

The Need for Affordable Urban Settlement in Tebet-Jakarta: Challenge and Opportunity

Budi Arlius Putra¹

Abstract—Settlement, as a basic human need, is needed by people to protect them from harm, to rest, to raise child and a place to socialize with family and community. The rapid growth of people in Jakarta will increase the number of settlement need. The more demand of land for settlement, the higher the price for land will be. In this case, not all people can afford to have proper settlement. Only the have been able to have one. The government built rusun towers to provide appropriate settlement for the low income family. However, there are many things that must be addressed in order to make towers as a sustainable settlement.

Keywords—Component, settlement, rusun, personal space.

I. INTRODUCTION

ABraham Maslow states in his book, “Theory of Human Motivation” that settlement is one of the most important thing in human life. Meanwhile, Maslow also proposes the Hierarchy of human need which is divided into five grades and portrayed in a pyramid. The most important thing from basic human need is physical needs such as air, food, water, sleep, sex, excretion. These needs are described as the lowest level in the pyramid. It means human can't survive if they can't fulfill these basic needs mentioned above.

The second grade is security needs. It includes personal security, health, and financial security. The next grade of human which needs to be completed to gain full happiness is love and belonging, self-esteem and self-actualization.

Human not only should fulfill physical needs however also spiritual needs such as settlement. It is an important part in people's lives to protect them from any danger, as a shelter and a place to rest as well as a place to gather with family and community. As a device to complete both physical and spiritual needs, a settlement should provide peace and tranquility of its inhabitants.

Beyond that, settlement can also be used as center of cultural activity. In settlement, human is grown up and form a family. In this house, a process of character formation and a process of knowing values take place. These two processes will shape the total character of a good human.

Realizing the importance of a house, it is a must that each individual can occupy a proper house. Everyone needs settlement and when a small community developed into a

large social community, such as cities, then it also needs the space for the house to grow up. Jakarta, as the capital city of Indonesia, is the center of government and business. Those two functions have attracted a rapid urban population growth and is characterized by a continued upward. In one side, the area of the city remains the same, meanwhile more and more free space are transformed into public settlement to fulfill the people's settlement's need. This results in the scarcity of land for housing in Jakarta. Consequently, land prices in Jakarta is increasing sharply as a result of the increasing needs for land itself.

II. PROVIDING SETTLEMENT

Not all people can afford to buy homes. People with different financial conditions will select different ways in meeting their housing needs. In this situation, there are various forms and types of homes available in community. There are two types of settlements, conventional and non conventional (D. Smith in H.S. Murison and J.P. Lea, 1979). Conventional type is settlement developed by formal institution and appropriate with the standard procedure of housing. This type is usually developed by informal building industry or by people who will occupy the house, and often in contradiction with law set by the government.

There are two types of conventional settlement: public and private. Public conventional settlement is housing developed by government planning and is aimed for middle to low income families. In Jakarta we usually call it KPR house. Private settlement is developed by private sector with commercial purpose. The target is middle to upper levels of society. This housing type usually appears in the city center next to important facilities such as hospital, office, international school, mall, etc. Many developers use superblock as housing concept to draw interest from target market. People who settle there don't need to go anywhere to meet their daily needs, they can find all of their necessities in their housing neighborhood. There are some settlement sites with superblock concept such as BSD city, Bukit Mediterania, Pantai Indah Kapuk, etc.

Non conventional is divided into two types: slums and squatters. Squatters settlement are the types which are developed by the poor urban. These settlements have spontaneous improvement. Yet, the growth is often uncontrolled, and they are often built as temporary building. The example is settlement along the railway track.

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The second type of non conventional settlement is slums. Slums are legal settlement that grows wild without planning. They are permanent dwellings however often neglect housing standards, such as structure, sanitation, room size. Squatters have urban linkages. For instance is in railway tracks case. Squatters are often built close to railway tracks, and behind that slums grow as well.

Drakakis-Smith theory continue amend until now. It is the table after Drakakis-Smith developed by Hardjoko to clear the connection between legal aspect, consumption mode, and production mode.

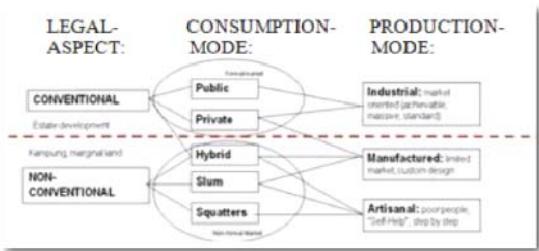


Fig. 1. Connection between legal aspect, consumption mode, and production mode

To address the problem of land shortage for settlement in Jakarta, government try to solve it by building vertical flats for the poor. We usually call it *rusunami* and *rusunawa*. According to law no. 20 of 2011 clauses 1 of the flat, house is divided into four flats, public flats, special flats, and commercial flats or apartment.

Public flats is vertical settlement built for the poor. This kind of flats usually has 4 until 6 without lift. Special flats are flats built to support special requirement. Nation flats are the state owned flats serve residence or dwelling for supporting the implementation of official duties and civil servants. Commercial flat is flat built to gain profit as much as possible.

Commercial flats best known as apartments are usually located in the center of city in strategic area close to the office, business or education area. Apartment target market comes from upper middle class and rich people. Apartment is divided into two types, rental apartments and owned apartment or condominium. Condominium is usually built by capitalist who want to gain much profit.

Government has launched a program to build a thousand tower to supply settlement for the poor and middle lower classes in Jakarta. These towers are expected to fulfill the settlement requirement in Jakarta or just minimize squatter and slum in Jakarta although it hard. Additionally, the government also make a law for commercial flat area to help the settlement supply for poor. Despite the government's ability to build rusunami to have an optimal use of the land, there arises a new problem. Some people think that the unit is too small. It is due to the fact that each rusunami must be able to provide settlement for many people in need, since limited budget on this program results in the limited space for each unit. A small unit may make the inhabitants' lack of space to

do their activities and to interact with others. Public flats are combination of several unit therefore, the problems happen in unit will develop into complex for public flats. Based on the object characteristics, this study refers to human behavior paradigm, e.g. (Hall, 1966; Sommer, 1969; Altman, 1975) states that "The designer should master the relation between, room geography" and, human behavior". Additionally, tracing the privacy requirements in relation to its use to determine the real or symbolic boundaries are needed as a territorial boundary in the design of building and open space design.

The issues that must be discussed is whether the unit has comfortable space for household, for social interaction between inhabitants, for safety and health standards.

III. CASE STUDY RUSUNAMI TEBET

A. Profile Rusunami Tebet

To analyze the issue we use rusunami Tebet as an example. Rusunami Tebet is located at Tebet near Tebet Raya street.



Fig. 2. Rusunami Tebet-Jakarta

This project is located at Tebet since it has dense population. Furthermore, this building was built with the aim of changing the concept of residential development horizontal to the vertical for saving the land. Rusunami Tebet is one of the government projects for helping poor Tebet's people with the half of budget subsidy. Therefore, it is hoped that it will be much affordable by the poor.

Rusunami Tebet has an area 2000 m² and has two blocks (block E and block F). The total units are 120 units. Block E has 50 units (10 units each floor) and block F has 70 units (14 units each floor).

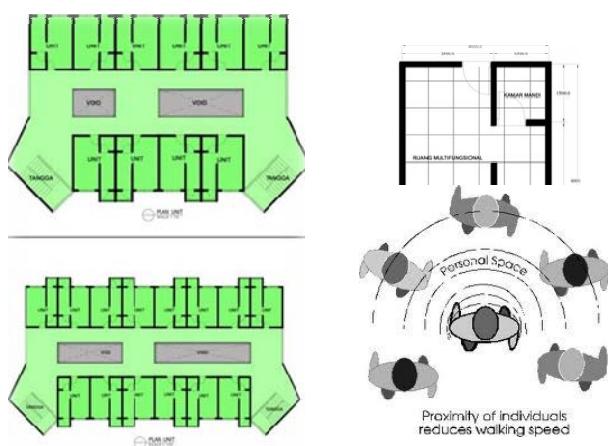


Fig. 3. Plan unit & typical unit

The typical of units is 21 m^2 ($4 \text{ m} \times 5 \text{ m}$) with the addition of a balcony 1 m^2 .

B. Issue and Analysis

The issue discussed in this case is rusunami, it has very narrow room for people to live. It causes inconvenience for the household and the space problems. Eventually the problem might lead social and territorial boundary problems.

- Personal Space

Feasibility or convenience of unit depends on the number of occupants and the area. This is since there are many people live in a shelter, greater space should be provided. When the area of space was same they will not fill the territorial space they need. Convenience or feasibility privacy rely on each individual who settle in the unit. According to Hadinugroho in a study entitled "Ruang dan Perilaku (Space and Behavior)", stated privacy. is closely related to personal and territorial space.

Understanding of personal space according to Katz (1973), that personal space is region of virtual space based on the physical person with a certain radius of an area privacy. Personal space is abstract, moving according to human movement, the area rely on how close the individual is physically interacted. The dimension of personal space as needed and communicate the required protection depends on the situation occurred. Personal space can be shaped as bubble

of space that varies according to the movement of each individual.

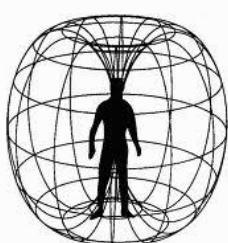


Fig. 4. Personal space as bubble of space

Personal space is also explained by Hall (1966), that

conceptually personal space primarily intended as a communication function and protective function in the form of spatial effect related to proxemic distance. Proxemic is different distance that give rise to the typical behavior of sensory reception inter personal involved in this distance. He also attributed proxemic with personal space by dividing into 4 categories:

- 1) Intimate Distance (<1.5 feet) Maximum physical contact visual detail is blurred, all factor sensation increase participation of muscle, skin, whisper, extremities of hand's touch.
- 2) Personal Distance ($1.5 - 4$ feet) Best distance for appreciating three dimensional quality of object. Fine details of object. Voice level is moderate.
- 3) Social Distance ($4 - 12$ feet) No violation each others personal space greater portion of person can be seen. Distance for working together and socializing. Voice level is louder.
- 4) Public Distance (> 12 feet) $12 - 25$ feet, voice level is loud, speech is formal, impersonal interaction, fine details are not visible, three dimensionalities is reduced. >25 feet, personality involving is reduced non verbal communication, voice level is very loud.

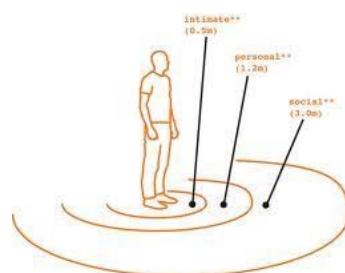


Fig. 5. Personal space on proxemic distance

Personal space is divided into three zones such as public zone, semi-public zone and private zone (privacy). Proxemic personal space can be included to the classification zone, intimate distance (<1.5 feet) and personal distance ($4-12$ feet) in the category of semi-public zone, while the public distance (> 12 feet) in the category of public zone. However, over all radius is used as a benchmark one base on each activity. For instance bubble radius when running will be different with when sleeping (can be proven in further discussion).

It can be concluded that the private zone is a part of the personal space bubble with a radius distance of 1.5 feet minimum space radius and maximum radius distance is 4 feet. To analyze the feasibility of convenience or a person in a unit is taken within a maximum radius of about 4 feet without social interaction in order to get privacy.

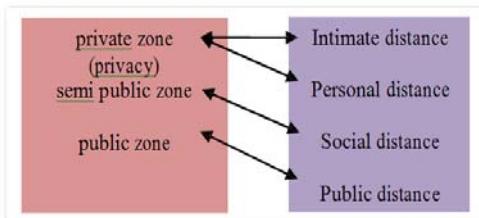


Fig. 6. Personal space zones

Edney (1976) expresses the sense the privacy of individuals or groups the ability to control the visual, auditory and olfactory in interacting with others. Pastalan (1970) said that, "A territory is a delimited space that a person or group uses and defends as an exclusive preserve". Additionally, Sommer (1969) say that, " Territory is visible, stationary, tends to be home centered, regulating who will interact".

When we combine that two statements we get that territorial is a space that is occupied as activity that has real boundary such as walls, this is to show identity of space activities and sign a territory unmolested. Then the link between personal space with a territory almost equal in the form of boundary areas, however tends to limit the presence of territory tangible personal space while not visible presence that can only be felt in the form of restrictions radius (1.5 feet minimum radius and maximum radius of 4 feet).

For the conclusion between privacy, personal space, territory that Privacy is a part of personal space that more restrictive to the external interaction, that is intimate distance. While personal relationships with the territorial space, it is the real limit of the territorial profile.

Feasibility of a unit can be seen from the amount of privacy of each individual who resides in it. However, that from each individual would have a radius limit privacy that does not intersect with each other and determined according to the activity within that unit. Amount of privacy radius of activity is generally carried all members of residents will establish the amount of territory in the form of a wall. It should be in accordance with industry standards, in the case of feasibility of a unit that has been available about 21 m^2 can be compared with that obtained from the sum of territory in accordance with privacy of each individual activity.

- Analysis on the number of dweller in a unit

To find the number of occupants of a unit can be analyzed through the unit provided. Fit described above regarding the magnitude of the unit ranges from 21 m^2 rusunami ($4\text{m} \times 5\text{m}$ with the addition of balcony $1\text{m} \times 1\text{m}$). Multi-functional space with a scale consisting $\pm 1.5\text{m} \times 1.5\text{m}$, kitchen space $\pm 3.5\text{m}$ and a balcony $\pm 1\text{m} \times 1\text{m}$.

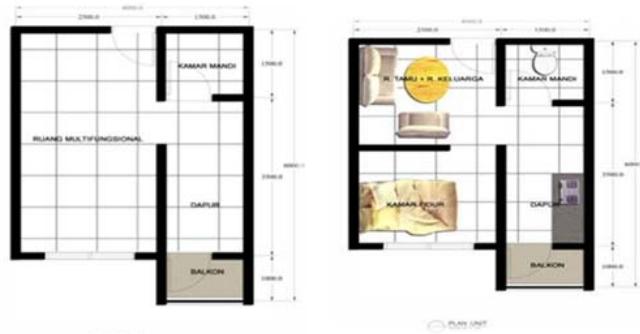


Fig. 7. Plan unit & multifunctional space

Multifunctional space has a magnitude of nearly half of the total area of the unit with the purpose of this room can be subdivided into the bedroom and living room. Based on case studies that have occurred in the area Tebet rusunami residents split the functional space into a bedroom and living room as well as the dining room and family room. Magnitude of the bedroom and living room or family room or dining room is almost the same $2.5\text{m} \times 2.5\text{m}$. The developer of rusunami also have set up multifunctional scale can be partitioned into two function rooms of the bedroom and living room which also served a dining room or family room.

Based on rusunami Tebet data, each unit should be occupied by two or three people, however in real it is occupied up to four people. It is numerous members of residents that the unit has been set. To analyzed the convenience or the occupant, then set the ideal number of residents in accordance with the amount of spaces provided, in this unit there are one bathrooms, one kitchen, one balcony, and one functional space that can be divided into a single bedroom and one living room. It can be concluded with a single bedroom occupied by two people ideally the husband and wife or occupied by one person. Therefore, ideally a single rooms can be occupied by one or two people. The single rooms can be occupied by two people, three people, the husband, wife and one child up to 1 year. It can be concluded that a single room can be used by one to three people with a condition one person is less than one year old. The specified number of occupants in maximum of three people, then it can be analyzed the amount of privacy for the space needs of each person should have in order to obtain the required total territory.

- Analysis on feasibility unit for dwelling

In accordance with the above information that convenience of the inhabitants of the unit depends on the required area of the total radius of privacy established by each occupant. To determine the amount of the radius of each householder must be assisted by the scale radius (bubble) every 1.5 to 4 feet residents that according to the activity in general unit. The first step to analyze is to know the types of activities generally take place in one unit and the second step is to create a radius (bubble) privacy of each member according to its activity as the amount of proof required.

- Activities generally performed in *rusunami* unit.

Common activities generally undertaken in a unit is sleeping, eating, watching TV, family gathering, cooking, and bathing. Radius (bubble) privacy of each resident was associated with activities that are generally carried out in a unit. Based on the data, the activities within a unit can be attributed to the amount of radius (bubble) each individual's privacy is by depiction. However, this analysis does not inform all rooms just two sample rooms. There are kitchens and bedroom which analysis bubble each activity to compare space of room.

a. Analysis Activity bubble at kitchen

Kitchen is generally used by mother for cooking, washing the vegetable, and using refrigerator to keep the food. In this room we will show analysis about a human activity with bubble need, account for dimension from bubble activity, and compare the space need from bubble with the space from unit.

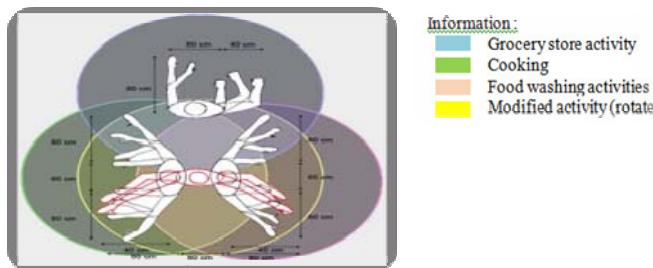


Fig. 8. Activity bubble at kitchen

Based on the above picture, we explain the three kinds of activity that is cooking, washing food, and activities of the food store in the refrigerator. Each activity such as cooking requires bubble radius is almost same as washing of food that is at least 80 cm and a maximum of 120 cm (in accordance with the provisions of the radius of privacy), however the radius is needed for cooking and food washing activities can be taken around 100 cm. As for the grocery store activities required radius of about 80 cm (corresponding to the maximum required motions of the body axis with a maximum hand size of 80 cm). Therefore, that the bubble size required for the activity grocery store at least 80 cm and a maximum of 120 cm and made estimates about 100 cm radius is needed to store food in the refrigerator.

The total space needed in doing activities of cooking, washing food, and storing food into the refrigerator is about 3m x 3m. If the comparison between the number of units that already exist in the kitchen in each unit of the towers Tebet of 3.5m x 1.5m is less than the amount resulting from the need activities through a bubble of space that is needed for 3m x 3m. Therefore, it can be inferred that the kitchen provided in unit towers Tebet is less than decent and not too convenient to use.

b. Analysis activity bubble at bedroom

Activities generally carried out in the bedroom are from sleeping range to taking the clothes and doing make up. The analysis of this room will show the amount of each bubble generated from several activities undertaken by a person in an activity that is usually done in the bedroom, which then accumulated to obtain total activity of the whole bubble of activity in the bedroom.

Purpose of adding the entire amount of bubble aimed to compare the required amount of total activity bubble size bedroom with a bedroom that has been provided by the unit *Rusun Tebet*.

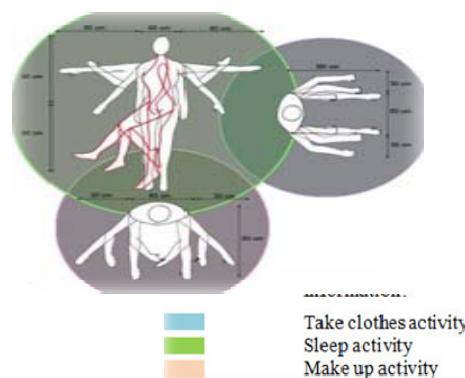


Fig. 9. Activity bubble at bedroom

The above picture explain the three kinds of activity that is sleeping, taking the clothes and doing make up. Each activity has bubbled needs such as clothing and make up to take each one has a radius of at least match the image size above 80 cm and a maximum radius of privacy in accordance with the provisions of 120 cm, however for a comfortable amount of ricochet about 100 cm. As for the activity of bed for one person to have a minimum bubble radius of 90 cm and 120 cm for maximum bubble size, however to be safe can be taken a maximum size for a sleep state that is 120 cm. The total amount to make up the activity and take the clothing range 3.2m x 3.2m. If the total make up and take the clothes add up to the bubble radius size bed that has a magnitude of 1.2m x 1.2m x 4.4m is about 4.4 m. The amount of sleep will be amended if the bedroom occupied by two persons namely by multiplying the amount of two of sleep with one person. In the ideal case study of one room at a unit there are two towers Tebet the husband and wife (two people), the total amount of sleep that is inhabited by two people is a bubble (1.2 m x 1.2 m) multiplied by two which is 2.4 m x 2.4 m. Given the magnitude of changes in sleep activity is affecting the overall total amount of the activity of 5.6 m x 5.6 m.

Then the comparison of magnitude between the amount of demand from the bedroom through the analysis of the bubble has a larger area of the bedroom space that is expected / provided at the same unit Tebet towers, in which the scale through the analysis has a magnitude of 5.6 m x 5.6 m, while

the amount provided on one unit of the 2.5 m x 2.5 m. this proves that the amount of space required is proper sleep has a magnitude greater than the amount that has been provided by *Rusun Tebet*.

Based on the analysis on the needs of the bubble chamber there are two examples of kitchen and bedroom generate a greater amount than the amount of space that has been provided by the towers Tebet. This proved for living in a unit towers which are inhabited by one to two adults or two adults with one child.

The quantity of each unit has a shortage of decent size for the occupants of each unit. Since the amount required by the larger should this affect the amount of towers. Due to the lack of scale towers resulted in a very small space provided, then it will result in on the nature of each individual occupants of each unit to affect the cleanliness of the towers.

- Social interaction of each dweller.

Social interactions that occurs between each occupant of the peace is likely to be affected by the small scale unit. This occurs since the small scale units do not correspond to the number of residents. As there is limited space in the unit, the dweller prefers socializing outside the unit. They would like to find extra space inside the rusun to socialize. This makes more people socializing outside. They get in touch with people coming from different backgrounds. Certainly, this may result in conflict as the dwellers come from various educational backgrounds as well. This conflict can serve as a negative side of interaction. Basically, all the dwellers must set a togetherness as they live in the same place and become a big family of rusun dwellers.

- Environmental cleanliness around *rusun*

Environmental hygiene is also influenced by the size of the unit on the towers. This is because the size of a unit is limited to people movement since the people who living in that residents placed items corridor area.



Fig. 10. The environment of rusun Tebet

If the dwellers put their goods in the corridor, it will affect the general circulation. It makes the inconvenience of other residents as well as the danger of disease from too stuffy with the goods. There is also fire hazards due to items that are piled up. It will be difficult to escape when there is a fire or earthquake. Those are due to the bad circulation of the corridor.

IV. CONCLUSION

Rusun is one solution of settlement for the poor in Jakarta from government. Tower as settlement should be able to meet householder needs or they will leave and search for new settlement. If it happens, many new problem will appear. In larger scale it will make degradation of environment, increasing number of the poor, crime etc.

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Application of Six Sigma Process Improvement Method on Construction Turnkey Projects

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Abstract—A Process Improvement Project (PIP) is a performance improvement program aimed at reduction of quality defect, waste time and cost in a construction project. This PIP identifies the system completion turning over to client process required to be performed to gain the final acceptance. As the PIP progressed through Define, Measure Analysis, Improve and Control (DMAIC) Phases, this paper illustrates Six Sigma techniques and tools to determine possible causes of exceed man-hours spent on the preparing the turnover packages. By applying statistical methods, the final probable causes are determined. The purpose of this paper is to share some findings resulted from the application of Six Sigma methodology to construction turnkey projects through PIP. The key recommendation for eliminating or reducing the probable causes and achieving this PIP objective will be discussed.

Keywords—Process Improvement Project, Six Sigma, Turnover Package.

I. INTRODUCTION

Six Sigma is a data-driven approach to improve project efficiency and quality. The methodology was developed and utilized for manufacturing companies such as General Electric, AlliedSignal and Motorola in the early 1980s. The dramatic results and the publicity about their quality programs, created the current wave of Six Sigma deployments worldwide. This statistics-based method uses hard data to know how the processes perform, to understand causes if something goes wrong, and to help to develop solutions that result in better performance and capability. By using a rigorous set of statistical and analytic tools, Six Sigma produces dramatic improvements not only in manufacturing production lines, but also help to deliver quality to the customers. This systematic methodology makes it an applicable tool in engineering and construction industry [1]. In recent years, international engineering constructor company has chosen it as a business improvement method.

From customer's point of view, it helps organizations focus on the cost of poor quality and customer requirements. The Six Sigma methodology of detection, analysis, and correction of defects directly impacts customer satisfaction to deliver quality,

timeliness and cost effectiveness. It provides significant benefits to customers, including reduced risk and increased efficiencies. Six Sigma processes help to identify critical components that directly impact project deliverables and help to deliver project budget and schedule certainty, to mitigate project risks and an objective method to understand and manage project risks. On the other hand, business leaders like the effects of Six Sigma. It directly enhances the bottom line by reducing the cost of poor quality.

II. PROCESS IMPROVEMENT PROJECT (PIP) FOR CONSTRUCTION TURNKEY OPERATION

The business case of this PIP was developed by linking the strategy gap of construction turnkey project operation of an engineering constructor in Taiwan and applying the six sigma methodology to achieve the improvement of the final turnover process. After mechanical completion and commissioning phase, the system completion and turnover to client requires to be performed in order to define the project final acceptance by the client. This study was based on the PIP for the Hi-Tech and semiconductor construction turnkey projects in Taiwan.

Data from two completed turnkey projects had indicated a significant amount of reworks in the turnover to client package and these reworks lead to excessive engineering, procurement, construction and startup costs. The average time to prepare per system turnover package was 300 man-hours which contained with waste man-hours and process quality defects. In PIP, the work process and procedure need to be improved to enhance more cost saving and performance benefit, also to standardize system completion and turnover requirements and increase the efficiency of turnover package generation process during client acceptance phase.

III. DEFINE PHASE

Data from two executed turnkey projects, as shown in Figure 1, the average time to prepare per system turnover package was 300 man-hours and the gap of 200 man-hours from the target performance and the process standardization was required to improve the productivity and reduce total installation cost.

PIP objective was to reduce the average time per system turnover package from 300 man-hours to 100 man-hours indicated in standard man-hours estimation and standardize system completion and turnover requirements. By closing the gap of 200 man-hours, this PIP will be implemented and potential cost savings can be identified.

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