

## Integration of Urban Design and Industrial Estate Planning, a Case Study: Medan Industrial Estate, Indonesia

Hilma Tamiami Fachrudin <sup>a\*</sup> and Kausar Hj. Ali <sup>a</sup>

<sup>a</sup>School of Housing, Building & Planning, Universiti Sains Malaysia, MALAYSIA

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### ABSTRACT

There is no clear sense of urban design direction and even though considerable progress has been made in social and economic aspects, the quality of physical urban environment is still relatively low. While there are numerous studies commenting on urban design elements in city centre, little was written on the design elements of industrial areas. This paper will try to compare two industrial estates (KIM I and KIM II) in Medan, Indonesia as a case study. The aim is to have some assessment of how some urban design elements are being applied in both areas. To do this, urban design elements from Lynch (path, edge, district, node and landmark) and design guidelines from The Ministry of Industry were combined and used for analysis. From the comparison, KIM I development was more ad hoc and KIM II has more complete facilities and more friendly. Urban development in these cases continues to face the issues of accommodating economic development with a more balanced approach which includes promoting environmental sustainability, reconciling old and new development as well as matching development plans with economic expansion.

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## 1. Introduction

The goals of urban design can be summarized as designing and building urban environments that are structurally sound, functionally vibrant, and aesthetically pleasing or as

defined in architecture as utility, durability, and emotional satisfaction (Moughtin, 1999). In developing countries where resources are limited, this exercise can be daunting. The planners, faced with unemployment, inadequate housing, and overcrowding, are pressed between providing an economic livelihood to sustain local population as well as maintaining visually pleasurable environments. In some cases there is no clear sense of urban design direction or even tradition, especially at the local level where it counts most. In many developing cities, even though considerable progress has been made in social and economic aspects, the quality of physical urban environment is still relatively low.

While there are numerous studies commenting on urban design elements in city center (streets, neighborhoods, business districts, etc), little was written on the design elements of industrial areas. In older industrial areas where development was haphazard and ad hoc, the lack of proper planning was obvious. Aesthetics was not exactly high on the priority list where accessibility, infrastructure and maintenance of the roads take center stage. The problems are compounded when there is demand for expansion and the master plan is outdated. Economic policies that propagate expansion must also be followed by a master plan that accommodates industrial operations as well as provides considerations for the aesthetics. Urban development in these cases continues to face the issues of accommodating economic development with a more balanced approach which includes promoting environmental sustainability, reconciling old and new development as well as matching development plans with economic expansion.

This paper will try to compare two industrial estates in Medan as a case study. The aim is to have some assessment of how some urban design elements are being applied in both areas.

## **2. Urban Design and Industrial Estate**

### **2.1 Urban Design**

Urban design is not regarded as a profession but it transcends between architecture and urban planning (Koray, 1999). According to Urban Design Handbook of Baton Rouge City, US (2009), urban design is the field where planning and architecture can make or renew a sense of pleasure and natural identity. It can add the visual image and environmental quality by giving three-dimensional physical form to explain policy in the complete plan. Since

urban design involves modifying the natural environment, the built environment inevitably will have a lasting impact on the ecology and its subsystem. Conversely, in heavily built up areas, the presence of trees and shrubs and parks will not only cool down the air but also minimize the effects of air pollutants. Vegetation can indeed decrease air turbulence, filter dust particles and thus, cleansing breezes, as well as cools the air. Trees and shrubs offer psychological, aesthetic and functional benefits as well. They form softer boundaries, screen from the unsightly, and often help to humanize the scale of huge urban structures (Thompson, 1998).

According to Kevin Lynch in his book titled *The Image of the City* (1960), there are five aspects in urban design:

- a. Path, namely displacement or movement, including road, railway and highway.
- b. Edge, the perceived boundary between the region, including road, beaches, wall, etc.
- c. District, a section of a large part in the city, like area or neighbourhood.
- d. Node, the centre of district, intersection and focal point.
- e. Landmark, such as statue, high building, mountain, etc.

Meanwhile Shirvani (1985) divided urban forms into eight aspects, i.e.:

1. Land use, focuses on old and new physical planning and community development plan.
2. Form and building mass, refers to physical form to determine special height, setback and coverage.
3. Circulation and parking
4. Open space, including all landscape, soft and hard landscape (road and sidewalks), parks and recreation space in urban area.
5. Pedestrian walkways
6. Supporting activity includes all the uses and activities that help strengthen public space.
7. Signage, advertising sign have become increasingly important visual element quality.
8. Preservation does not refer solely to concern for historic structure and building, but also to a place and existing structure, permanent or temporary.

Spreiregen (1965) examines the urban visual survey which includes the visual elements in urban design namely: image of the city referred by Lynch (namely path, edge, district, node and landmark), as well as topography, climate, shape, size and density, pattern, urban space

and open space, route, activity centre, visual experience, strength and weakness of district, point of conflict, history, community conflict, preservation and sign.

Yoshinobu Ashihara (1970) compares the Japanese architecture with European architecture. The Japanese architecture regards the view from inside the house is more important than the view from the outside. But in European architecture, the view from outside of the building is more important. The townscape must have a balance between the width (w) and height (h) of the building's wall. The ratio of W and H is between 0.6 and 1 to give the good view of townscape.

According to Trieb in Poerbo (2001), the city is a product of conscious and unconscious decisions in economy, social and culture. The attractiveness of the city comes from the building and spatial diversity. The three dimensional aspects of the city consist of the visible urban elements of landscape, ground plan, open space and buildings. The angle to the building that allows people to enjoy the view of the building is 27° and for billboards and signage, 45° which would allow reading from the sidewalk from the other side of the street.

**Table 1:** Summary of Urban Design Visual Elements from Lynch, Spreiregen, and Shirvani

Lynch (1960)	Spreiregen (1965)	Shirvani (1985)
<i>Path</i>	<i>Path, route</i>	Circulation and parking Pedestrian pathway
<i>Edge</i>	<i>Edge</i> Topography Climate Shape Size Pattern	
District	Historic or special district Preservation Community structure	Land use Building mass and form Preservation
<i>Node</i>	Urban space Magnet, generator Special activity centres Point of conflict	Open space Support activity
Landmark	Vista, Visual experience Strong and weak areas of orientation Sign areas	signage

Lynch and Kepes in Laurence (2009) have studied the visual aspects of the urban environment that was fundamentally concerned with human experience of the city. They also

study about light, color and other phenomenological qualities of urban landscape as well as develop a ‘grammar of visual features’ which is called townscape. They also analyse and develop descriptions of significant visual elements: spaces, surfaces, silhouettes, masses, color and detail.

Some urban design definition summarized by Poerbo (2001) can be seen as a process, product, aspects in urban design and characteristics of urban design. Aspects in urban design can be divided into two:

1. Visual aspect, three dimensional design aspect of city planning.
2. Non-visual aspect, consist of social, economy, political, etc.

There are several theories about the visual elements of urban design proposed by Lynch (1960), Spreiregen (1965) and Shirvani (1985). The summarized from the three opinion about urban design visual elements indicated in Table 1.

There are some parts of emphasis, such as road, pedestrian ways, building, preservation, environment, cultural, social, politic, etc. Table 2 show the visual aspects of urban design based on Kevin Lynch’s (1960) theory:

**Table 2:** Visual Aspects of Urban Design.

ASPECT	ELEMENTS
<i>Path</i>	Road, street, pedestrian ways, railway, circulation & parking.
<i>Edge</i>	Space between wall/building, walls, beach.
<i>District</i>	Land use: Commercial area, housing area, industrial area and building.
<i>Node</i>	Open space, landscape, plaza.
<i>Landmark</i>	Statue, high building, fountain, signage.

Besides visual aspects, there are non-visual aspects that influence urban design, such as social, politic, economic and environment. The explanation of non-visual aspects can be explained in Table 3.

**Table 3:** Non-visual Aspects of Urban Design

ASPECT	ELEMENT
Social	Culture, preservation, activity.
Politic	Policy and strategy.
Economy	Architecture value.
Environment	Environment impact.

## 2.2 Integration Between Urban Design and Industrial Estate Planning

Urban design has several aspects that can be divided into visual and non-visual. Industrial estate planning can also be divided into two parts, i.e. physical and non physical. Industrial estate planning is based on the policies and strategies formulated by the government. The next steps are location decision making, planning master plan, design, and development process.

In Regulation of the Minister of Industry no. 35 of 2010, the technical guidelines for industrial estate, the principles of industrial estate development refer to the spatial suitability, availability of infrastructure and facilities, security and comfortable working environment and infrastructure and facilities network. The industrial estate land use pattern from technical standard of industrial estate from the Minister of Industry, Republic of Indonesia is shown in Table 4. In industrial estate planning there are several steps, namely:

1. Pre-feasibility industrial estate development
2. License
3. Analysis of environment impact
4. Industrial estate design planning (master plan)

**Table 4:** Industrial Estate Land Use Pattern.

No	Type	Usage Structure (%)	Remark
1	Industrial plots	Max 70 %	Every plot must follow the ratio from state government (60:40)
2	Road and drain	8 – 12 %	Accessibility to primary road and secondary road (service) Primary axle emphasis minimum 8 ton and secondary minimum 5 ton Road minimum 7 m
3	Open space	Min 10%	Green belt, park and perimeter.
4	Support facilities	6-12 %	Eq: canteen, guest house, place of worship, sport facilities, etc.

*Source:* Technical standard of industrial estate contained in the decrees of Minister of Industry Republic of Indonesia number: 291/M/SK/10/1989 date October, 1989 and the decrees of Minister of Industry number: 35, 2010

From the theories and guidelines of urban design that were explained above, Table 5 explains the visual aspects in industrial estate planning and Table 6 shows the non-visual aspects in industrial estate planning.

**Table 5:** Visual Aspects in Industrial Estate Planning

ASPECT	ELEMENT
Path	Infrastructure Circulation & parking
Edge	Landscape, street furniture
District	Land use/Zoning Building Open space
Node	Roundabout, plaza
Landmark	Statue, high building, fountain, signage.

**Table 6:** Non-visual Aspects in Industrial Estate Planning

ASPECT	ELEMENT
Social	Activity.
Politic	Policy, regional planning.
Economy	Economic value of area: location, workforce, resource
Environment	Pollution

### 3. Methodology

The objective of this research is to find and assess the integration and application of urban design in industrial planning. Industrial estates in Medan, Indonesia were selected as a case study for this research. The variables of this research are the five visual aspects of urban design as outlined in Table 5 above: Path, Edge, District, Node, and Landmark. The elements observed in this study were developed by merging the elements of visual aspects in urban design and the elements of visual aspects in industrial planning. Data were collected by observation in the study area. A comparison analysis of the elements is made on the two areas: Medan Industrial Estate I and Medan Industrial Estate II.

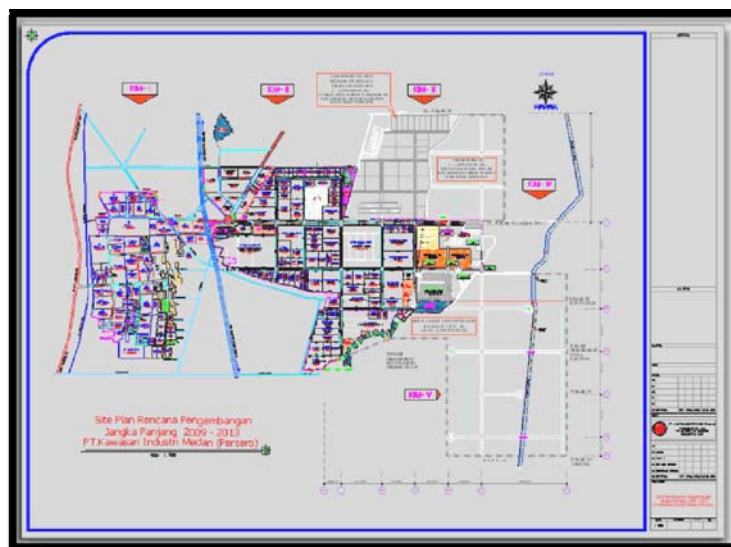
#### 3.1 Background of Medan Industrial Estate Planning

Medan city is the third largest city in Indonesia. Medan has an industrial estate named Kawasan Industri Medan (KIM). PT. (Persero). Medan industrial estate (PT. KIM) was established on 1998 with the status of State-Owned Enterprise (SOEs). Since it was first opened, PT. KIM continues to develop the land to accommodate the high interest of investors to invest in North Sumatera. The total area is 780 hectares and will continue to be developed by enterprises or with private parties with professional experience in industrial estate development. Currently there are 86 national private companies and 17 foreign companies.

KIM area is divided into two phases: Phase 1, with an area of 190.72 hectares that is located on the western highway and Phase 2 with an area of 368.06 hectares in the east of the highway. Currently, a third phase is being planned to be built, but still in the process of land acquisition. Location map of KIM I, II and III is shown in Figure 1.

KIM is located in the northern part of Medan city, in Medan Deli district. This area has good accessibility through well connected roads, near to Belmera highway gate and close to Belawan port. There are public and social facilities in the area, such as banking services, post office, commercial area, telecommunication services for new connection service, payment of account, the internet, teleconference and places of worship (masjid and church).

Phase 2 is well planned, with main road inside and outside the area of 2 x 17.5 m and 12 m for secondary road. On both sides of the road, infrastructural lines and drainage systems were laid out: sewerage, clean water pipes, gas lines, fire hydrants, electricity and telephone cables with underground construction.



**Figure 1:** KIM Site Plan Source: KIM (2010). (Source: <http://www.kim.co.id>).

Medan Industrial Estate is located near to the infrastructure such as road and highway, and port to facilitate acquisition of raw materials and distribution of finished products.

### 3. Analysis of Visual Factors of Medan Industrial Estate

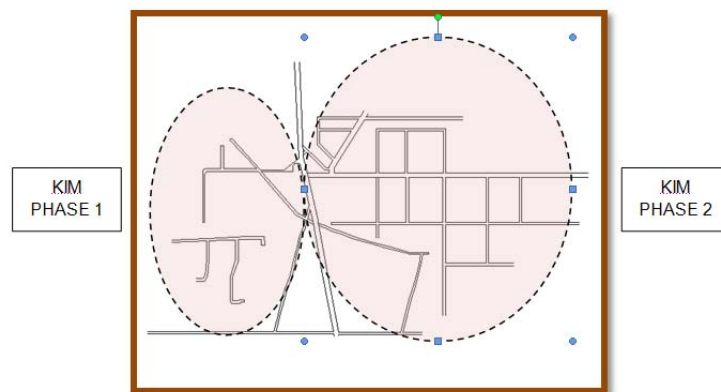
Medan Industrial Estate was divided into two stages, namely Kawasan Industri Medan I (KIM I) and Kawasan Industri Medan II (KIM II). These industrial estates are opposite each



other and bounded by roads. For the analysis, this research will study about the visual aspects of industrial estate that were divided to five parts referring to the principles of urban design that was developed by Kevin Lynch.

### a. Path

Lynch (1960) indicated that path is the most important element of urban design. Normally, the first element designed in any plan is the path. Paths in industrial estate are the infrastructure, circulation and utilities such as drainage, water and electricity. KIM I has the main roads and secondary roads with a less regular pattern. There are constant interrupted and irregular flows of traffic. On the other hand, the KIM II with its iron grid of 48 meter wide main roads and secondary roads are wide enough to accommodate the heavy traffic flow. Figure 2 shows the road pattern comparison between KIM I and KIM II.



**Figure 2:** Road pattern of KIM I & KIM II.



**Figure 3:** Main road of Medan Industrial Estate; KIM I (Left), KIM II (Right).

As far as the street pattern is concerned, KIM I has many *cul-de-sacs* so the traffic flow becomes more irregular and interrupted. In addition, container trucks and long vehicles face

problem while reversing. The street pattern at KIM II has a grid iron shape and has a lot of intersections. The grid iron pattern is better from the view of design, as it maintains regularity, but the numerous junctions can also make the roads become more crowded. Along the street there are ditches and drainage, while electricity sources exist along the central part of the main road of KIM II. The condition of main road in KIM I and KIM II is shown in Figure 3.

### b. Edge

The second factor is the edge that consists of landscape, open space, parking and street furniture. From Figure 4, KIM I and KIM II have shades of trees on the left and right sides of the road while the main road has trees planted in the middle of the road divider.



**Figure 4:** Edge factor of Medan Industrial Estate; KIM I (Left), KIM II (Right).

The plants on both sides of the road and in the middle of the road make this industrial estate becomes more shady and cooler. Landscaping plants were neatly arranged along pedestrian paths. Trees on the side of the road at KIM I and KIM II have an average span less than 0.5 meters and provide some sense of road direction. In KIM I, the middle of the road has a wider span, while in KIM II the small trees planted serve to beautify the place and provide some aesthetic value. Existing street furniture on the KIM II consist of street lights, bins and signage.

### c. District

KIM I has industrial and commercial areas. There are many lots that are used for the firm, while the KIM II has industrial areas, commercial areas and public and social facilities that were planned into the districts.



**Figure 5:** CBD in Medan Industrial Estate; KIM I (Left), KIM II (Right)



**Figure 6:** Office Management of Medan Industrial Estate.

Land use for industrial lots in both industrial estates already follow the standard issued by the Industrial Ministry of Indonesia that is approximately 70% of total area. The CBD complex of KIM I and KIM II is shown in Figure 5. Other existing facilities include places of worship, canteen and sport facilities. There is a building for playing futsal located between KIM I and KIM II and it is being shared by both areas. Figure 6 is a management office called ‘Wisma Kawasan Industri Medan’ located in the KIM II.

District arrangement at KIM I looks more crowded, while at KIM II it has some regularity. At KIM II, the commercial district is located in the middle of the industrial area, while the public facilities are located at the front of the industrial area. This arrangement is done so that the district can be accessed from all directions.

#### d. Node

Lynch (1960) stated that node is an important point in urban design, something which becomes a focus, can be accessed from all directions and a place for people to congregate whether they are coming or going. From observation, KIM I does not have a node that becomes the foundation of the area, while KIM II has a big roundabout in front of the gate. This roundabout becomes an important feature of the highway leading to KIM I and II.



**Figure 7** Node of Medan Industrial Estate.

Roundabout becomes the point for people who will enter the KIM I and KIM II from the road and highway. Figure 7 is a roundabout in KIM II that function as a focus point for the surrounding area.

#### e. Landmark

KIM I and Kim II have a landmark in the site. KIM I has a gate at the entrance and exit area. KIM II has one main gate in front of the estate that is equipped with signage. Figure 8 is a gate in KIM I and KIM II as a landmark in this area.



**Figure 8:** Landmark of Medan Industrial Estate; KIM I (Left), KIM II (Right).

Inside the industrial estate there are some signage to facilitate the user to the destination. KIM I does not have a lot of signage, while KIM II have a more complete and clear signage. The signage would help people who are going to KIM I and KIM II. The comparison of the physical and visual aspects of KIM I and KIM II can be concluded in the Table 7.

**Table 7: Physical and Visual Aspects of KIM I and KIM II.,**

ASPECT	ELEMENT	KIM I	KIM II	STANDARD	
Path	Infrastructure	Main road = 24 m	Main road = 48 m	Accessibility to primary road and secondary road (service) Primary axle emphasis minimum 8 ton and secondary minimum 5 ton, Road minimum 7 m	
	Circulation	Cul de sac	Grid iron, lot of intersection	Electric, communication, water, drainage	
	Utility	Complete, well maintained	Complete, well maintained		
	Parking	Not available	Not available		
Edge	Edge between district	Wall, no buffer	Wall, no buffer		Min 10 %
	Landscape	Beside & in the middle of the road, span <0.5 m	Beside the road, small trees in the middle of the road		
	Street furniture	Street lamp	Street lamp, bins		
District	CBD lot	Available	Available	70%	
	Industrial lot	Well maintained	Well maintained		
	Building	Well maintained	Well maintained		
	Facilities	Available	Available in front of area	Min 10%	
	Office management	Not available	Available		
	Open space	In the middle of main road	In the middle of main road		
Node	Roundabout	Not available	Available as focus point	-	
	Guardpost	Available	Available		
Landmark	Gate	2 gate	1 gate	-	
	Signage:	Traffic flow	Available		Available, complete
		Information	Not available		Not available
		Road's name	Available		Available
		Firm's name	Available		Available

From the comparison, it can be concluded that KIM I is more crowded, has less street furniture and does not have a node. KIM II has a grid iron circulation, a good landscape and a node as an activity focal point. The design of KIM II is better than KIM I and it has more complete facilities. KIM I design is unstructured and bored, but KIM II is more friendly.

## 4. Discussion

Medan Industrial Estate (KIM) phase 1 was built in 1978, which then progressed into phase 2 and phase 3. This shows that KIM is one of the successful industrial estates in Indonesia. Some of the factors that influence the success of KIM are the right location and the physical aspects. Determining the location is not only related to accessibility but also the policy and spatial planning and spatial region.

## 5. Conclusion

From the explanation above of urban design and industrial estate planning, there is a relationship between them. Physical planning can be divided into two parts, namely the visual aspects and non-visual aspects. Visual aspects are related to path, edge, district, node and landmark, while the non-visual aspects are related to politic (policy), economic (location) and social aspects.

KIM I and KIM II were planned in different time periods: KIM I built in 1978, while KIM II in 1988. Both of the industrial estates have some differences in terms of physical aspects. KIM I and KIM II are planned at a location close to the port. KIM I has a simple design and does not follow the principles of good design. KIM II has a well planned design and is quite efficient with the formation of the grid iron. Avenues available have good traffic flow and are equipped with impressionable landscape while reducing heat. From the analysis of physical aspects of the Medan Industrial Estate, it can be concluded that the planning and design of KIM II is better than KIM I. Physical factors influence the success of an industrial estate. If planning is done properly, then the industrial estate will be successful.

Good urban design preserves the qualities of the city and will take into account all the changes and restructuring exercises as enhancement of those qualities. Indeed, today living qualities and amenities are in fact key deciding factors in corporate location. Accessibility, an important urban design element, for instance will not only attract investors, but also tourists who come to enjoy the city.

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**Hilma Tamiami Fachrudin**, ST, M. Sc, graduated from Architecture Department, Engineering Faculty, University of North Sumatera, Indonesia on 2003 (ST). She earned her master degree in Planning Department, School of Housing, Building and Planning, Universiti Sains Malaysia in 2006 (M.Sc). In 2006-2007, she worked as a planner for village spatial planning in Nanggroe Aceh Darussalam, Indonesia under AusAID. During 2007-2008 she worked in Architecture firm in Medan city, Indonesia. Since 2008, she was being a lecturer in Architecture Department, Engineering Faculty, University of North Sumatera, Indonesia. Currently, she is a Ph.D student in Urban Design Department, School of Housing, Building and Planning, Universiti Sains Malaysia.



**Dr.Kausar Hj. Ali** is an Associate Professor in Planning Department, School of Housing, Building and Planning, Universiti Sains Malaysia. She is a planning lecturer at the School of HBP, USM since February 1993. She graduated with a B.Sc.in Urban and Regional Planning, specializing in Economics, Land Use and Real Estate; a Master in Urban and Regional Planning specializing in Regional Economic Development; and a Ph.D in City and Regional Planning. Her areas of interest include Regional Economic Development, Urbanization and Urban Location, and Rural Planning.

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