Development of leading Hotel Chains
		Development of a unique shopping district along Beira Lake
		Market area expansion with housing projects and increased population
02	Nearness to the Market area	Establishment of most of the leading marketing areas very much closer to the port and airport
03	Access to the Market area	Development of a good road network, transportation facilities, etc.
04	Shipping costs to market areas	Development of multimodal transport access which decreases the time and the cost.

Source: WRMPP