



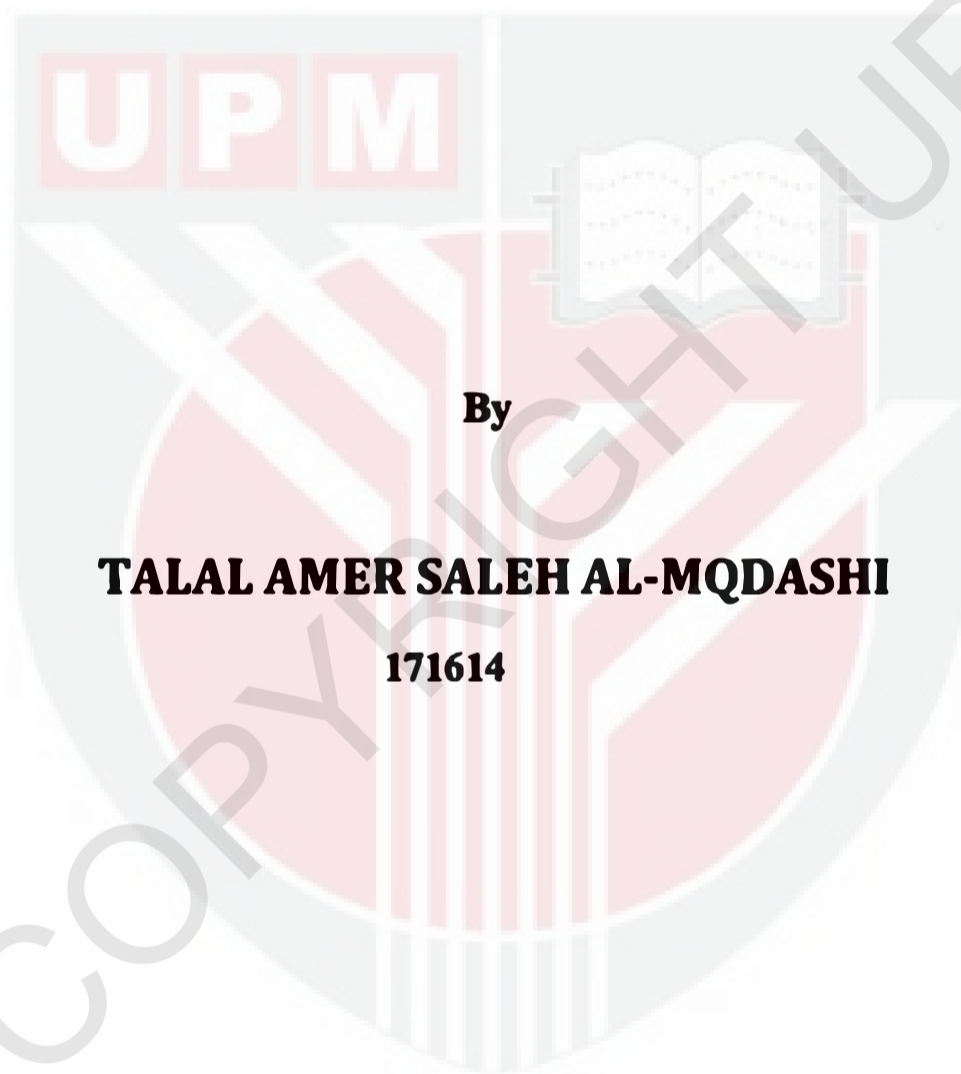
**UNIVERSITI PUTRA MALAYSIA**

***FACILITATES MANAGEMENT: HOW IT IS AFFECTED BY  
PROCUREMENT PROCESSES IN CONSTRUCTION FIRMS***

**TALAL AMER SALEH AL-MQDASHI**

**Ip  
FK 2017 79**

# **FACILITATES MANAGEMENT: HOW IT IS AFFECTED BY PROCUREMENT PROCESSES IN CONSTRUCTION FIRMS**



**By**

**TALAL AMER SALEH AL-MQDASHI**

**171614**

**Report Submitted to the Faculty of Engineering, Universiti Putra Malaysia,  
in Partial Fulfillment of the Requirement for the Degree of Bachelor of  
Engineering (Civil)**

**June 2017**

## **ABSTRACT**

An exploratory study has been conducted to investigate the successful drivers of private companies performing in Yemen in terms of facilities managements based on the procurement process. This study tends to investigate the relationship between time, cost and quality services among procurement process and facilities management of private companies Malaysia. Using convenience based sampling methods author has used quantitative methodology where total set of n=40 questionnaires has been distributed amongst employees in the selected private companies in Kuala Lumpur, Malaysia. Author has used statistical package for social sciences (SPSS) to conduct data analysis using descriptive and inferential statistics. Descriptive statistics has been used to conduct demographic and the dependent and independents variable analysis of respondents catered by researcher to ensure adequate sampling techniques whereas inferential statistical analysis has been conducted to analysis of each items. Author has used Pearson correlation analysis method to interpret the results and test proposed hypothesis. In this research, the hypothesis are accepted as our findings reveals that time, cost and quality services are significant predictors of procurement process and facilities management in the private companies in Malaysia with moderate correlation making a linear equation. In the end author has proposed some recommendations in the form of facilities management of private companies to drive quality services and decrease time and cost in order and enhance the procurement process for achieving high performance of facilities management in private companies in Malaysia.

**Keywords:** procurement process and facilities management, time, cost, quality services.

## ABSTRAK

Kajian awal telah dijalankan untuk menyiasat pemandu berjaya syarikat-syarikat swasta di Yaman dari segi kemudahan pengurusan berdasarkan proses perolehan. kajian ini cenderung untuk mengkaji hubungan antara perkhidmatan masa, kos dan kualiti antara proses pemerolehan dan kemudahan pengurusan syarikat-syarikat swasta Malaysia. Menggunakan kemudahan berdasarkan kaedah persampelan, penulis telah menggunakan kaedah kuantitatif di mana jumlah set  $n = 40$  soal selidik telah diedarkan di kalangan kakitangan dalam syarikat-syarikat swasta yang terpilih di Kuala Lumpur, Malaysia. Pengarang telah menggunakan pakej statistik untuk sains sosial (SPSS) bagi menjalankan analisis data menggunakan statistik deskriptif dan inferensi. Statistik deskriptif telah digunakan untuk menjalankan analisis pembolehubah demografi, bersandar dan bebas daripada responden, yang mana telah disediakan oleh pengkaji untuk memastikan teknik persampelan yang mencukupi manakala analisis statistik inferensi telah dijalankan untuk analisis setiap item. Pengarang telah menggunakan Pearson kaedah analisis korelasi untuk mentafsir keputusan dan menguji hipotesis yang dicadangkan. Dalam kajian ini, hipotesis diterima sebagai penemuan kami menunjukkan bahawa masa, kos dan kualiti perkhidmatan adalah peramal bererti proses perolehan dan pengurusan kemudahan dalam syarikat-syarikat swasta di Malaysia dengan hubungan yang sederhana membuat persamaan linear. Akhirnya, penulis telah mencadangkan beberapa cadangan dalam bentuk pengurusan kemudahan syarikat-syarikat swasta untuk memacu perkhidmatan yang berkualiti dan mengurangkan masa dan kos bagi dan meningkatkan proses perolehan untuk mencapai prestasi yang tinggi daripada pengurusan kemudahan dalam syarikat-syarikat swasta di Malaysia.

## **ACKNOWLEDGEMENT**

**First and foremost, I am expressing my thankfulness and praise to Allah for granting me an opportunity to complete my project with full of knowledge and limited obstacle throughout the period study.**

**My huge appreciation goes too my supervisor , Dr Nuzul Azam Haron for the kindly sharing his precious comments and ideas in attaining the knowledge required in completing this project. Besides that, I am sincere appreciate his willingness to spend time to review my study progress. Then, I would like to thank my examiners; Associate Professor / Ir. Salihudin Hassim and also Dr Aidi Hizami Ales for their efforts and comments to examine this project thesis and also for their personal suggestion to complete this thesis.**

**Lastly, I would like to express my appreciation to all my family and friends who have helped and supported me to carry out this project. All of their kindness will always be remembered.**

## CONTENTS

<b>ABSTRACT</b>	<b>I</b>
<b>ABSTRAK</b>	<b>II</b>
<b>ACKNOWLEDGMENT</b>	<b>III</b>
<b>APPROVAL SHEET</b>	<b>IV</b>
<b>DECLARATION</b>	<b>V</b>
<b>LIST OF FIGURES</b>	<b>VIII</b>
<b>LIST OF TABLES</b>	<b>IX</b>
<b>CHAPTER ONE</b>	<b>1</b>
<b>INTRODUCTION</b>	<b>1</b>
1.1 Introduction .....	1
1.2 Problem Statement .....	2
1.3 Research Questions .....	5
1.4 Research Objectives.....	6
1.5 Significance of The study.....	7
1.6 Scope of The study.....	8
1.7 Limitations of The study .....	8
1.8 Organization of The study.....	9
<b>CHAPTER 2</b>	<b>10</b>
<b>LITERATURE REVIEW</b>	<b>10</b>
2.1 Introduction .....	10
2.2 Construction industry .....	10
2.3 The construction industry in Malaysia .....	11
2.4 Facilities Management .....	12
2.4.1 Facilities Management in Malaysia:	12
2.4.2 Facilities management in the construction industry:	13
2.5 Procurement definition and scope:.....	14
2.6 The relationship between Facilities Management and Procurement:.....	16
<b>CHAPTER 3</b>	<b>21</b>
<b>RESEARCH METHODOLOGY</b>	<b>22</b>
3.1 Introduction .....	22
3.2 Flow Chart of Methodology.....	23
3.3 Research Variables .....	23
3.4 Research Design .....	24
3.5 Sampling .....	26
3.6 Research Instrument.....	27
3.7 Data Analysis .....	27
3.8 Ethical Considerations .....	28
3.9 Conclusion .....	28
<b>CHAPTER 4</b>	<b>29</b>
<b>RESULTS AND DISCUSSIONS</b>	<b>29</b>

4.1 Primary results .....	29
4.1.1 Reliability Test	29
4.1.2. Normality Test	29
4.2 Statistical Analysis.....	31
<i>Demographic Section</i>	30
Question 1: How long have you worked at your current job? .....	30
Question 2: What is the highest level of education you've achieved? .....	31
Question 3: What is the size of the company you work at (in terms of employee's number) .....	32
Question 4: Please choose your Job Position:.....	33
Question 5: Does the company is deeply and directly involved in procurement process and facilities management: .....	34
Question 6: Your Company has a dedicated department for facilities management:.....	35
Question 7: Your Company have dedicated department for procurement: .....	37
4.3 Inferential Statistics .....	38
4.3.1 Pearson Correlation Analysis	38
4.4 Result and Discussion	40
4.5 Strategy Development.....	43
<b>CHAPTER 5</b>	<b>45</b>
<b>CONCLUSION AND RECOMMENDATION</b>	<b>45</b>
5.1 Conclusion .....	45
5.2 Recommendations.....	46
<b>REFERENCES</b>	<b>48</b>
<b>APPENDIX</b>	<b>49</b>

## LIST OF FIGURES

LIST	PAGE
Figure 1.1 : Organization of The study	9
Figure 2.1: The IFMA model of FM scope.	16
Figure 2.2: FM and procurement interrelated	19
Figure 2.3 : FM and procurement processes Integrated model	20
Figure 4.1: The histogram plot of the procurement and FM .	30
Figure 4.2: The duration of the current job.	31
Figure 4.3: The Level of education.	32
Figure 4.4: The company size.	33
Figure 4.5: The job position.	34
Figure 4.6: Deeply and directly involved in procurement and FM.	35
Figure 4.7: dedicated department of FM.	36
Figure 4. 8: dedicated department of procurement.	37
Figure 4. 9: Framework Strategy.	43

## LIST OF TABLES

LIST	PAGE
Table 2.1 Percentage share of GDP for selected countries of the construction Sector	12
Table 3.1 Contractors and Construction companies registered in Malaysia (CIDB, 2014)	24
Table 3.2: Z-score value based on confidence level	26
Table 4.1: Reliability Statistics	29
Table 4.2: Tests of Normality	30
Table 4.3: the statistical of the duration of the current job.	31
Table 4.4 : The statistical of level of education.	32
Table 4.5: The statistical of the company size.	33
Table 4.6: The statistical of the job position.	34
Table 4.7: The statistical of deeply and directly involved in procurement and FM	35
Table 4.8: The statistical of dedicated department of FM.	36
Table 4.9: The statistical of dedicated department of procurement.	37
Table 4.10 Pearson correlation between the procurement and facilities management and the performance.	38
Table 4.11: Pearson correlation between the procurement and facilities management and the factors include time, cost and quality services .	39

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Introduction**

This research is aimed at study the procurement of different material and services necessary for a successful facilities management at construction firms and how it affects it, with the goal to attempt and reduce both the cost and time. In order to perform a sound analysis, a clear definition of facilities management has to be established first, followed by a precise definition of the procurement measures undertaken by the firm in order to look into how both are related and affect each other.

Facilities management is defined as a distinct discipline of engineering that deals with integrating the different processes and procedures a firm conducts into one system, thus, supporting the services and functions of different departments to achieve an overall effectiveness and efficiency of the main activities of the firm, then on the next level to other sub activities (Zaw Min, 2016). Facilities management is also defined as a multi-dimensional disciplinary profession that includes supporting the functions and services of built facilities to enable the growth and prosperity of the organization (Joseph Lai, 2015).

The issue of wasteful resources in terms of time and money negatively affects the organization's effectiveness and performance on both the short and long terms, proper facilities management practices stems from two sources, external and internal; in this research the focus will be on one of the major external factors; procurement , where it was shown that it constitutes the majority of wasted money as one integral part of facilities management (Nor Diana Aziz, 2016).

The performance of any successful organization depends largely on their management style and system, there is no doubt that managing the resources is very important and can be largely affected by procurement of essentials for facilities management, where resources and time have to be allocated effectively to minimize any wastage, time managed accordingly to reduce lead times, over time wages and increase productivity. Therefore, this research will take an attempt to conduct an analysis on the procurement process and how it influences facilities management in construction firms, where the targeted sample will be construction firms, then identifying shortcomings and try to come up with a rectification, and increase the overall productivity and efficiency.

## **1.2 Problem Statement**

Due to the complexity of facilities management practices as they depend on several factors, both technology in its simplest form, and on its highest form alike, such capabilities of facilities management practices for the success of the organization can be driven towards optimizing non-core activities to reduce cost. Furthermore, the preoccupation with non-core activities such as procurement leads to less emphasis on core activities associated with facilities management, which in turn increases the cost and give a rise to other issues, such as maintenance and downsizing of resources to compensate for the gap created (Ancarani, 2005).

The impact of procurement on facilities management can also be noted in the energy consumption of the facility as a whole, as it is usually the case in procurement at construction firms, as the facilities manager decisions when he becomes a service provider according to

(Goulden, 2015) where they have to allocate the energy resources available to optimize production and reduce construction lead time, which in turn cut down cost and increase efficiency, and since facility managers interact directly with equipment and machinery, it becomes redundant to emphasize the importance of being aware of the details of procuring these machines to operate and maintain them in both cost and time efficient manners (Goulden, 2015)

In case study conducted by (Jason Morris, 2006) he analyzed the procurement strategies and how they influence facilities management, where he found out that procurement processes and strategy is strongly correlated to facilities management through asset maintenance and management, operational requirements, and constraints where he found out that adopting certain procurement strategies such as performance-based contracting, alliancing and relationship contracting which are believed to assist in the reduction of overall project costs and timeframes, to promote innovation and best practice (Jason Morris, 2006).

Another case study done by (COFELY BESIX, 2016) on Burj Khalifa in Dubai estimated that optimizing the procurement processes with facilities management during the construction processes through a shared data base of internal processes and procurement planning could have saved an estimated 12% of project cost, and about 6% of materials wastage, where it was available during the project, however the emphasis was on other factors such as marketing and publicity which proves that there is always an opportunity to enhance these (COFELY BESIX, 2016).

Procurement processes are vital for the success of any business, as procurement processes include planning , setting standards, measuring specifications , and setting a budget and timeline for the entire process, thus, in the facilities management which largely depends on internal processes directly related to procurement, it has become important to understand how facilities management is impacted by procurement processes, as very few studies have discussed the relation between procurement and facilities management. This research will discuss the interrelationship between both, and determine the factors that influence facilities management, and procurement processes as part of the overall enhancement in facilities management in terms of efficiency, effectiveness, and cost (Miodrag, 2012).

Facilities management is vital for the success of any organization, it was deduced from reading on the topic that the procurement of materials, personnel, and services to manage the facilities of any organization causes a lot of issues in terms of wastage, time, and inefficiency , which lead this paper to attempt an analysis of the procurement processes done specifically for facilities management at construction firms such as maintenance materials purchasing, procuring services such as cleaning services, and the procurement of new personnel and how it influences the overall productivity and efficiency of the organization.

At last, it has been established that FM planning is very important to the lifecycle of projects When correlated directly to procurement planning, where (Alex Davies, 2015) conducted several case studies such as in NEC company and Hartsfield-Jackson Atlanta International Airport,

Where they found out that in most cases procurement and facilities management failure to integrate increased both the cost and timeline of the project, in some cases adding extra steps that were not necessary to complete the project.

In summary, there are several issues that can arise in facilities management related directly to procurement, such as poor maintenance, increased cost, and wastage of material. The research constructs will be built upon research on previous literature then constructing the research question to attempt an answer them, which is in the next section.

### **1.3 Research Questions**

This research will try to answer several questions that will help construction firms understand the impact of their procurement operations on facilities management, as the questions in relevance the objectives set are the following:

- 1- What is the nature of the relationship between procurement and facilities management?**
- 2- What are the factors that affect facilities management in the term of procurement processes?**
- 3- How can facilities management be enhanced through the optimization of procurement processes**

## **1.4 Research Objectives**

**This research will have the following objectives, of which it will attempt to achieve:**

- 1- To study the relationship between procurement and facilities management towards enhancing the overall performance and productivity of the organization.**
- 2- To determine the factors affecting facilities management in the term of procurement processes.**
- 3- To develop a framework strategy for the enhancement of the facilities management through the optimization of procurement processes.**

**Where a framework strategy will be built by the end of this research in order to help construction firms in increasing their productivity and efficiency by optimizing the resources procured that relate to their internal processes (facilities management), where the framework strategy will be one step towards developing the construction sector even further.**

## **1.5 Significance of The study**

There is a severe lack in studies that examine the effect of procurement on facilities management, and how it impacts it, especially in Malaysia, thus, this research will attempt to solve some of the issues that may face construction firms in Putrajaya and Kuala Lumpur as there is almost no research found on this vital sector in Malaysia, especially on the impact of procurement process on facilities management in construction firms' performance and how to enhance it, as construction firms in Putrajaya and Kuala Lumpur can benefit from the results of this research to enhance their performance and optimize it, thus, increase profits and reduce cost as mentioned before by (Nor Diana Aziz, 2016).

Furthermore, to enhance the productivity of construction firms in the Putrajaya and Kuala Lumpur area by getting a better understanding of procurement effects on facilities management, as construction firms largely depend on smooth and efficient facilities management to reduce costs and enhance performance, will definitely aid in achieving more growth in this vital sector of the economy, where the construction sector index of productivity was estimated to grow at 4% as of September 2016, where Malaysia ranks at no. 10 in the percentage of construction sector contribution to the GDP (Malaysian department of Statistics, 2016).

## **1.6 Scope of The study**

This study will examine the factors affecting facilities management due to procurement in construction firms in the Putrajaya and Kuala Lumpur area in Malaysia, the study will sample construction firms where companies will be subject to a questionnaire, rather, their procurement and facilities staff as well as personnel in charge. The limited scope of the study is due to the limitations explained in the next section.

### **1.7 Limitations of The study**

The study is considered limited as it will face cost and time limitations, as the time frame doesn't permit doing more elaborate research and collect data from large amount of companies and firms involved in both the procurement processes, and construction firms. Also, due to the nature of the operations in the construction sector, facilities managers are usually preoccupied and the respondents to the intended questionnaire to collect the data are expected to be limited due to the general lack of awareness on the topic. Furthermore, the cost limitation will forbid the author from expanding the scope of the study to include a larger area and distribution of questionnaires, or conduct interviews with persons in charge.

## 1.8 Organization of The study

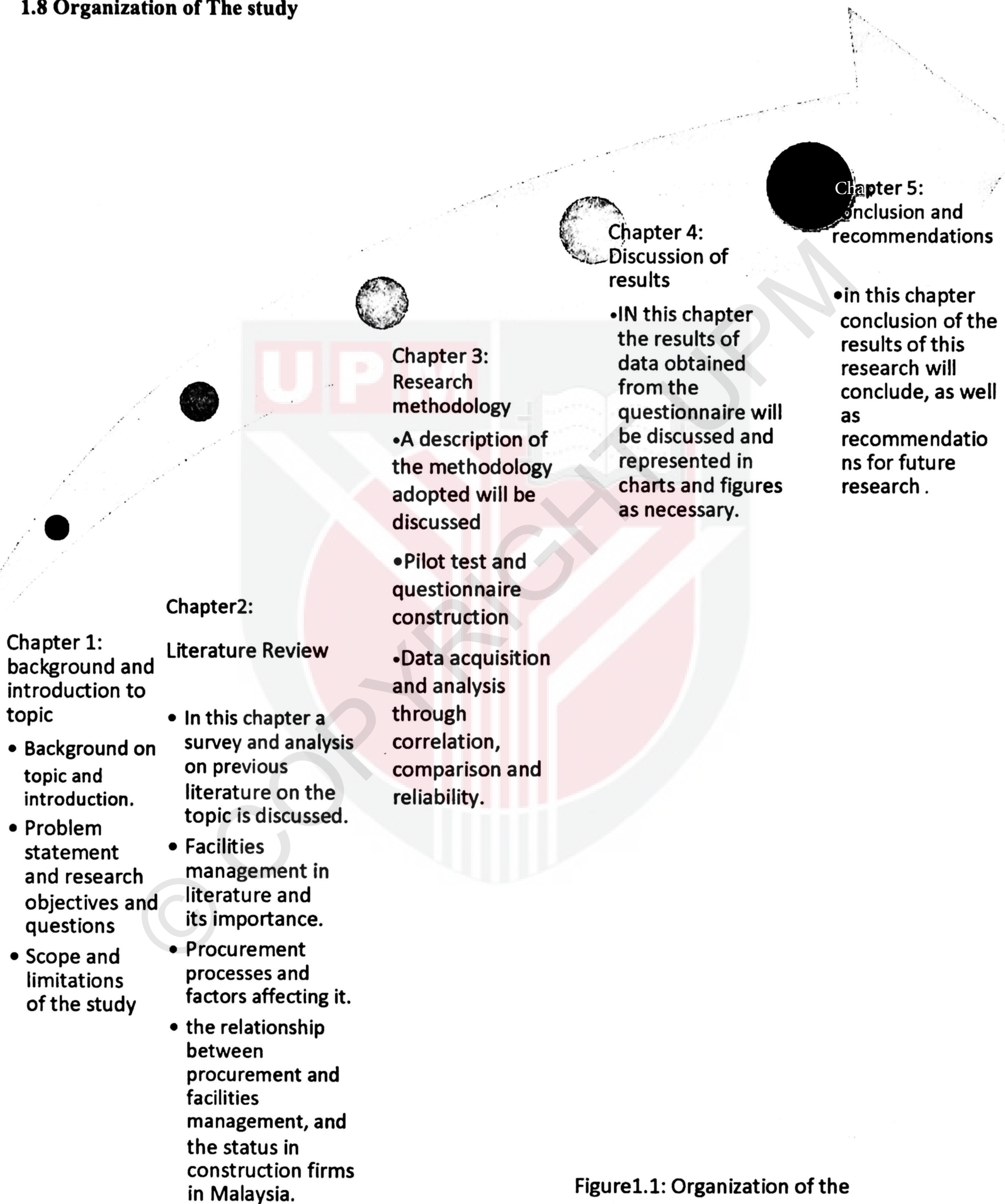


Figure1.1: Organization of the Study

## **CHAPTER 2 LITERATURE REVIEW**

### **2.1 Introduction**

This chapter will present a review of previous literature and research on the topic, it will start by describing literature definitions on important terms used throughout, as well as an introduction to important concepts, such as facilities management, procurement process as a whole, and how both interact. In addition to presenting a review of previous research on the construction sector in Malaysia and how procurement and facilities management can enhance the performance in this vital sector to the economy, as the research targets the construction industry, an introduction is first shown, followed by narrowing it down to the scope of the research Malaysia.

### **2.2 Construction industry**

The major contribution to both economy and development by the construction industry has been highlighted before, where several studies according to (Olenrewaju, 2015) have shown the importance of the contribution of the construction industry to both. This importance where shown according to the same source where some suggested using the construction industry to regulate the economy, but were opposed by the thought that this improvement is only on the short term.

In relevance of to our research, the construction industry was described as a path towards helping in boosting the economic growth rate in developing countries such as Malaysia (Olenrewaju, 2015), where the building and construction industry provide the needed infra-structure for continuous growth and development, deeming the industry a requirement for national development if any remarkable success is sought to pave the way towards development. This importance led

the construction industry to constantly appear in national economic accounts and reports such as the GDP (Gross Domestic Production), and one of the most visible outputs of that can be measured directly to indicate growth (Olenrewaju, 2015).

### **2.3 The construction industry in Malaysia**

The construction industry is very important for a fast developing country like Malaysia, where it is estimated to have contributed between 3-5% of the entire GDP in Malaysia in the past 20 years (Malaysian department of Statistics, 2016), furthermore, where Malaysia strives to achieve the vision of 2020 where it will be in the high-income countries category, the general outline of the plan has already been announced by the government, where over the few decades since Malaysian independence the construction industry growth has been described as stable and consistent compared to other similar countries, however, it was decided that it is still short from the set goal of achieving a 6% contribution to GDP set by the 2020 vision, which would require more work on both practices to be drive towards more productivity and cost reduction, as well as formulating more policies and laws (Olenrewaju, 2015).

To put this in perspective, the below table shows the contribution of construction industry to GDP in different fast developing countries including Malaysia:

**Table 2.1: Percentage share of GDP for selected countries of the construction sector: (Source: Department of Statistics Malaysia, 2014)**

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
South Korea	5.7	5.5	5.3	5.0	5.1	4.6	4.2	4.1	4.1
Hong Kong	3.4	2.9	2.7	2.9	2.7	2.9	3.3	3.5	3.5
Taiwan	2.8	2.7	2.6	2.4	2.3	2.3	2.3	2.2	2.2
Singapore	n.a	n.a	3.0	3.6	4.2	3.8	3.8	4.0	4.1
Thailand	2.4	2.4	2.4	2.2	2.2	2.2	2.1	2.1	2.1
Philippines	4.4	4.6	5.0	5.1	5.4	5.7	5.0	5.4	5.6
Indonesia	5.9	6.1	6.2	6.3	6.4	6.5	6.5	6.5	6.6
Malaysia	3.0	2.9	2.9	2.8	3.1	3.2	3.2	3.5	3.8

## **2.4 Facilities Management**

Facilities management has been defined as a series of plans and arrangements with coordinating the distinctive procedures and techniques a firm leads into one framework, in this way, supporting the administrations and elements of various divisions to accomplish a general adequacy and productivity of the principle exercises of the firm. Facilities management is additionally characterized as a multi-dimensional disciplinary approach that incorporates supporting the capacities and administrations of constructed offices to empower the development and flourishing of the association, where the practices of Facilities Management are more than often directly influencing the output of the business, including productivity and quality, all the way to customer satisfaction with the product of service. (Joseph Lai, 2015) (Zaw Min, 2016).

### **2.4.1 Facilities Management in Malaysia:**

Facilities management has also been described as being one of the fastest growing professions, where comprehensive research and efforts have been allocated towards developing and enhancing this field. On the contrary, in Malaysia interest in this field is amateur, and remains one of the most underrated fields that could greatly improve the management of the national assets towards

more effective and productive economy, which would directly leads to economic growth, which in turn would enhance practices in the field (Noor, 2014).

According to (Noor, 2014), there has been some initiatives taken towards overcoming the obstacles that are hindering the development of Facilities Management practices in Malaysia amongst public and private institutions and companies, including construction companies, where many consider them as a vital sector that is responsible for boosting the efforts further by providing the necessary physical requirements towards the efforts put towards overall growth and development, where the efforts paid off when the first National Asset and Facility management convention was held in August 2012 showing good signs of the evolution this sector has been experiencing in both the built and human environments helping to come up with a more efficient and productive procedural framework towards continuous Facilities Management development (Noor, 2014).

#### **2.4.2 Facilities management in the construction industry:**

Facilities management and construction projects overlaps in several different aspects, where both practices have been categorized in previous literature as being one of the disciplinary practices of management, as it is essential for the project manager and the facilities manager understand each

other's role which would in almost all the cases to determine the project's success from different aspects , where the similarities between both can be shown in their main driven goal to attempt and achieve both the short and long term objectives of the organization, in the case of the construction industry facilities management is thought to play a more complex role, where it by definition cover a wider spectrum of roles and different competencies , a good example is the competency of facilities management to coordinate the physical work place and actual workers within the work environment integrating different managerial principles including behavioral, business architecture ,and administrative management (Chan, 2015).

It is clear from the above that Facilities Management can be considered one of the main fields that support the construction industry towards occurring more influence on developing in general, economic growth in particular, two integrated terms where it is only logical that development can only be achieved if the economy is healthy and is continuously growing.

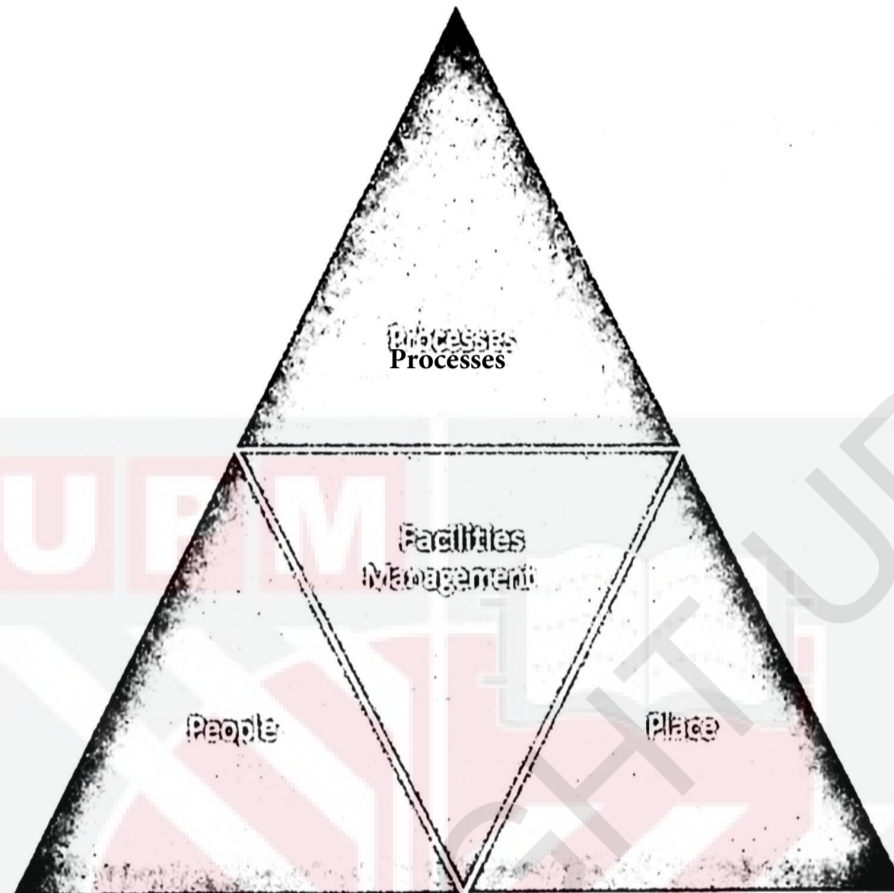
### **2.5 Procurement definition and scope:**

Procurement have been defined an integral function of business management that have to make sure of identifying resources needed that an organization would require to fulfill its strategic objectives, where one of the main functions of procurement management is to implement strategies that ensure delivering the best supply outcome of products and services to all stakeholders utilizing available resources, both internal and external (Dutton,2015).

Procurement procedures are crucial for the accomplishment of any business, as obtainment procedures incorporate arranging , setting principles, measuring details ,and setting a financial plan and course of events for the whole procedure, in this manner, in the facilities management which to a great extent relies on upon inner procedures straightforwardly identified with acquisition, it has turned out to be essential to see how facilities management is affected by procurement , as not many reviews have examined the connection amongst both (Miodrag, 2012).

There has been a model proposed that covers the scope of Facilities Management and it has been proven to be the most descriptive and reliable model, the IFMA model describes in a triangular form how the three P's in facilities management can interact, those P's are the processes, people, and place, where Facilities Management lies in the middle of those three interactive aspects of any business, especially in the construction industry, where the processes involved in construction are various and relatively complex requiring careful planning and resource management and allocation to manage both the cost of time of the entire project, followed by the people, where the human resources and personnel management in construction projects which more than often involve a large volume of human labor on different managerial levels, as effectively managing this vital resource could also be detrimental to the success of the project, and finally the place, where most construction projects will take place physically in relatively large places where space would matter, effectively management it can greatly enhance productivity and efficiency in carrying out tasks, thus the three parts are both vital and integral scopes of activities that reflect the extent of importance of facilities management scope in construction companies (PATANAPIRADEJ, 2004).

The below figure shows the IFMA model that describes the scope of Facilities Management (FM).



**Figure 2.1: The IFMA model of FM scope.**

## **2.6 The relationship between Facilities Management and Procurement:**

The relationship between Facilities Management and Procurement has been described as integral and mutually dependable when measuring the impact both have on performance measured by means of productivity, efficiency, and profitability where it was stated that the practices of procurement that require planning of resources needed, categorizing suppliers, allocating the budget needed and planning spending of the budget set, and extend all the way up to delivery of purchased products and services which to serve different practices of facilities management (Lehtonen, 2006).

Furthermore, (Lehtonen, 2006) added that the importance of understanding this relationship is important to work enhancement, as not only does procurement could significantly influence the quality of product and the standards it needs to meet, facilities management would have to be able to encapsulate any occurring situation and adapt to any change, where both are greatly implemented in successful construction firms towards achieving the objectives of projects financially, and meeting time schedules for different activities (Nor Diana Aziz, 2016)

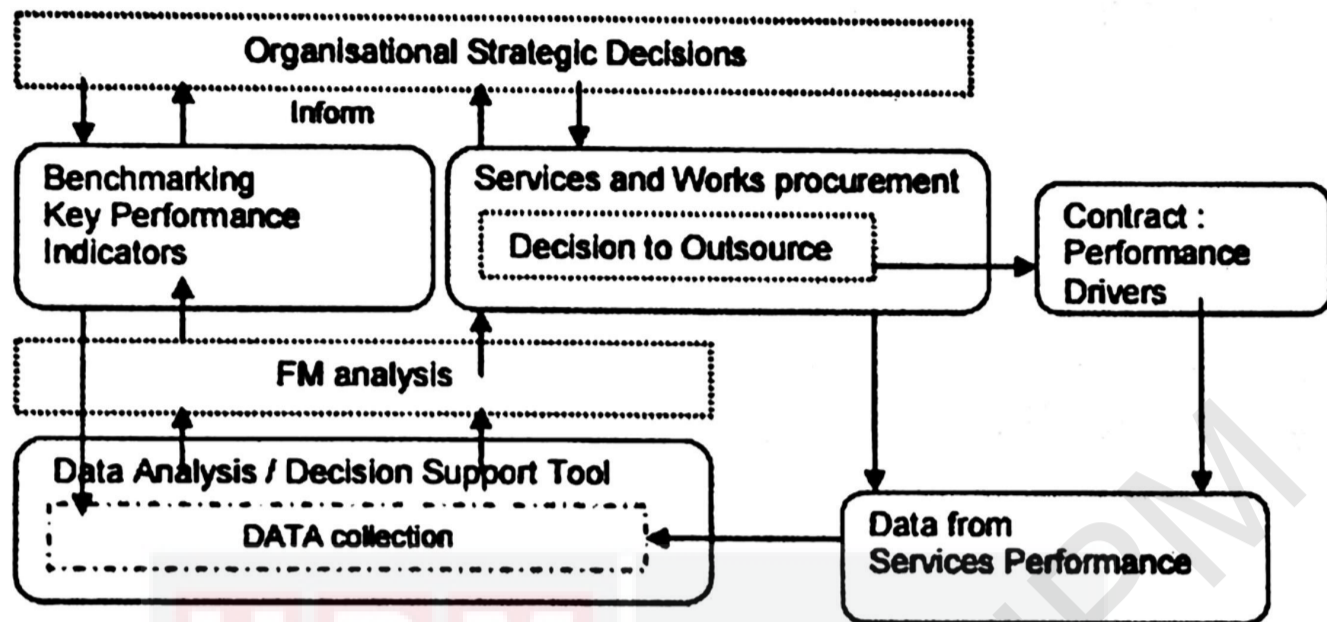
It was also pointed out that both Facilities Management and Procurement share several factors that influence them albeit both may not necessarily be identical of the extent of the effect of those factors; such as cost, where more than often companies find themselves constricted to a certain budget with an urgent need to cater for the different activities without compromising the budget set for each, this is where effective resource planning and acquisition is largely controlled by procurement through suppliers relations, as the cost of raw items and materials procured usually determines the budget as it is more than often the case in the construction industry as it largely depends on outsourced materials where the focus of the company is usually on effectively managing these available resources either internal or external towards more cost effective project management directly attributed to both Facilities Management and Procurement working integrally (Lehtonen, 2006).

Furthermore, the aspect of energy consumption in the construction industry could contribute to negative impact on the environment and cost as well, where the environmental aspect can be clearly visible on the increasing rates of pollution in fast developing nations, including Malaysia,

where the energy consumption of polluting energy sources wastes precious unrenowable energy sources and pollutes the environment (Sev, 2009), as the same source stated that the construction industry energy consumption is one of the main causes of pollution and in certain construction project can cost up to 20% of the entire project budget, a significant amount which can be reduced in order to use the resources available towards enhancing work practices which would drive growth in general, and productivity and efficiency in particular, as well as save energy resources and adopt to sustainable development (Zaw Min, 2016).

Finally, it is clear and evident the impact procurement and facilities management can play in the field of energy, where it is always thought that there is a gap in the performance of construction companies directly relevant to both facilities management and procurement processes usually associated with the practices as was shown in (Chan, 2015) (Goulden, 2015) (Noor, 2014) (Sev, 2009) and (Zaw Min, 2016).

Based on the above review of literature , this research will attempt to further understand the how both Facilities Management and Procurement processes work integrally together in the construction industry in Malaysia towards achieving better performance in terms of cost, efficiency, and resource management defined by terms of money and energy, which would aid in further developing the practices in the construction industry in Malaysia in general to help it make the target set by the 2020 plan of achieving a minimum contribution of 6% of the GDP. Furthermore, (Jason Morris, 2006) have constructed a model of how procurement processes and facilities management interrelate where in his case study he found out that adopting a certain procurement strategy can greatly affect the success of the project by having a direct influence on internal processes strategies and facilities management; the model he constructed is shown below



**Figure 2.2 A model of how procurement processes and facilities management interrelated**  
**Source (Jason Morris, 2006)**

Furthermore, (Jason Morris, 2006) stated that the integration of procurement planning with facilities management can greatly improve facilities management through analyzing the specific be integrated together.

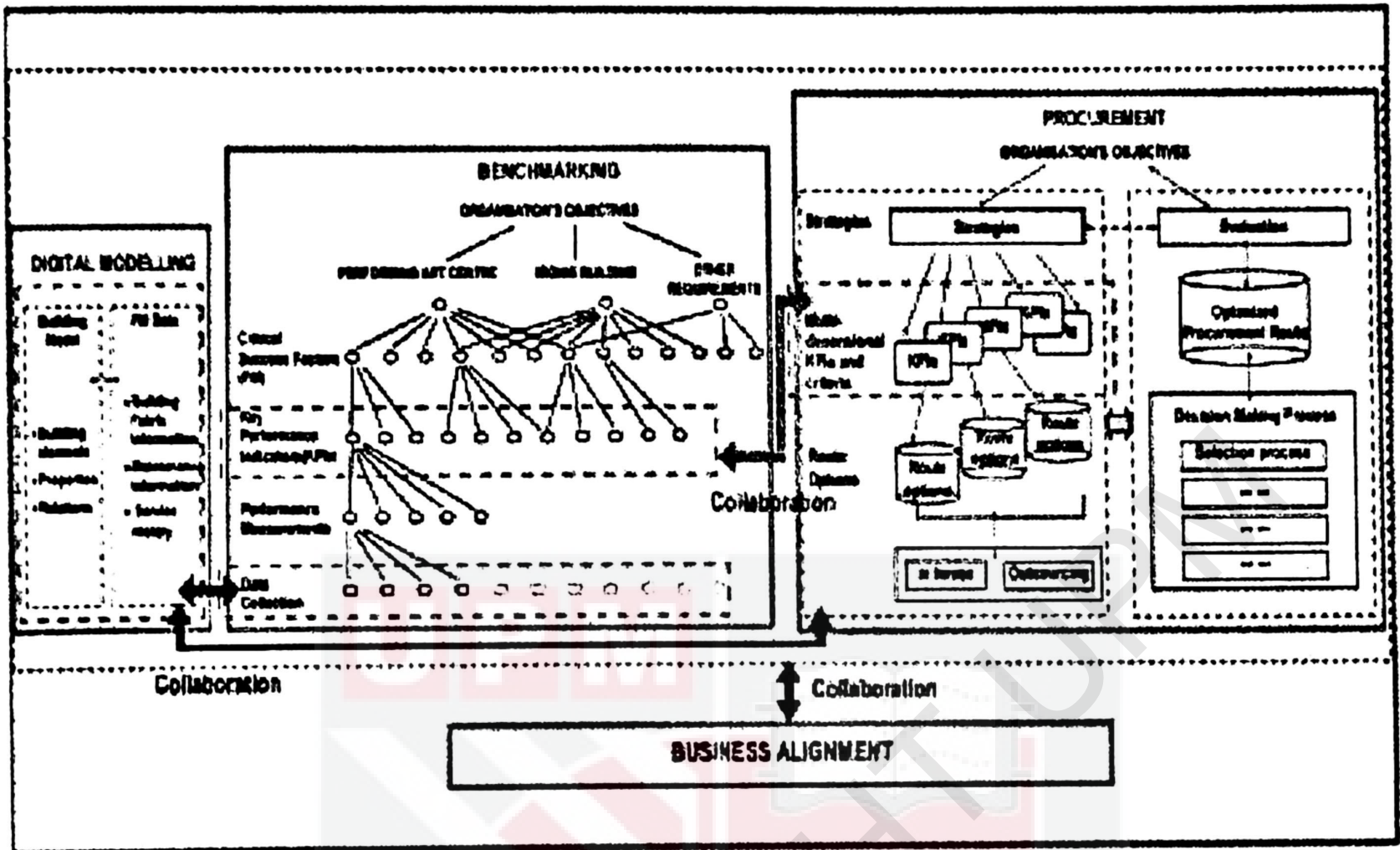


Figure 2.3 A model on how procurement processes and facilities management can be integrated together

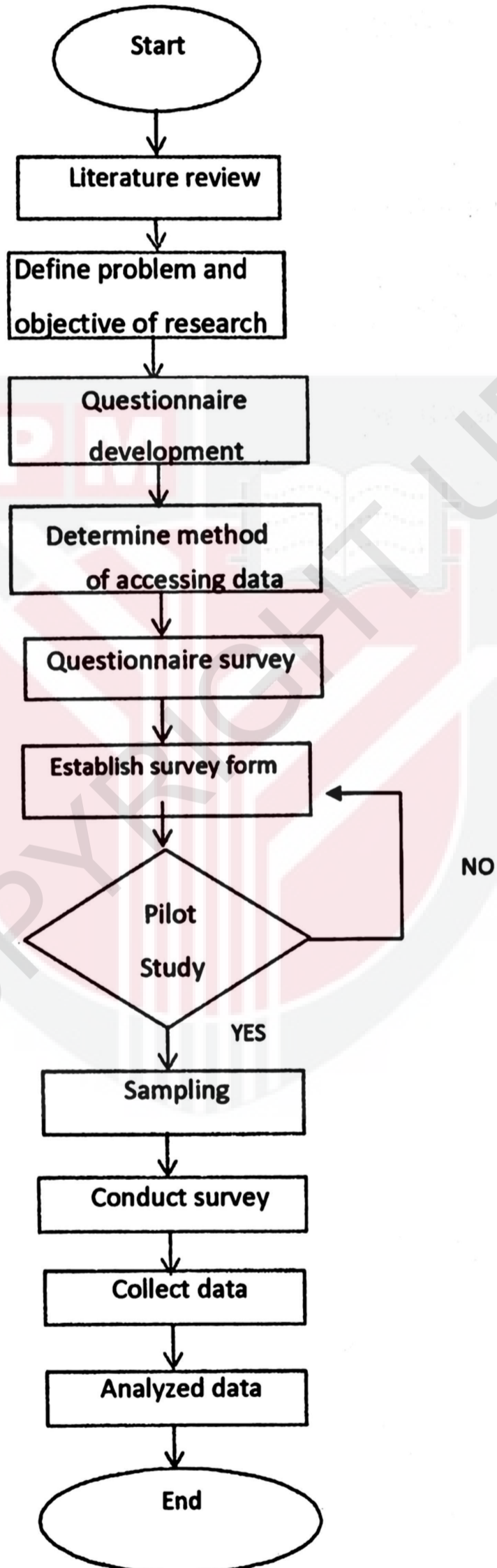
## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

In this chapter the research methodology is discussed, starting with the, identifying the variables to be tested based on research objectives. The design, sampling, and instruments will also be discussed with justifications as why they were chosen, as this research adopts survey based on questionnaire to obtain data, then to be analyzed using a combination of qualitative and quantitative analysis, as the questionnaire will be distributed and analyzed statistically using SPSS software, then the chapter will conclude with a summary.

### 3.2 Flow Chart of Methodology



### **3.3 Research Variables**

There are two types of research variables present, the dependent and independent variables, where the dependent variable value or weight will be influenced by the independent variables, which in themselves may or may not depend on other factors which won't be discussed. Initially, it was assumed that the role of facilities management in construction companies is the dependent variable, and the different factors that affect procurement and facilities management interaction towards the development of facilities management practices are the independent variables, as those variables were chosen based in the literature review.

### **3.4 Research Design**

This research is a quantitative based study with explanatory variables that are both quantitative and qualitative attributes. The research will be designed around a regression model, with data source being a questionnaire-based survey that will be distributed to the population of interest, then results will be analyzed using an appropriate software, such as SPSS and using those results to construct a model of optimization of facilities management with procurement processes towards enhancing and developing the practice of construction companies.

### 3.5 Sampling

According to (Chuan, 2014) there are 7 categories of construction and contractors companies in Malaysia according to capital and tendering capacity, the table below shows the registered companies in each category across Malaysia.

Table 3.1: Contractors and Construction companies registered in Malaysia (CIDB, 2014).

Grade	Tendering Capacity (RM)	Paid-Up Capital (RM)	Size	Number of registered contractors
G1	< 200,000	5,000	Small	34,485
G2	< 500,000	25,000	Small	9,628
G3	< 1,000,000	50,000	Small	8,825
G4	< 3,000,000	150,000	Medium	3,038
G5	< 5,000,000	250,000	Medium	4,130
G6	< 10,000,000	500,000	Large	1,694
G7	> 10,000,000	750,000	Large	5,332

This table does not show companies with capital exceeding 750,000 Ringgits as those companies will be omitted due to the time and cost limitations of this research.

The steps for the sampling technique are as follows:

- 1- Defining the population (building and construction firms in Kuala Lumpur and Putrajaya ).
- 2- Choosing sample size (1499 companies).
- 3- Listing of the population.
- 4- Assigning numbers to each company.
- 5- Finding random numbers.
- 6- Selecting the sample.

Based on the total number of contractor in Putrajaya and Kuala Lumpur, sample size was calculated in order to know how much questionnaire to be distributed and how much expected the

questionnaire will get in return. The calculation process will be stated below :

Confidence level	: 90%
Margin of error	: 13%
Population size	: 1499
Sample size	: 39

From the result above it can be seen that the confidence level was 90% , the margin of error is 13% and the population size is 1499 companies that were distributed by emails and handing the questionnaires face to face meeting, so the sample size that need to get back is 39 respondents from each company. On the other hand, to calculate the sample size there is alternative way which by using the formula below :

$$\text{Sample size} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

Where: *Population Size = N* , *margin of error = e* , *z-score = z* , *p= 0.46*

The z-score is the number of standard deviations a given proportion is away from the mean.

To find the right z-score to use, refer to the table below:

Table 3.2: Z-score value based on confidence level

<b>Desired Confidence Level</b>	<b>Z-score</b>
80%	1.28
85%	1.44
90%	1.65
95%	1.96
99%	2.58

After determining the sample size required, 1499 questionnaire were sent to the companies. However, only 40 were returned back which is considered well due to the study of Creswell(2000). Samples from companies in Putrajaya and Kuala Lumpur will be chosen to have all companies within this scope an equal chance of being picked then the questionnaire will be distributed to them.

### **3.6 Research Instrument**

The main instrument use by this research is questionnaires, as they are cost and time effective, the questionnaires will be distributed to the selected sample via emails, phone calls, and personal interviews to be self-administered and filled by respondents, then key findings from results will be grouped accordingly. However, since questionnaires can't be relied upon as a single source of data, secondary data sources might include one or two in-depth interviews with people in charge of facilities and procurement in the sample subject to our study.

### **3.7 Data Analysis**

As mentioned previously the research will use the data obtained from the questionnaires and analyze them using SPSS, as the measures of analysis will include mean, mode, standard deviation, amongst any other suitable statistical measure that would help in building the proposed model, where each factor determined will be analyzed separately then in correlation with other factors using an appropriate model, such as regression model or as deemed fit.

### **3.8 Ethical Considerations**

To conduct research in an ethical manner, below is some of the ethical consideration before, during and after the research. Researcher is obliged to treat all the information collected from respondents should be as strictly private and confidential. Researcher is obliged to obtained consent from respondents prior to survey; no respondents should be forced to participate in the survey. Researcher should not be deliberately misrepresent or distort the data collected. Respondents should give all full cooperation to complete the research once they agree to participate. Respondents are obliged to provide truthful and honest responses.

### **3.9 Conclusion**

**This chapter presents the research methodology and framework of the study, as this research is a correlation study that examines the relationship between the variables, it also utilizes qualitative approaches towards variables using a structured pre-set questionnaire. The sample will include construction and contracting firms in Putrajaya and Kuala Lumpur, and data collected will be analyzed using both linear and non-linear regression models into addition to other statistical measures to found the foundations towards constructing an optimization model between procurement and facilities management which would enhance and develop the construction companies.**

## CHAPTER 4

### RESULTS AND DISCUSSIONS

#### 4.1 Primary results

##### 4.1.1 Reliability Test

Reliability is the degree to which an assessment tool produces stable and consistent results. This type of testing incorporates the results from non-functional testing. In this study, the reliability test was analysis using SPSS software and alpha was found to be .881 (Table 1) which is higher than .75. This indicated that our instrument was suitably fit the purpose of the survey. This result is in agreement with previous research (Youn et al., 2003).

Table 4.1: Reliability Statistics

Cronbach's	N of Items
.881	27

##### 4.1.2. Normality Test

The aim of this test is to overview checking for normality in statistical analysis using SPSS. The main tests for the assessment of normality are Kolmogorov-Smirnov (K-S) test and Shapiro-Wilk test (Öztuna et al., 2006). Among these, Shapiro-Wilk is a much used test. In Figure 4.1, the frequency distributions plot shows that data follow a normal distribution. Results of Kolmogorov-Smirnov and Shapiro-Wilk normality tests are shown in Table 4.2. It is clear that both tests have a p-value greater than 0.05, which indicates normal distribution of data.

Table4.2: Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Procurement and Facilities Management	.209	40	.020	.932	40	.088
Performance	.246	40	.030	.884	40	.101
Time	.249	40	.068	.902	40	.102
Cost	.257	40	.105	.887	40	.081
Quality Services	.211	40	.080	.895	40	.065

a. Lilliefors Significance Correction

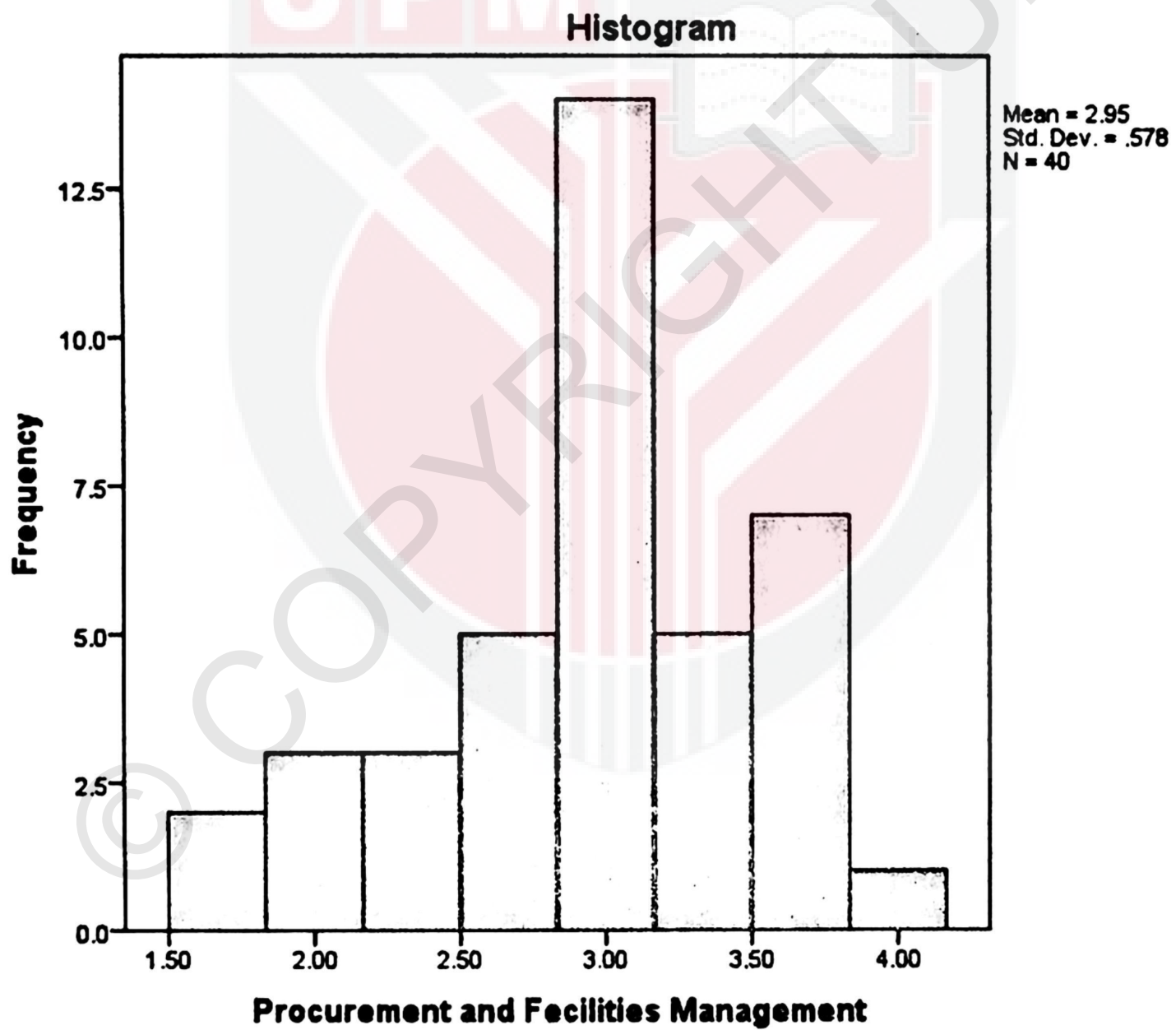


Figure 4.1: The histogram plot of the procurement and facilities management.

## 4.2 Statistical Analysis

### Demographic Section

This section of the results involves the current job, educational background, size of the company, job position and the procurement and facilities management involvement. The questionnaire is about the respondents of Demographic Information.

#### Question 1: How long have you worked at your current job?

Table 4.3: the statistical of the duration of the current job.

Duration of current job	No. of respondents	Percentage (%)
0 to 5 years	20	50.0
6 to 10 years	10	25.0
10 to 20 years	7	17.5
20 to 30 years	3	7.5
<b>Total</b>	<b>40</b>	<b>100</b>

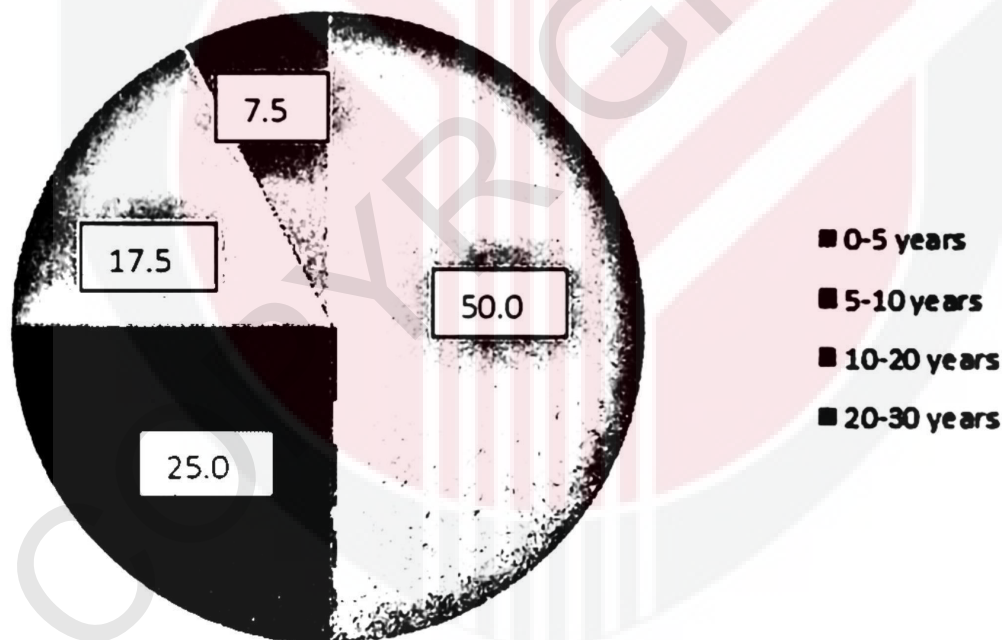


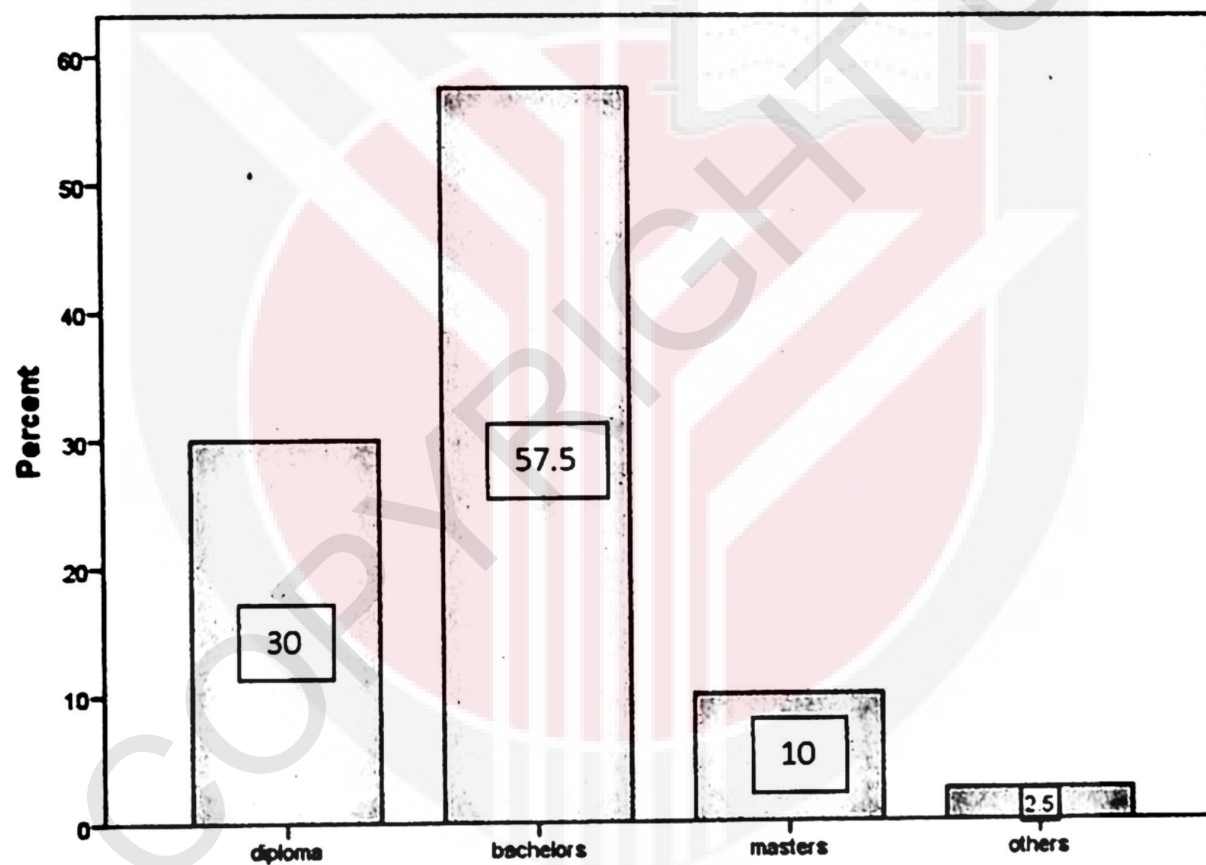
Figure 4.2: The duration of the current job.

As it can be seen from Figure 4.2, about 20 of the respondents representing 50.00% worked with experience less than 5 years, 10 of the respondents representing 25.00% worked for almost 6 to 10 years, 7 of the respondents representing 17.50% have the current job for almost 10 to 20 years and 3 of the respondents representing 7.50% worked in current job with more than 20 years as illustrated in Table 3. Therefore, most of the employees have the current job from 0 to 5 years.

**Question 2: What is the highest level of education you've achieved?**

Table 4.4 : The statistical of level of education.

Qualification	No. of respondents	Percentage (%)
Diploma	12	30.00
Bachelor	23	57.50
Master	4	10
Others	1	2.50
<b>Total</b>	<b>40</b>	<b>100</b>



**Figure 4.3: The Level of education.**

According to the statistics shows in Figure 4.3 and Table 4.4, about 12 (30.00%) of respondents are Diploma holder, 23 (57.50) of respondents are Bachelor holder, 4 (10.00) of respondents are Master holder, and 1 (2.50%) of respondents are other level of education.

**Question 3: What is the size of the company you work at (in terms of employee's number)**

Table 4.5: The statistical of the company size.

Company size	No. of respondents	Percentage (%)
0 to 20 employees	6	15.00
20 to 50 employees	6	15.00
50 to 100 employees	4	10.00
more than 100 employees	24	60.00
<b>Total</b>	<b>40</b>	<b>100</b>

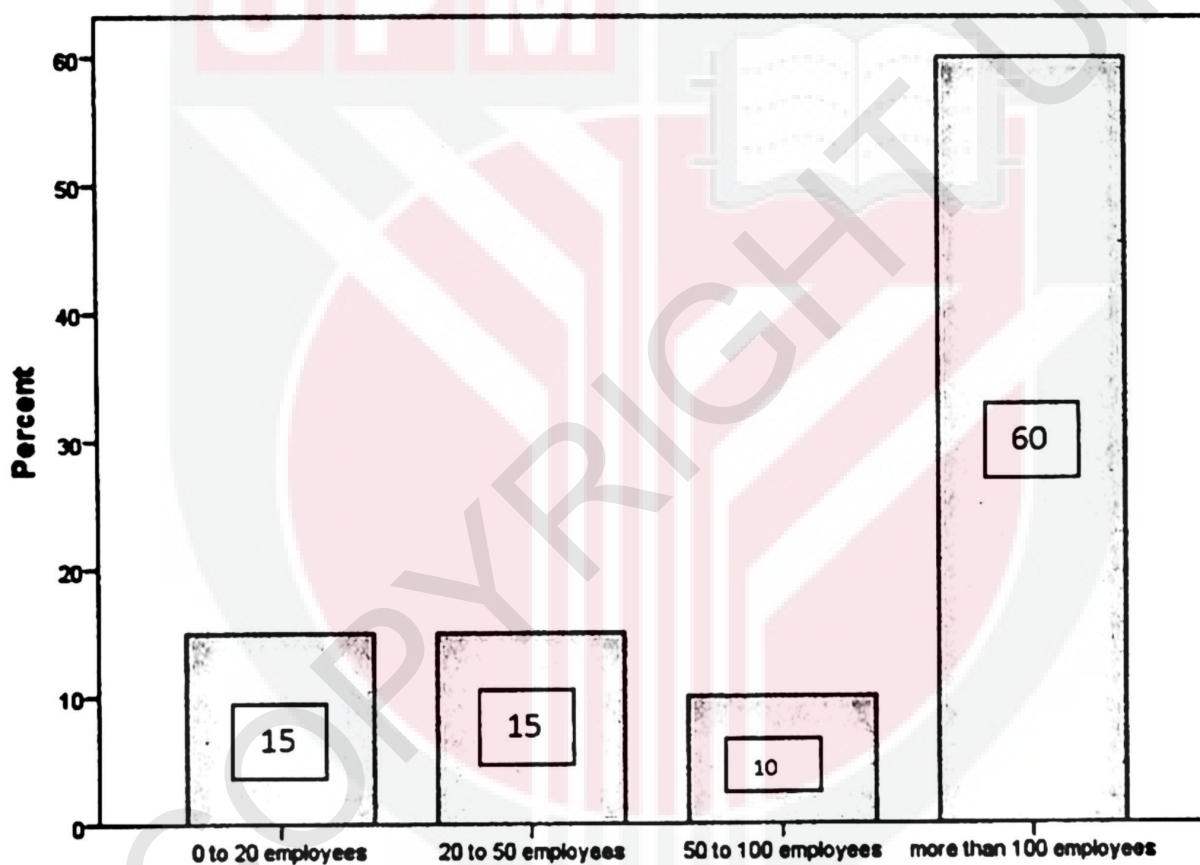


Figure 4.4: The company size.

The statistics analysis found from Figure 4.4 and Table 4.5 show that 6 (15.00) of the company size have from 0 to 20 and from 20 to 50 employees, 4 (10.00%) of the company size have from 0 to 20 employees, and 24 (60.00%) of the company size have from 0 to 20 employees. The justification of this section we got the employees more than 100 because the companies that we did our survey in were from the big companies in Malaysia.

**Question 4: Please choose your Job Position:**

Table 4.6: The statistical of the job position.

Job position	No. of respondents	Percentage (%)
top level management	3	7.50
mid level management	24	60.00
low level management	3	7.50
technical position	7	17.50
Others	3	7.50
<b>Total</b>	<b>40</b>	<b>100</b>

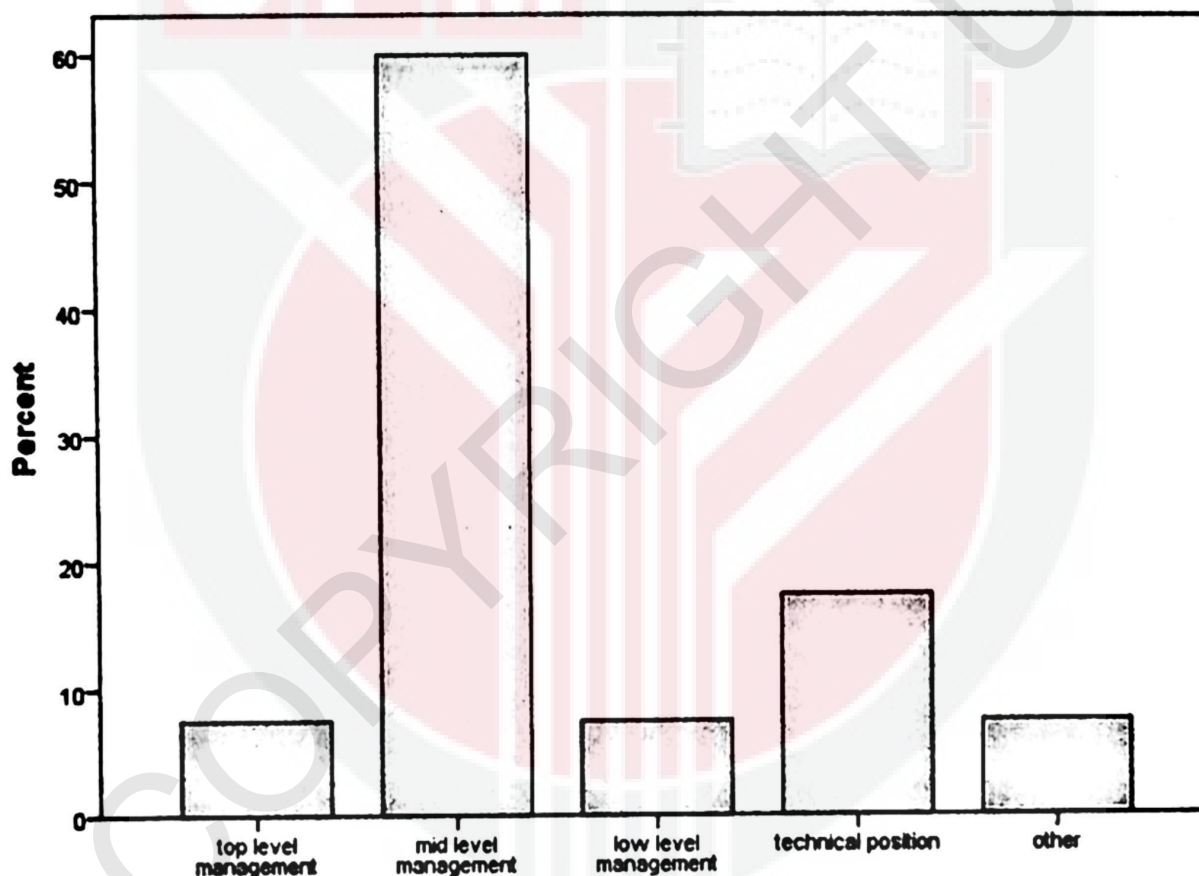


Figure 4.5: The job position.

From Figure 4.5 and Table 4.6, about 3 (7.30%) of respondents were occupied top and low level management and also other positions, 24 (60.00%) occupied the mid level management, and almost 7 (17.50%) of the stuff occupied as a technical position jobs.

**Question 5: Does the company is deeply and directly involved in procurement process and facilities management:**

Table 4.7: The statistical of deeply and directly involoved in procurement and FM.

	No. of respondents	Percentage (%)
Yes	31	77.50
No	9	22.50
<b>Total</b>	<b>40</b>	<b>100</b>

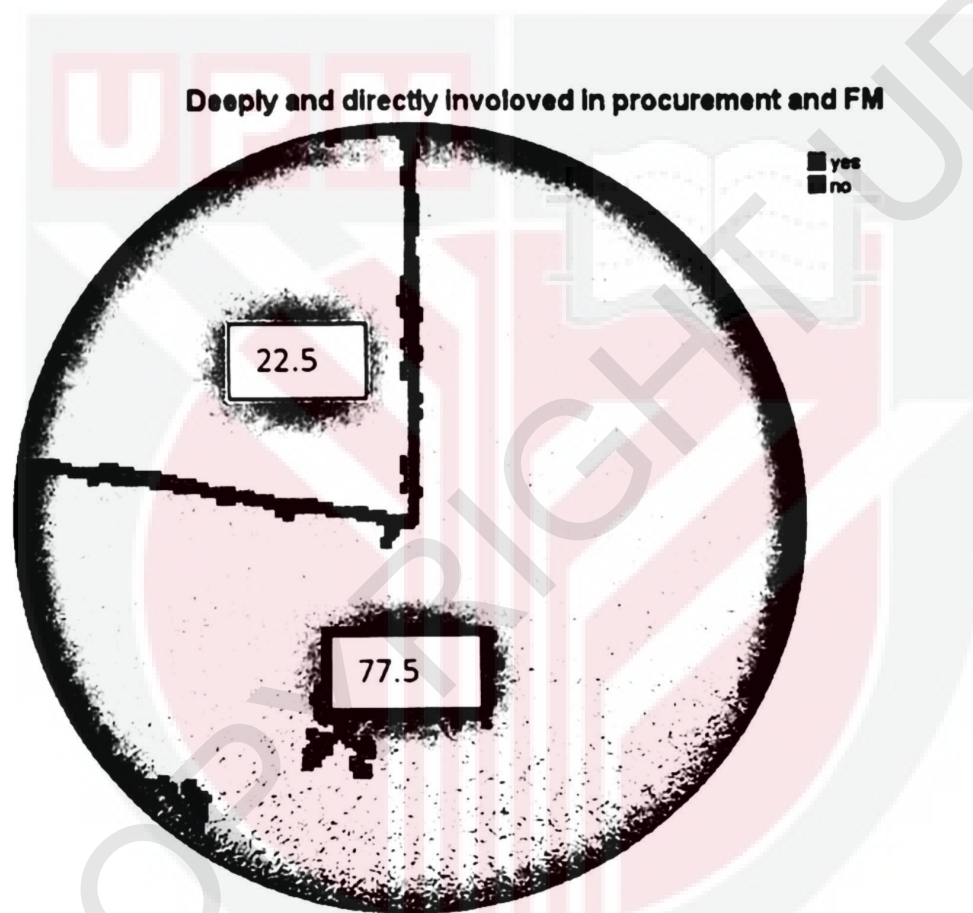


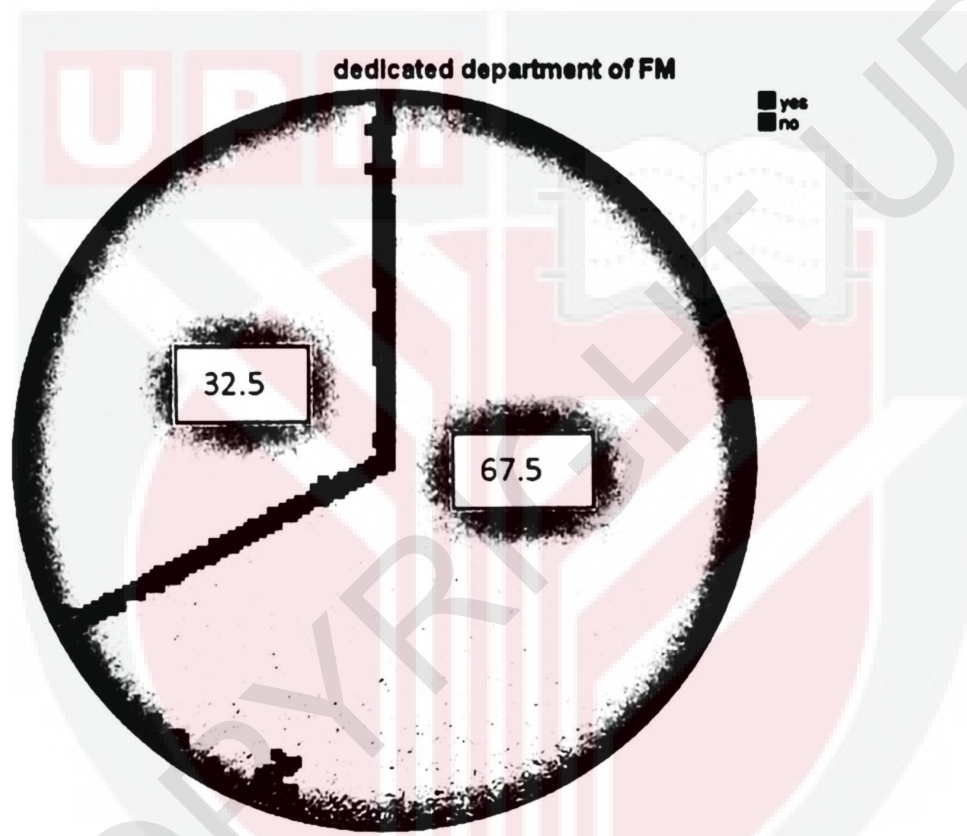
Figure 4.6: Deeply and directly involoved in procurement and FM.

From Figure 4.6 and Table 4.7, about 31 (77.50%) of respondents were answered yes of the question that the company is deeply and directly involved in procurement process and facilities management. While 9 (22.50%) of the respondents answered by no. Thus, the majority of the respondents were agreeing about the involvement of procurement process and facilities management.

**Question 6: Your Company has a dedicated department for facilities management:**

**Table 4. 8: The statistical of dedicated department of FM.**

	<b>No. of respondents</b>	<b>Percentage (%)</b>
Yes	27	67.50
No	13	32.50
<b>Total</b>	<b>40</b>	<b>100</b>



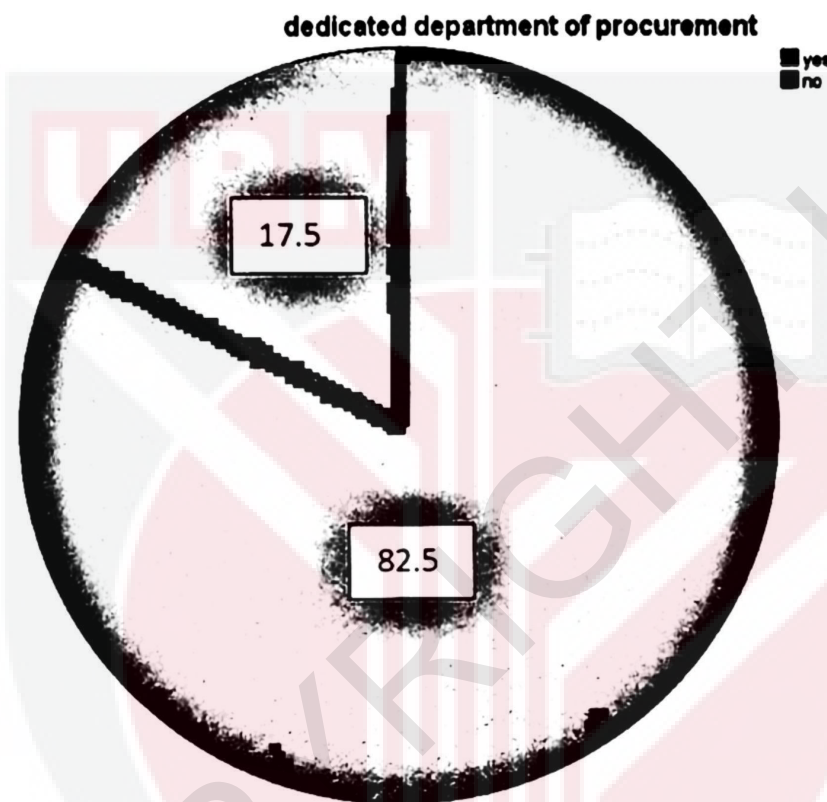
**Figure 4.7: Dedicated department of FM.**

From Figure 4.7 and Table 4.8, about 27 (67.50%) of respondents were answered yes of the question that the company has a dedicated department for facilities management. While 13 (32.50%) of the respondents answered by no. Thus, the majority of the respondents were agreeing about that the company has a dedicated department for facilities management.

**Question 7: Your Company have dedicated department for procurement:**

Table 4.9: The statistical of dedicated department of procurement.

	No. of respondents	Percentage (%)
Yes	33	82.50
No	7	17.50
<b>Total</b>	<b>40</b>	<b>100</b>



**Figure4. 8: Dedicated department of procurement.**

From Figure 4.8 and Table 4.9, about 33 (82.50%) of respondents were answered yes of the question that the company have dedicated department for procurement. While 7 (17.50%) of the respondents answered by no. Thus, the majority of the respondents were agreeing about that the company has a dedicated department of procurement.

### 4.3 Inferential Statistics

Author has conducted the test of Pearson correlation analysis using inferential statistics. This test has been conducted using (Statistical package for social sciences version 20). This part of the chapter provides basis for hypothesis testing.

#### 4.3.1 Pearson Correlation Analysis

Correlation analysis has been conducted in SPSS (Statistical Package of social sciences) using three independent variables (IV's) which includes IV(1) time, IV(2) cost, and IV(3) quality services. One dependent variable (DV) is facilities management and procurement process. Author have computed (mean) for the questionnaires developed for all (IV's) and (DV). Using the Statistical compute mean function in SPSS author has applied Pearson correlation analysis.

According to Tompkins (2004) correlation tends to measure the linear association between two or more variables. For example if the value for one variable increases other variable also increase. Value of correlation coefficient lays between -1 and +1. The +1 indicates that both dependent and independent variables are perfectly related to each other in the linear sense, whereas -1 indicates that both variables are negatively interrelated in the linear sense. The below tables shows Pearson two tailed correlation analysis retrieved from SPSS.

Table 4.10 Pearson correlation between the procurement and facilities management and the performance.

<b>VARIABLES</b>	<b>Procurement and facilities Management</b>	<b>Performance</b>
<b>Procurement and facilities Management</b>	1	
<b>Performance</b>	0.724**	1

Table 4.11: Pearson correlation between the procurement and facilities management and the factors include time, cost and quality services.

<i>VARIABLES</i>	<i>Procurement and facilities Management</i>
<i>Procurement and facilities Management</i>	1
<i>Time</i>	-0.690**
<i>Cost</i>	-0.589**
<i>Quality Services</i>	0.546**

The results found from the table 4.31 illustrates that IV (1) which is time is moderate correlated with procurement and facilities management in private companies in Malaysia with negative coefficient value of  $r = -0.690$  which is considered moderately acceptable in organizational science and not closer the value of 1. IV (2) which is cost is moderate correlated with procurement and facilities management in in private companies in Malaysia with the negative coefficient value of  $r = -0.589$  which is somehow closer the value of 0.7 as per organizational science standard. IV (3) which is quality services is also same moderate correlated with procurement and facilities management in private companies in Malaysia with the positive coefficient value of  $r = 0.546$  which is closer the value of 1 as per organizational science standards (Weinberg and Knap, 2001).

#### 4.4 Findings and Discussion

This section is going to discuss the result of the survey conducted on the primary research and link it back to the prior literature studies. First and foremost, it is going to discuss in detail how the researcher could achieve the study objectives with a provision of relevant explanation and statistical evidence. Secondly, it is going to discuss the hypothesis testing through Pearson correlation matrix which is employed to examine the relationship between time, cost and quality services as the independents variables and procurement and facilities management as dependent variable. Based on the statistical result the hypotheses are going to be either accepted or rejected hence the finding is also going to be supported with relevant literature and past findings.

##### 4.4.1 System Testing

**Research Objective 1:** To study the relationship between procurement and facilities management towards enhancing the overall performance of the organization

Our findings suggested that there is a positive relationship between the performance and procurement and facilities management in private companies in Malaysia. Pearson correlation analysis was conducted to investigate the relationship between dependent and independent variable. Promisingly, the findings indicates that there is strong relationship between performance and procurement and facilities management with correlation coefficient of  $r=0.724$ . Besides that, performance is a significant predictor of procurement and facilities management with the significance level  $P < 0.05$  as it scored  $p = 0.000$ .

**Research Objective 2:** To determine the factors that influence facilities management in the term in the term of procurement processes

Our findings suggested that there is a negative relationship between time the independents variables and procurement and facilities management as dependent variable in private companies in Malaysia. Pearson correlation analysis was conducted to investigate the relationship between dependent and independent variable. However the findings indicates that there is moderate relationship between time and procurement and facilities management with correlation coefficient of  $r=-0.690$ . Besides that, time is a significant predictor of procurement and facilities management with the significance level  $P < 0.05$  as it scored  $p= 0.000$ .

Time has been found to be correlated to procurement and facilities management, Panayiotou et al. (2004) reported that delay in time and among procurement department in companies found a negative relationship between timing deletion process and facilities management. In a similar research in USA, Dubey et al., (2017) revealed that there is negative relationships between poor efficient include time and procurement process. In addition, according to Brauers et al., (2017) studied the relationship between procurement process and efficient enhancement and they found that the relationship between them is negatively correlated.

For the cost variable, our findings suggested that there is a negative relationship between cost as the independents variables and procurement and facilities management as dependent variable in private companies in Malaysia. Pearson correlation analysis was conducted to investigate the relationship between dependent and independent variable and the findings indicates that there is a moderate negative relationship between them with correlation coefficient of  $r=-0.589$ . Besides that, cost is a significant predictor of employee performance with the significance level  $P < 0.05$  as it scored  $p= 0.000$ .

According to Goulden, (2015) revealed that there is a negative and significant relationship between cost and facilities management. The authors have allocated the energy resources available to optimize production and reduce construction lead time, which in turn cut down cost and increase efficiency.

For the quality services, our findings suggested that there is a positive relationship between quality services as the independent variables and procurement and facilities management as dependent variable in private companies in Malaysia. Pearson correlation analysis was conducted to find the relationship between dependent and independent variable and the findings indicates that there is a moderate negative relationship between them with correlation coefficient of  $r=0.546$ . Besides that, quality services is significant predictor of employee performance with the significance level  $P < 0.05$  as it scored  $p = 0.000$ .

**Research Objective 3:** To develop strategy for enhancing facilities management by optimization of procurement processes.

From the results found in this chapter, it can be seen that procurement process has a great affect to the facilities management in a company in terms of time, cost and quality services. The focusing of the three factors in order to enhance the facilities management should be highlighted for enhance the overall company future. That what this study was tried to found, which has been observed the procurement process can play a very important rule in order to asses and as a result to enhance the facilities management in any company. For the results, time and cost was found a negative relationship and high correlation with the facilities management. Therefore, the smart strategy plan ought to minimize the time as well as the cost in in procurement department. This can have a significant effect for the Facilities management to develop and enhance. Moreover, the results also found that a positive correlation was

found between quality services and facilitates management, which the advance technology and training workshops and so forth in the procurement department can have a great influenced to the enhance and develop the facilities management and lead to continue in the company progress and profit.

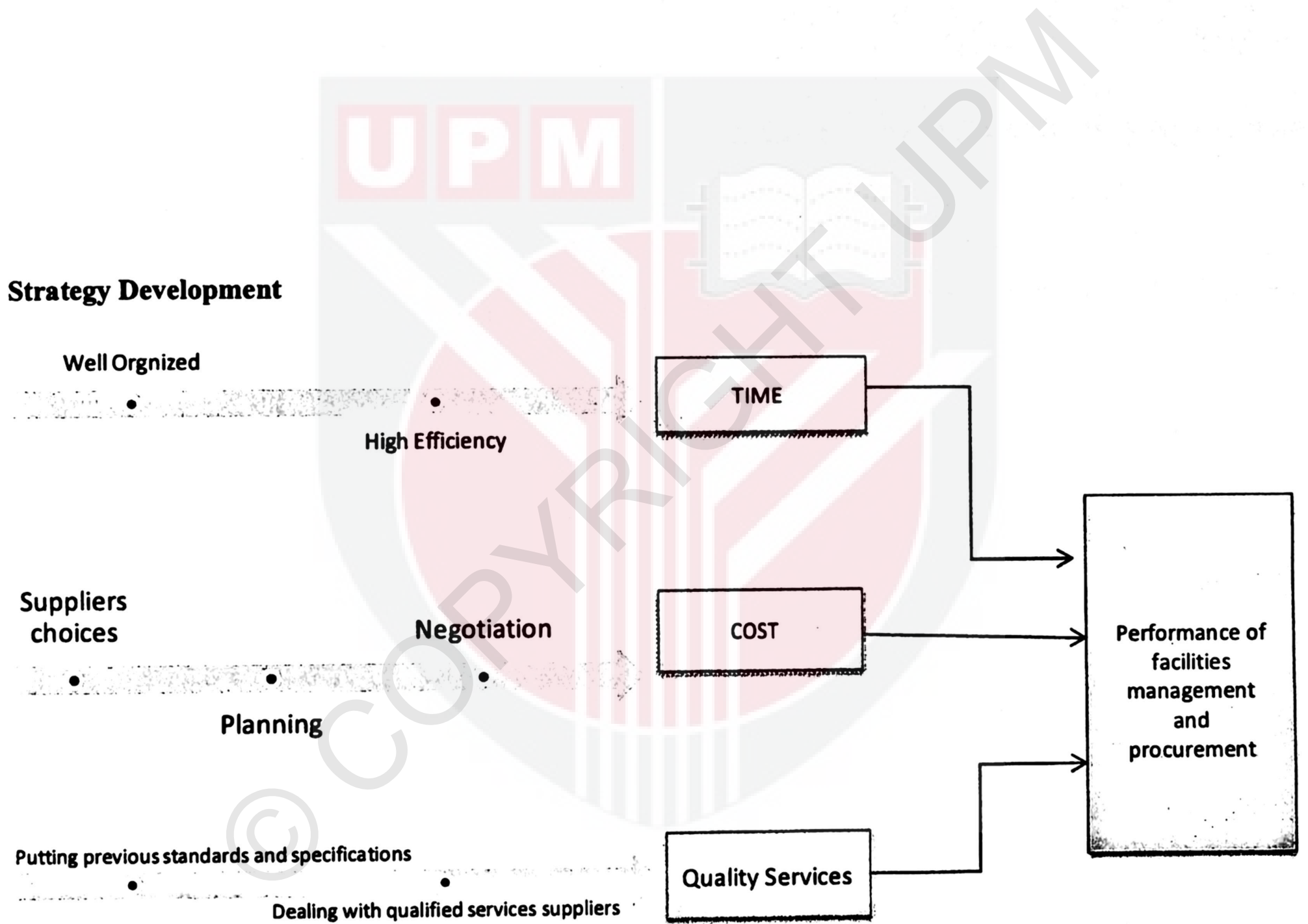


Figure 4.9: Framework Strategy

As it can see from the above graph, three variables are affected the performance of facilitates management and procurement. They are time, cost and quality services. The time variable is affected by well-organized as well as high efficiency. While cost variable is influenced by suppliers choices, planning, and negotiation. In addition, the quality services are affected by putting the previous standards and specifications and dealing with qualified services suppliers.



## **CHAPTER 5**

# **CONCLUSION AND RECOMMENDATION**

### **5.1 Conclusion**

This chapter consists of the overall conclusion of the whole research study. Basically, this chapter is going to conclude the research statistical findings. Furthermore, it is going to provide some recommendation based on the statistical findings to improve the performance of procurement process and facilities management in private companies in Malaysia.

The purpose of the study was to identify the dimensions of the impact of time, cost and quality service towards procurement process and facilities management in private companies in Malaysia. The questionnaires were distributed to Malaysians' private companies for a period of three weeks. The statistical results confirmed that collected data was reliable for analysis and measurement of the relationship between time, cost and quality service and procurement process and facilities management. Furthermore, it indicates that time, cost and quality service have an influence on procurement process and facilities management in Malaysians' companies which basically confirms the past literature, that there is a negative relationship between time and cost and procurement process in terms to enhance the facilities management. Also, the results found that there was a positive relationship between quality services and procurement process in terms to enhance and develop the facilities management.

## **5.2 Recommendations**

The results found from this study are indicated that the time is highly affecting the procurement process and the facilities management performance for enhancing their work in excellent way; therefore the different strategies and principles for time factor should be applied. Besides that, Efficiency For Performance (EFP) system should be implemented in private companies in Malaysia which aims to monitor and evaluate the time period of the procurement process thus will improve and develop the facilities management in general. Also, the new ideas and techniques for reducing the time period ought to be innovated in order to enhance and improve the facilities management and leads to advance the progress of the companies in Malaysia.

The findings revealed from this study are indicated that the cost is influencing the procurement process and facilities management performance for enhancing their work in perfect way, therefore the various strategies and principles for decreasing the cost must be applied. Thus, these methods should be applied in order to enhance and improve the procurement process performance which leads to improve the facilities management in Malaysia.

The results found from this study also indicated that the quality services have a moderate relationship with procurement process and facilities management performance. Moreover, the quality services in the companies must improve in terms of applied advanced technologies and provide training for their employees that can create a positive work environment health, safety and appropriateness work times. Those factors can significantly influence the procurement process and consequently enhance the facilities management in general and help the company to be well-established in particular.

## REFERENCES

- Alex Davies, D. S. (2015). *RICS Strategic Facilities Management Case Studies*. Cambridge: International Work Place .
- Ancarani, C. (2005). Supporting decision-making process in facilities management services procurement: A methodological approach . *Journal of Purchasing and Supply Management*, 232-241.
- Chan, M. (2015). *CONSTRUCTION PROJECT MANAGEMENT IN THE CONTEXT OF FACILITIES MANAGEMENT*. Hong Kong: The Hong Kong Institute of Facility Management.
- Chuan, M. L. (2014). *Business Strategies of Small and Medium Sized Contractors in Malaysia*. *International Review of Basic and Applied Sciences* , 131-141.
- COFELY BESIX. (2016). *CBFM Case Study: Burj Khalifa*. Dubai: COFELY BESIX.
- Dutton. (2015). *The definition of Procurement* . Victoria: CIPS Australia Pty Ltd.
- Goulden, S. (2015). Caught in the middle: The role of the Facilities Manager in organisational energy use. *Energy Policy*, 280-287.
- Jason Morris, S. B. (2006). *FACILITIES MANAGEMENT: Case Study: AN INTEGRATED COLLABORATIVE APPROACH FOR FM –SYDNEY OPERA HOUSE FM EXEMPLAR* . Sydney : Cooperative Research Centre (CRC) for Construction Innovation.
- Joseph Lai, E. C. (2015). Performance measurement for teaching hotels: A hierarchical system incorporating facilities management. *Journal of Hospitality, Leisure, Sport & Tourism Education*, 48-58.
- Lehtonen, S. (2006). *Procurement and relationship management trends in FM services*. Helsinki: Helsinki University of Technology.
- Malaysian department of Statistics. (2016, Septmeber 23). *Construction* . Retrieved from Department of Statistics Malaysia: [https://www.statistics.gov.my/index.php?r=column/ctwoByCat&parent\\_id=89&menu\\_id=SjgwNXdiMOJIT3Q2TDBIWXdKdUVldz09](https://www.statistics.gov.my/index.php?r=column/ctwoByCat&parent_id=89&menu_id=SjgwNXdiMOJIT3Q2TDBIWXdKdUVldz09)
- Miodrag, T. C. (2012). *Improving Resource Management of Large Logistics Facilities*. *Proceedings of EWGT2012 - 15th Meeting of the EURO Working Group on Transportation* (pp. 12-18). Paris: Procedia - Social and Behavioral Sciences.
- Noor, P. (2014). *DEFINING FACILITIES MANAGEMENT (FM) IN THE MALAYSIAN PERSPECTIVE*. Liverpool: Jhon Moores University.
- Nor Diana Aziz, A. H. (2016). *Building Information Modelling (BIM) in Facilities Management: Opportunities to be considered by Facility Managers* . *Procedia - Social and Behavioral Sciences*, 353-362.

- Olenrewaju, A.-A. (2015). the case of fast developing countries. In *Building Maintenance processes and practices* (pp. 9-31). New York: Springer.
- PATANAPIRADEJ. (2004). *The Scope of Facilities Management*. Bangkok: Chulalongkorn University.
- Sev. (2009). How can the construction industry contribute to sustainable development? A conceptual framework. *Journal Of Sustainable Development*, 161-173.
- The University of North Carolina. (2014). *Determining Sample size*. North Carolina: UNC.
- Zaw Min, P. M. (2016). Facilities management added value in closing the energy performance gap *International Journal of Sustainable Built Environment*, 197-209.
- Youn, B. D., Choi, K. K., & Park, Y. H. (2003). Hybrid analysis method for reliability-based design optimization. *Journal of Mechanical Design*, 125(2), 221-232.
- Öztuna, D., Elhan, A. H., & Tüccar, E. (2006). Investigation of four different normality tests in terms of type 1 error rate and power under different distributions. *Turkish Journal of Medical Sciences*, 36(3), 171-176.
- Weinberg, S. L., & Abramowitz, S. K. (2002). *Data analysis for the behavioral sciences using SPSS*. Cambridge, UK: Cambridge University Press.
- Panayiotou, N. A., Gayialis, S. P., & Tatsiopoulou, I. P. (2004). An e -procurement system for governmental purchasing. *International Journal of Production Economics*, 90(1), 79-102.
- Dubey, R., Dubey, R., Gunasekaran, A., Gunasekaran, A., Papadopoulos, T., & Papadopoulos, T. (2017). Green supply chain management: theoretical framework and further research directions. *Benchmarking: An International Journal*, 24(1), 184-218.
- Brauers, W. K. M., Zavadskas, E. K., & Lepkova, N. (2017). The Future of Facilities Management in Lithuania. *Journal for Economic Forecasting*, (1), 98-115.

**APPENDIX**

---



© COPYRIGHT UPM

# Questionnaire Survey

## Demographic

---

### 1. How long have you worked at your current job?

Mark only one oval.

- 0-5 years
- 5-10 years
- 10-20 years
- 20 - <30 years

### 2. What is the highest level of education you've achieved?

Mark only one oval.

- Diploma
- Bachelors
- Masters
- PHD
- Others.....

### 3. What is the size of the company you work at (in terms of employee's number)

Mark only one oval.

- 0 to 20 employees
- 20 to 50 employees
- 50 to 100 employees
- More than 100 employees

### 4. Please choose your Job Position:

Mark only one oval.

- Top level management
- Mid-Level management
- Low-Level management
- Technical position
- Other

### 5. Your Company is deeply and directly involved in procurement process and facilities management:

Mark only one oval.

- Yes
- NO

**6. Your company have a dedicated department for facilities management:***Mark only one oval.* Yes No**7. Your Company have dedicated department for procurement:***Mark only one oval.* Yes No**Relationship between procurement and facilities management**

Please rank the following factors that enhance green procurement practice in your company (1= strongly disagree, 2= disagree, 3= neutral 4= agree, 5= strongly agree).

**8. Are there shared database/personnel/budget allocation between procurement and facilities management?***Mark only one oval.* Yes No**9. There is a direct relationship between procurement and facilities management at your company:***Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**10. There is an opportunity to enhance current procurement and/or facilities management:***Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**11. Enhancing procurement processes costing measures will have a direct and positive effect on facilities management:***Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**12. Enhancing facilities management processes costing affects procurement processes:***Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**13. Saving time on procurement process could save more time to be put in facilities management to increase productivity:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**14. Enhancing internal facilities management processes such as maintenance improves procurement planning which in turn enhances productivity and performance:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**15. Funds allocation and cost have a direct and positive impact on procurement processes:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**16. Funds allocation and cost have a direct and positive impact on facilities management processes:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**17. Time schedules and deadlines have a direct impact on procurement processes:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**18. Time schedules and deadlines have a direct impact on facilities management processes:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**19. Facilities management processes success is directly correlated to successful procurement processes**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## **Determining factors that affect facilities management in the term of procurement processes :**

---

Please rank the following factors that enhance green procurement practice in your company (1= strongly disagree, 2= disagree, 3= neutral 4= agree, 5= strongly agree).

**20. Facilities management of company are directly affected by efficient and inefficient procurement:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**21. Facilities management are affected by the procurement of poor service delivery performance measurement:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**22. Facilities management are affected by the procurement of poor Competent and experienced personnel**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**23. Facilities management are affected by the procurement of poor training and development:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**24. Facilities management are affected by the procurement of poor awareness of sustainable products and materials:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**25. Facilities management are affected by the procurement of whole life forecasting techniques:**

*Mark only one oval.*

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**26. Facilities management and procurement are affected by poor technologies that will manage, operate and maintain both:**

*Mark only one oval.*

1      2      3      4      5

**27. Facilities management are affected by the procurement of asset selection, procurement and deployment strategies:**

*Mark only one oval.*

1      2      3      4      5

Powered by  
 Google Forms



COPYRIGHT UPM