

PROJECT MANAGEMENT MATURITY IN PUBLIC INFRASTRUCTURE DEPARTMENTS IN DUBAI

by

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ABSTRACT

Since the past few years, Dubai has been undergoing a major economic ‘boom’ which has resulted in an increase in demand of public services. Local governments play an important role in the development of the required infrastructure, particularly when it is involved in building the infrastructure. In such cases, knowledge of government’s project management maturity is vital to the success. Unfortunately, there have been no studies to assess the project management maturity of the public infrastructure departments in Dubai. This study aims at assessing the project management maturity in the public sector in Dubai. Main findings of the study indicate that although the state of project management in local governments is not chaotic, improvements are required. This research was concluded by recommending that future studies conduct a comprehensive, in-depth assessment of the project management maturity that shall follow by an action plan.

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CHAPTER 1 – INTRODUCTION

1.1INTRODUCTION

Chapter 1 is an introductory chapter for this research projects. It aims at presenting the topic, introducing the main problems and outlining the main chapters of the study. At the beginning, a background of the topic is given, during which some of the main problems are presented. Following this, an introduction to the selected case study is given. The aims and objectives are then listed. The main assumptions and limitations of the research as discussed before an outline of the included chapters is presented.

1.2BACKGROUND INFORMATION

There is little doubt among researchers with regard to the benefits of economic growth, with some of the main benefits including increase in government revenues and reduction of unemployment rate [Binns & Nel, 2002; Firebaugh & Beck, 1994; Rogers, 2003; Walsh, 1998]. Thus, it is not surprising to know that most nations desire the growth.

Infrastructure development is often associated with economic growth. However, there appears to be a conflict with regard to the direction of causality between them. Some researchers argue that economic growth results in an increase in demand of public services and, thus, fuels the infrastructure investment [Esfahani & Ramirez, 2003; Fourie, 2006; Perkins *et al*, 2005]. On the other hand, many researchers disagree with this and state that economic growth does not have any significant effect on infrastructure expenditure. In fact, many argue that infrastructure investment stimulates growth by improving the accessibility and quality of the available services which eases trade [Aschauer, 1989; Briceño-Garmendia *et al*, 2004]. Regardless of the correctness of either or both theories, it remains a

fact that economic growth and infrastructure investment are closely linked together and are often required simultaneously if advancement of a nation is desired.

Governments, and in particular local governments, are responsible for the provision of infrastructure services [Fourie, 2006; Woods, 1998]. This, in general, is done in two ways. Local governments have the option of either building operating the infrastructure by itself or by encouraging the participation of the private sector [Briceño-Garmendia *et al*, 2004; Romp & de Haan, 2007]. In the lateral case, the government acts as a regulatory body. However, due to the new challenges facing the countries, many governments have changed its responsibilities from solely being a service provider into being a development oriented [Andrew & Goldsmith, 1998; Nel, 2001].

Regardless of the stance of governments with regard to its role, they are usually indulged in initiating, planning, managing and executing projects. In addition, particularly in case of infrastructure development, government projects often carry high value. Any delays or deviations in a government project, even if minor, could translate into large sums of capital. Thus, it is important that those projects are carefully managed in order to ensure a successful completion within time and budget [Kaliba *et al*, 2008]. Governments ought to monitor and improve their project management competence.

One way of by which government entities, or any organisation, could optimise their project management skills is through assessing their project management maturity [Crawford, 2006; Hillson, 2001, Hillson, 2003; Ibbs & Kwak, 2000; Rwelamila, 2007]. Project management maturity measures

organisation's ability to manage projects successfully and identifies its strengths and weakness in relation to project management [Hillson, 2003; Judev & Thomas, 2002]. Organisation's project management maturity could be measured using project management maturity models. A survey, conducted in early 21st century, identified more than 30 project management maturity models that are being used in the market [Hillson, 2003].

1.3CASE STUDY

Dubai, one of the seven states of the United Arab of Emirates (UAE), has traditionally been known for being a center for trade and business [Al Tamimi, 2006; DeNicola, 2005; DP World 2; Pacione, 2005]. During the 19th century, many of the regions merchants chose Dubai as their main port in the Middle East, which was due to low tax rates and high quality of services provided [DP World 2; Pacione, 2005]. Moreover, despite the discovery of oil in 1966 and having it as a main source of income, earlier rulers of Dubai still believed that focus on trade and services sector would, on the long term, still be the best option [Al Tamimi, 2006; Pacione, 2005].

In 2005, the DSP 2015 was developed. Its main aim was to present the performance of the government of Dubai and set a ten year plan, by which all local departments are required to adhere to [DSP 2015, 2005]. According to the presented data, the services sector, including, but not limited to, logistics and business services, accounted for about 74% of Dubai's 2005 GDP while oil accounted for only 5% [DSP 2015, 2005]. These figures confirm the precision of the vision of the earlier rulers of Dubai.

Since 2001, Dubai is undergoing a significant economic “boom“. This has resulted escalation of demand on public services, such as the transportation system and the utilities. The government of Dubai has promptly responded to the increased demand and has indulged itself in a large number of major projects, such as the construction of the first light railway services, the Dubai Metro, and the world’s largest airport, Al-Maktoum International Airport [RTA Rail Agency 1; Sambidge, 2008].

1.4 THE CHALLENGES

As mentioned above, it is important for governments to successfully manage projects. However, it appears that local governments are not well equipped to manage projects. Albeit being scarce, studies have shown that governments have often failed to manage projects successfully. For example, a study was conducted to measure the project management maturity in one of the infrastructure departments in South Africa. Using a 5-point Likert scale, the public department achieved the lowest score and was deemed as having a maturity level of 1 [Rwelamila, 2007]. Moreover, there also exist numerous examples on the failure of government led projects. Some of the most famous projects that failed include the construction of the Millennium Dome in London and the development of Concorde plane [Concorde SST; Flyvbjerg, 2005].

The situation appears to be the same with Dubai. Published studies in relation to the project management performance of the public sector of Dubai are non-existent. However, indications taken from the local media indicate that certain limitations exist. For example, it was recently announced that the traffic smoothening programme encountered certain

roadblocks and that the initial three year programme would be delayed by a further year [Ahmed, 2007].

1.5 STATEMENT OF THE PROBLEM

As the indications on the project management performance of the public sector of Dubai are not satisfactory, the local government ought to take the necessary action to improve the project management ability. However, it is important for the government to review the levels of the existing project management knowledge and skills when planning an improvement. As indicated earlier, the use of project management maturity is one option.

1.6 AIMS & OBJECTIVES

The aim of this research is to assess the project management maturity in public sector of the Government of Dubai. The research will assess the status of the existing project management capability. In particular, the research would review the project management maturity level of the infrastructure departments in Dubai.

The objectives of the report are:

- To demonstrate the importance of infrastructure in developing countries and show its relationship with economic development.
- To review the role of local governments in developing the infrastructure.

- Provide a brief review on the importance of project management and the need of measuring the project management maturity.
- To present and discuss the main project management maturity models.
- To investigate the current Project maturity level of the selected local government departments by conducting surveys and interviews.

1.7 RESEARCH LIMITATIONS

This research is associated with certain limitations, which, in brief, include:

- The utilisation of forced choice survey in the questionnaire, which generally introduces certain inaccuracy in results.
- Data collection was exclusively reliant on the questionnaire. No interviews, auditing or ethnographic approach was used.
- The number of selected sample was small, which was due to low response rate. Therefore, no proof could be found with regard to the generalisation of the results.
- The maturity model and its assessment tool were novel and were developed as part of this research. Thus, it was not possible to check on the correlation of maturities of various project management domains.
- Lack of previous information on the project management maturity of public sector in Dubai. Thus, no comparisons could be made.

1.8 OUTLINE OF THE DISSERTATION

The research is divided into eight chapters. The first chapter gives an introduction to the dissertation. It gives background information on the topic, describes the problem and sets out the aims and objectives. The limitations of the research are also briefly presented.

The second chapter is the literature review. Initially, it discusses the infrastructure in general and links it to the government responsibilities. Following this, the importance of having the latest status of an organisation's project management is explained. Finally, the chapter describes the maturity models and gives a brief overview of the main maturity models that are being used.

The third chapter is the case study. It briefly gives information on Dubai and describes its economic and infrastructure status. It then presents the current role of the government before presenting the problem.

The fourth chapter is the research methodology. The research philosophies, approaches and strategies are discussed. The selected samples are also decided. The chapter also detailed the development of the assessment tool.

The fifth chapter presents the results which are analysed and discussed in detailed in chapter 6. Chapter 7 and 8 are the recommendations and conclusions.

CHAPTER 2 – LITERATURE REVIEW

1.1INTRODUCTION

Chapter 2 is represents the main literature review of this research. It reflects the views of various researchers. This chapter is divided into 6 sections; namely economic growth and infrastructure, role of government, project management, project management maturity models and review of main project management maturity model.

1.2ECONOMIC GROWTH AND INFRASTRUCTURE

A) INTRODUCTION TO ECONOMIC GROWTH

There is little doubt among the majority of economists that *economic growth* is desirable and beneficial. Encyclopedia Britannica, the oldest English-language general Encyclopedia, defined economic growth as “*the process by which a nation’s wealth increases over time*”. Economic growth is measured using a combination of metrics including, but limited to, Gross Domestic Product (GDP), amount of foreign investment ...etc [CERC¹, 2006; Firebaugh & Beck, 1994; Rogers, 2003].

There are many benefits of economic growth. These include increase in government revenues, reduction in unemployment rates, improvement of income equality, improvement in quality of life of people, contribution to the social well-being, generation of additional goods and services, decline in the rate of population growth, provision of additional services to sustain the need of the increasing population, etc... [Binns & Nel, 2002; CERC; 2006; Firebaugh & Beck, 1994; Rogers, 2003; Sayre, 2007; Walsh, 1998].

¹ CERC = Connecticut Economic Resource Center

However, a number of researchers, in particular environmentalists, claim that economic growth is not as beneficial as it appears when considering its overall effect. It is often argued that economic growth fuels the ecological damage [Binns & Nel, 2002; de Bruyn *et al*, 1998; Holtz-Eakin & Selden, 1995]. While not denying the fact that economic growth leads to many benefits, studies suggest that economic growth benefits fail to achieve the desired results and as a results are outweighed by the price of harming the environment [Binns & Nel, 2002; Sayre, 2007].

An example of this is the case of poverty reduction. A generally inherited orthodoxy is that in order to reduce poverty in developing countries, economic growth requires swift growth in those countries, which, realistically, can only be achieved by having rapid growth in global economy [Woodward & Simms, 2006]. However, between 1990 and 2001, it was estimated that only \$0.60 out of every \$100 worth of growth in world's income per person contributed to reducing poverty to the levels required by the Millennium Development Goals (MDGs)² [Woodward & Simms, 2006].

Regardless of the dispute of the benefit of the economic growth, it remains a reality that most nations desire economic growth and seek the advantages it offers.

B) RELATIONSHIP BETWEEN ECONOMIC GROWTH & INFRASTRUCTURE

Economic growth is usually associated with infrastructure development. Infrastructure can be defined in a number of ways. Hirschman, in 1958,

² The first goal, MDG1, aim to halve the proportion of the population of developing countries living below the \$1-a-day [Woodward & Simms, 2006].

defined infrastructure as “*capital that provides public services*” [Fourie, 2006]. Infrastructure is in general categorized as either economic infrastructure or social infrastructure [Fourie, 2006]. Economic infrastructure supports economic activity and includes transportation, electricity, telecommunication, water supply and sanitation [Warner, 1999]. Social infrastructure promotes social welfare and includes schools, universities, libraries, clinics, hospitals, theaters, parks, housing ...etc. In this research, the word infrastructure refers to economic infrastructure.

Much research have been undertaken to establish the link between economic growth and infrastructure investment in the past 30 years. According to Aschauer [2000], the research was inspired by two factors. Firstly, the ratio of public capital expenditure to the GDP in the Organization of Economic Co-operations and Development (OECD) countries declined between 1971 and 1990. Studies have been conducted to investigate the effect of this decline. Secondly, many economists, such as Holtz-Eakin & Schwartz [1995], committed to examine the validity of the initial works, starting by Aschauer’s 1989 findings, which suggested that decline in public expenditure was accountable for the poor performance of the economy in the 1970s and 1980s.

In general, studies focused on the direction of causality between economic growth and infrastructure investment. In addition, studies have also focused on the effects on infrastructure investment on economic growth, education, health, income inequality ...etc. In literature, infrastructure investment has also been referred to as infrastructure development, public capital expenditure, public capital stock and public non-military spending.

Although many researchers agree that economic growth and infrastructure development are usually linked, there appear to be a general disagreement with regard to the sequence of their occurrence.

A number of researches maintain that an increase in economic activity results in an increase in the requirement of public services [e.g. Fourie, 2006]. Esfahani & Ramirez [2003], for example, indicate that economic growth outlines the scale of demand and supply of infrastructure services. Economic growth also provides the resources required to fund the infrastructure investment [Perkins *et al*, 2005]. Infrastructure, particularly economic infrastructure, does not exist on its own. Its aim is to support various types of economic activities [Perkins *et al*, 2005]. For example, the discovery of diamond in 1867 marked a historical development in South Africa's railway infrastructure [Perkins *et al*, 2005].

On the other hand, it is debated that infrastructure investment boosts economic growth. Aschauer, whose study in 1989 is considered to be the first to assess impact of infrastructure investment on productivity and growth, concluded that magnitude of infrastructure stock is has significant impact to growth. Aschauer used a cross country data to present his studies (refer to Figure 1 below). *The Quality of Growth* report [World Bank, 2000] represented the relationship between infrastructure development, i.e. physical capital, and economic growth, as shown in Figure 2 below. In addition, Briceño-Garmendia *et al* [2004] also represented this relation in a more detailed way, as shown in Figure 3 below. One of the main supportive arguments is the belief that the increase in infrastructure capital stock leads to the decline of services costs and to an increase in marketing opportunities and hence competitiveness [Briceño-Garmendia *et al*, 2004].

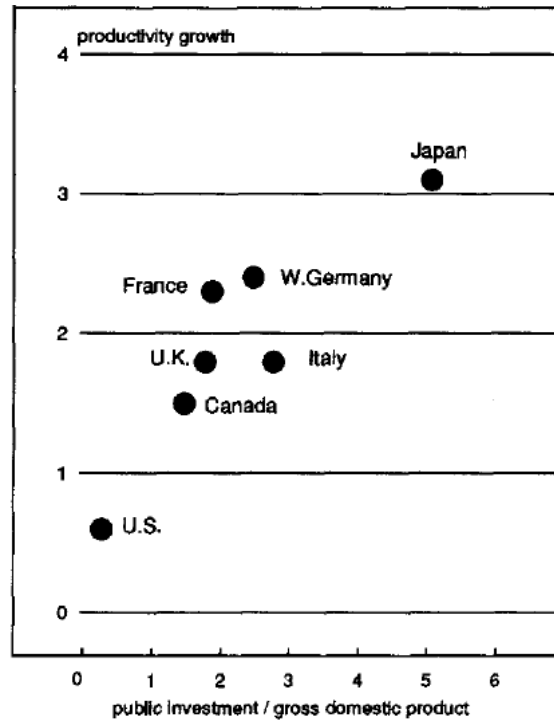


Figure 1 – Cross country comparison of the average annual productivity growth rate and the ratio of public investment to gross domestic product (1973-1985) [as presented in Aschauer, 1989, pp.197]

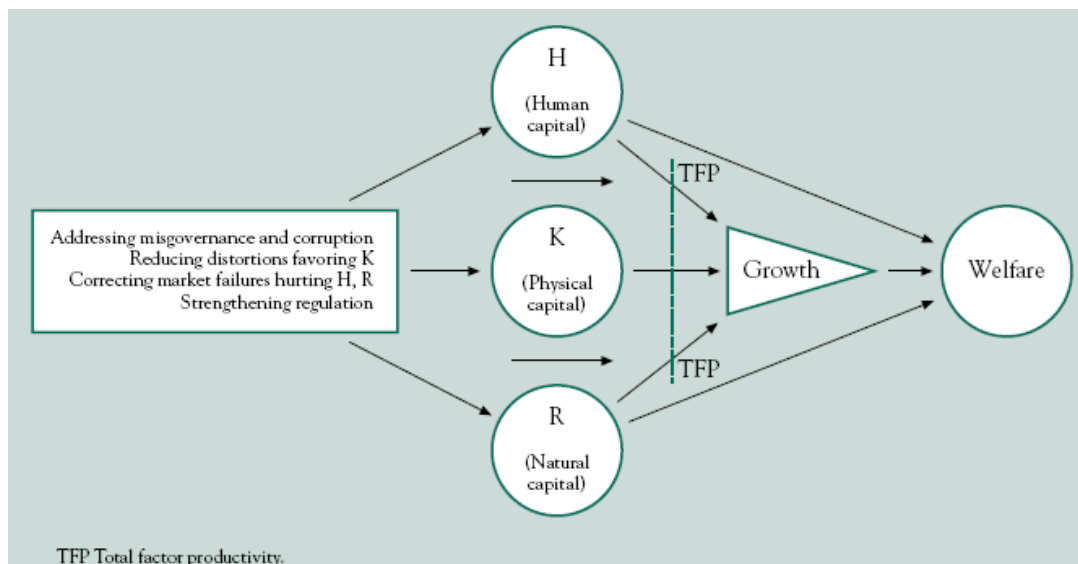


Figure 2 – Demonstration of how human (H), Physical (K) and Natural (N) capitals contribute to economic growth and welfare [as presented in World Bank, 2000, pp.XXVII]

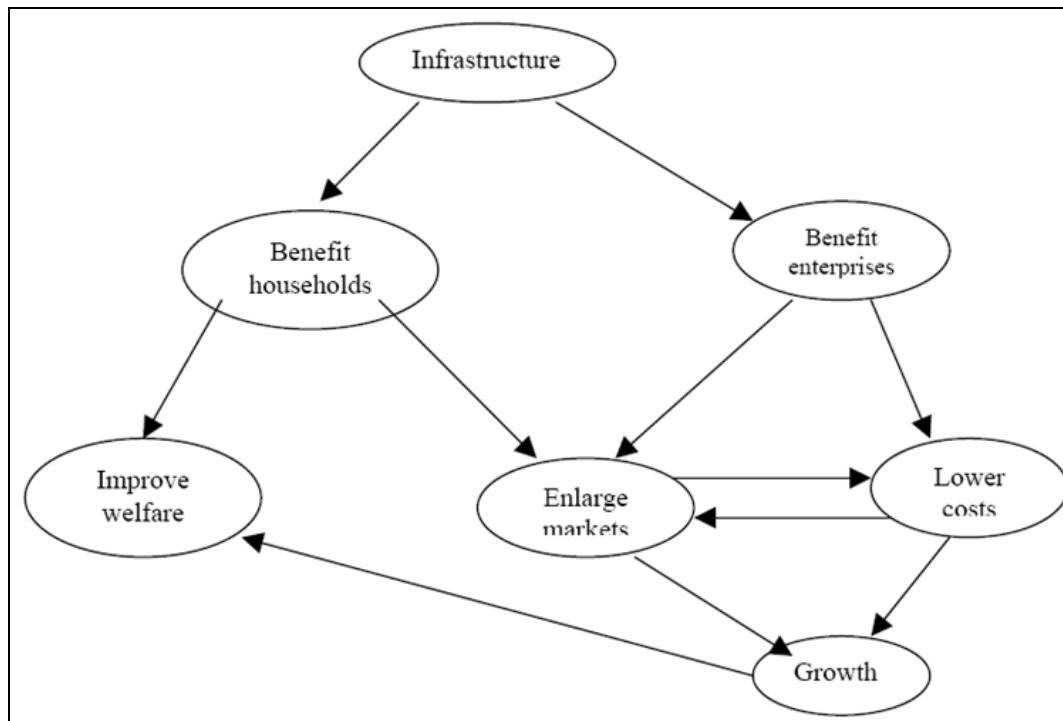


Figure 3 – Theory of how infrastructure development leads to boost in economic growth [as presented in Briceño-Garmendia *et al*, 2004, pp.4]

Yet, certain studies have shown that the relationship between infrastructure and economic growth run in two directions. Upon analyzing the economic infrastructure investment in South Africa, Perkins *et al* [2005] concluded that with the exception of roads, growth in GDP drives growth in infrastructure services. Similarly, Canning & Pedroni [1999] concluded that, when examining the effects of infrastructure expansion using worldwide statistics, paved roads and telephone lines had mixed results when considering their impacts for individual countries; when aggregating their findings, the overall average results indicated that infrastructure developments had no effect of economic growth.

It is important to note that infrastructure development, on its own, is not adequate to sustain an economic growth [World Bank, 1994]. Economic growth is a result of the existence of a number of factors that occur under

preferable circumstances [Esfahani & Ramirez, 2003]. Along with infrastructure, economic and financial policies form part of the key elements of creating a suitable environment for facilitating the economic growth [Briceño-Garmendia *et al*, 2004].

C) INFRASTRUCTURE BENEFITS

Besides addressing the causality issue, many studies reviewed the importance of infrastructure development to economic growth, regardless of the direction of causality between them.

The World Bank [1994] emphasized on the importance of infrastructure by representing public capital as “*the wheels – if not the engine – of economic activity*”. A number of studies in past two decades indicated a significant impact of telecommunications infrastructure investment on the economic growth [Caledron & Servén, 2004]. An empirical study by Esfahani & Ramirez in 2002 concluded that infrastructure, in particular telecommunications and power production, contribution to GDP is significant and, in general, exceeds the costs involved in providing those services. Fourie [2006] stated that infrastructure development lowers the costs of input of production industry. To demonstrate this, an example of the irrigation system was used. By improving the water supply infrastructure, the costs of the irrigating the farms would be reduced, thus benefiting the farmers and, therefore, the consumers.

Nevertheless, it should be noted that infrastructure development is also associated with other benefits. Infrastructure development improves education, health, agriculture, income inequality and poverty.

In relation to improving education opportunities, developing the transportation system that provides a safer road network aids in an enhanced school attendance rate [Caledron & Servén, 2004; Briceño-Garmendia *et al*, 2004]. Leipziger *et al* [2003] added that providing electricity permit extended studying time and facilitates the use of computers.

Supply provision to water and sanitation services improves health and prevents certain diseases [Briceño-Garmendia *et al*, 2004]. Providing access to clean water has proven to reduce child mortality rate. In Argentina, following an expansion of the water network, the child mortality rate was reduced by 8 percent [Galiani *et al*, 2002]. Similarly, 25 percent of infant mortality and 37 percent of child mortality differences between rich and poor were attributed to differences in access to the safe water services [Leipziger *et al*, 2003].

The development of infrastructure also improves agriculture productivity. The provision of irrigation and transportation system, in particular roads, had significantly increased the agriculture activity and profitability in rural India [Zhang & Fan, 2004].

Poverty is one of the main issues that are being addressed worldwide. The provision of reliable and affordable infrastructure reduces poverty [Briceño-Garmendia *et al*, 2004; Fourie, 2006]. Rural poverty level in India reduced significantly between 1960 and 1990, with the states starting with the better infrastructure and human resources achieving healthier rates of poverty reduction [Datt & Ravallion, 1996]. The development of roads and telecommunications also reduced rural poverty in China between 1978 and 1997 [Fan *et al*, 2002].

Much research has also been conducted to assess the impact of infrastructure availability on reducing income inequality. Cross country investigations for the period 1960-2000 showed that providing widespread infrastructure access improved income distribution [Caledron & Chong, 2004; Caledron & Serven, 2004]. Table 1 below demonstrates the variance of infrastructure access between Low, Middle and High Income Countries. Table 2 shows the composition of the infrastructure stocks among these countries.

	GDP per capita	Electricity Generation (kw per capita)	Telecommunications (per 1000 person)		Road (km/1000 person)	Rail (km/1000 person)	Water (% household connected)	Sanitation
			Fixed (lines)	Mobile (subscribers)				
LIC	475	116	28	5.8	1.06	0.07	76.26	45.58
MIC	1,919	406	127	83.7	1.10	0.13	81.82	61.87
HIC	29,808	2,031	582	526.0	10.54	0.44	99.59	98.07
Ratio HIC to LIC	63	18	21	91	10	6	1.3	2.2

Table 1 – Access to infrastructure by income group as of 2000 [as presented in Fay & Yepes, 2003, pp.1]

	Low Income	Middle income	High income	World
Electricity	25.6%	48.1%	40.1%	40.4%
Roads	50.9%	28.1%	44.9%	41.0%
Water & sanitation	14.5%	9.9%	4.7%	7.5%
Rail	7.2%	7.0%	4.1%	5.3%
Telecom (fixed)	1.3%	3.2%	2.4%	2.5%
Telecom (mobile)	0.5%	3.7%	3.8%	3.3%
Total (%)	100.0%	100.0%	100.0%	100.0%
Total (\$ billions)	1,968	4,194	8,804	14,966

Table 2 – The composite of infrastructure stocks as of 2000 [as presented in Fay & Yepes, 2003, pp.2]

Other advantages of infrastructure investments were also cited in the literature. Building an infrastructure creates job in the short term (during

construction and erection stages) and long term (during maintenance stages) [Fourie. 2006].

D) CONFLICT OF OPINION

Controversy to the above, certain studies indicated that infrastructure investment does not necessarily have any positive effects on economic growth, or in fact to the listed benefits. When assessing whether the cutback of infrastructure investment in the United States (US) between 1971 and 1986 accounted for the substandard performance of US economy and after reviewing the work of Aschauer in 1989 on the same subject, Holtz-Eakin & Schwartz [1995] found that no relation between infrastructure investment and the inferior performance of the US economy, which contrasted the findings of Aschauer. Economists, in general, have criticized the early works of Aschauer & co. as being laden with methodological and econometric difficulties [Romp & de Haan, 2007].

Looking at the bigger picture, Briceño-Garmendia *et al* [2004] outlined the findings of 102 studies that have examined the impact of infrastructure investment on productivity and growth and have been conducted in the period of 1989 – 2004. A summary of the findings is shown in Table 3 below. As it can be observed, more than 50% of these studies have indicated a positive effect of infrastructure investment on growth and productivity. 40% of the studies showed no effects of infrastructure investment while results of 5% of those studies showed a negative effect. Another notable finding is that all studies conducted in developing countries have shown a positive impact of infrastructure investment.

Area studied	Number of studies	Percentage showing a positive effect	Percentage showing no significant effect	Percentage showing a negative effect
Multiple countries	30	40	50	10
United States	41	41	54	5
Spain	19	74	26	0
Developing countries	12	100	0	0
Total/average	102	53	42	5

Table 3 – Summary of findings of 102 studies (1989-2004) to investigate impacts of infrastructure investment on productivity and growth [as presented in Briceño-Garmendia *et al*, 2004, pp.5]

When examining the various claims with regard to the relationship between economic growth and infrastructure development, a number of reasons were identified for the differences in opinion.

One of the main reasons for the difference is the quality of the infrastructure provided. In addition to the rate of growth, the quality of the growth process also plays an important role in determining the extent of the benefits [World Bank, 2000]. The quality of the infrastructure can be as important as providing the services themselves [Fourie, 2006]. Quality of growth includes issues such as distribution of opportunities, sustainability of environment and management of global risks [World Bank, 2000].

Scholars, of whom many do share the opinion of the positive impact of infrastructure investment on economic growth, have emphasized on necessity of assessing the infrastructure adequacy when conducting a study. In many cases, the main reason for having a positive impact on economic development which was a result of infrastructure investment was the fact that limited access to infrastructure acted as a bottleneck to the ongoing economic growth [Fay & Yepes, 2003].

In contrast, some countries invest in infrastructure development in excess of the requirements and/or do not invest the most needed sector of infrastructure. This could result in the accumulation “white-elephant” type infrastructure [Briceño-Garmendia *et al*, 2004]. “White-elephant” type infrastructure could also result when infrastructure development is used as a political tool to succeed in an election [Calderon & Chong, 2004]. An example is the case of the Peruvian Social Funds in the 1990s during which expenditure increase significantly prior to national elections and in regions that were seen as politically influential [Schady, 2000]. Another live example is the case of South Africa hosting the 2010 Soccer World Cup. The World Cup is an event that requires enormous infrastructure investment, particularly the transportation system [Fourie, 2006]. This could redirect South Africa’s financial resources from the high social returns projects to the sports, yet politically sensitive, event related projects [Fourie, 2006].

In order to maximize growth, infrastructure levels ought to be at an optimal level; high infrastructure levels divert financial resources away from other capital which, if not improved, could result in a decline in the economic growth [Canning & Pedroni, 1999]. Moreover, it is vital that the right type of infrastructure is selected at the right time to ensure that economic growth fulfills its potential [Perkins *et al*, 2005].

Assumptions made during initial research stages could largely be accounted for some of the differences. Canning & Pedroni [1999] state that, when considering a worldwide based panel of data, the relationship between infrastructure development and other parameters must be considered separately for each country. Failure to do so would cause an inconsistency and/or bias in the average worldwide effect of infrastructure investment [Canning & Pedroni, 1999].

Another cause for the differences in the opinions is the infrastructure efficiency [Wang, 2002]. The variances in the effective use of infrastructure accounted for more than 25 percent of the growth differential between Africa and East Asia [Caledron & Serven, 2004]. The growth differential, approximately 40 percent, between low and high growth countries was also attributed to similar reasons [Caledron & Serven, 2004].

One important factor that affects the extent by which infrastructure impacts on population inequality, and other benefits, is the stance of the local government. In many countries, private participation in infrastructure development takes place. If unmonitored by the government, the prices of services could increase beyond the affordability of the poor inhabitants, hence resulting in a reverse impact by increasing the gap between the rich and the poor [Caledron & Serven, 2004]. One way to overcome this is by including subsidies in the provision of infrastructure services [Caledron & Serven, 2004].

Direction of the local government, with regard to funding the public capital, also plays an important role in shaping the extent of benefits of infrastructure investment. It is important to reflect upon the effects of diverting finances required to fund the construction of infrastructure away from other possible uses, such as maintenance of existing infrastructure [Romp & de Haan, 2007]. Moreover, it is important to consider how the process by which funds is raised. Many countries raised capital by increasing taxes. Given that escalation of tax rates is generally associated with an adverse effect on economic growth, policy makers ought to ensure that the advantages of erecting infrastructure outweighs the disadvantages of increase tax rate [Romp & de Haan, 2007].

Maturity of a country's economy plays an important role in the outcome of any study. Returns to infrastructure investment in developing countries tend to be on the higher side as infrastructure services in those countries are scarce and basic networks are yet to be established [Briceño-Garmendia *et al*, 2004]. Conversely, positive impacts of infrastructure development decreases as the economy develops.

In addition, the endogeneity between economic growth and infrastructure investment needs to be considered when conducting any study. Failure to consider the endogeneity is likely to affect the outcome of a research, which could appear in the shape of an increased estimate on the returns of increase in infrastructure capital [Esfahani & Ramirez, 2003].

Other reasons have also been claimed to cause variances in the extent of the benefits of infrastructure investment. It is suggested that externalities of a major economic growth in one region could have negative impact on neighboring states [Briceño-Garmendia *et al*, 2004]. Thus, if any of those neighboring states were to invest in infrastructure, economic growth might not show any signs of significant improvements as migration of workers to the growing region is taking place.

E) CONCLUSION

The relationship between economic growth and infrastructure development appears to be a controversial. The World Bank [1994] reviewed the causality issue in details and concluded that the relationship is a grey area that would and would not be clear until research methodologies are substantially improved.

A real life example of how complex and conflicting the issue of determining the impacts of infrastructure investment and economy growth is the case of Spain. During the period of 1850–1935, Spain invested heavily in railroad system. Since then, different researchers have worked to determine the economic impacts of the investment. A summary of their works was described by Herranz-Loncán [2007] in his paper:

“Tortella (1973) set the basis of the pessimistic view. He pointed out the Spanish railroads were constructed ahead of demand and, as a consequence, railroad companies faced a situation of excess capacity that made them unprofitable during most of their lives. To make things worse, the construction of the Spanish railroads had very small ‘backward linkages’, since imports of the necessary materials were given generous tariff exemptions that deprived the Spanish iron industry of a crucial source of demand. Later on, however, Gomez Mendoza (1983) suggested a much more positive interpretation on the subject. He stressed the importance of the transport cost-saving effect of the Spanish railroad system. According to this author, the social savings of the Spanish railroads and their effects on economic growth were much larger than in other European countries due, among other reasons, to the lack of opportunities for the development of inland waterways in Spain.

Subsequently, historians have raised several caveats about Gomez Mendoza’s optimistic interpretation. On the one hand, Tortella (1999, p.250) and Comin et al. (1998, 1, pp.140-141) have indicated that despite the social saving evidence, the low density of use and the lack of profitability of the Spanish railroads constitute powerful proofs of their economic failure. On the other hand, further research has provided substantially lower estimates of the social savings of the Spanish railroads in the late nineteenth century In summary, the economic impact of the Spanish railroads is still the object of an open debate, in which no agreement has been reached among researchers so far.”

Herranz-Loncán, 2007, pp. 453

1.3ROLE OF GOVERNMENT

A) LOCAL GOVERNMENT

Local governments represent public administrative offices that function under the federal, national or central government to help running the nation effectively. The number of local governments is in general large. For instance, Nigeria has 774 local governments that aid the federal government in running the country [Thematic Committee, 2001]. Lebanon has 708 municipalities [Arnaout, 1998]. Moreover, it appears that the local citizens' perception supports the concept that local government is needed. For example, a conservative activist in Britain stated that:

"Local government is local issues, it's not national issues ..."

Woods, 1998, pp.23

A local government, in general, has lesser powers than the central government. However, the extent of their authority varies from one country to another. A local government in one country, such as Macedonia [Todorovski, 2001], could have the authority to set the appropriate amount of taxes as long as it fulfils its monetary obligation towards the central government. In contrast, local governments in other countries are fully financed by subventions from its federal government, as is the case of Lebanon [Arnaout, 1998].

B) LOCAL GOVERNMENT AS SERVICE PROVIDER

The primary role of the local government has traditionally been to provide the basic needs of the inhabitants falling under its jurisdiction. The local government is responsible for supplying the basic services, such as electricity and clean water, to its citizens. This concept is not new and has existed for a long time. The Ottoman Empire, in 1877, decreed the Ottoman ‘*Vilayet Municipal Law*’ which was constituted in every village and town [Arnaout, 1998]. In addition, in his 1776 publishing, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Adam Smith, a Scottish economist, identified three roles for the local state [Fourie, 2006]. Among them was the supply of public goods to the people. Adam Smith stated:

“... that of erecting and maintaining those public institutions and those public works, though they may be in the highest degree advantageous to a great society, are, however, of such a nature, that the profit could never repay individuals, and which it therefore cannot be expected that any individual or small number of individuals should erect or maintain”

Fourie 2006, pp. 533

In general, local governments deliver the public services this in two ways. Firstly, the local government plans for and builds the infrastructure on its own. It manages the infrastructure construction project from its planning phases going through installation and commissioning to operation and maintenance. Secondly, local governments encourage private sector to participate in the provision of infrastructure. By end of 2002, an estimate by International Telecommunication Union (ITU) indicated that more than 50% of the world countries had fully or partially privatized their telecommunication operators [Briceño-Garmendia *et al*, 2004].

However, in case of privatization, local governments ought to consider few issues. First, the pricing of the services provided by the private sector needs to be monitored and controlled to ensure that they are within the reach of all layers of the community, as stated earlier. Moreover, the availability of institutions to facilitate and co-ordinate for the delivery of the services needs to be addressed by the concerned authorities [Romp & de Haan, 2007]. A survey in early 2000s showed that 65% of developing countries separated between the government and the operation of urban water [Briceño-Garmendia *et al*, 2004]. Finally, local governments need to consider some of the market imperfections, such as the establishment of distribution networks between the infrastructure investor and the end user [Romp & de Haan, 2007]. It could prove difficult for an individual investor to bear the costs of the distribution networks is the investment is to be profitable.

C) LOCAL GOVERNMENT AS DEVELOPMENT ORIENTED

However, during the last two decades, there has been a significant change in the role of local government [Andrew & Goldsmith, 1998]. As the central government decentralizes its responsibilities, local government are given the task of helping the central government to implement national development programs and to redistribute public resources in the most efficient manner [Nel, 2001]. Local governments of Republic of South Africa (RSA) and Macedonia can be taken as examples.

RSA's *White Paper on Local Government*, published in 1998, emphasizes on the role of 'development local government' [RSA, 1998]. The paper identifies the following as main roles of the development local government:

- Work together with local community to find sustainable means to improve the general welfare of the community.

- Provision of household infrastructure and services such as water, sanitation, local roads, electricity ...etc.
- Creation of liveable, integrated cities, towns and rural areas.
- Maximizing social development and economic growth.
- Community empowerment and redistribution.

Likewise, Macedonia's local governments are given the task of maintenance, development and financing [Todorovski, 2001] of:

- Local infrastructure – roads, drinking water, sewerage, lighting ...etc.
- Local public transportation.
- and so forth.

Therefore, it is clear that the role of the local government is being transformed from solely a service provider into development oriented organization. Local governments' main focus is being shifted to stimulate and sustain growth. Moreover, where infrastructure is heavily being privatized, local governments role is also being revamped from a service provider into co-coordinator for the provision of services [Andrew & Goldsmith, 1998].

D) DEVELOPMENT PROGRAMMES

When describing the role of the government as being development oriented, it is important to understand how development programmes

emerge and what challenges do the local government face when managing those development programmes.

According to Nel [2001], local development programs do not emerge purposelessly. They rather develop as a result of either a policy or a national development program. A policy is broad statement of intent to address a particular issue. It indicates the direction that a local authority would move and often sets priorities for spending the available resources. Policies are turned into actions through development programs.

Before proceeding further, it is important to note that in the field of project management, a programme is a set of interrelated projects that are executed to achieve a common objective [Kerzner, 2003; Meredith & Mantel, 2006; PMBOK Guide, 2004]. Hence, it can be said that a development programme consists of a chain of interrelated development projects. An example of this is a housing programme for the poor in a rural area. Such a programme does not simply involve constructing homes for people to reside. It rather includes a series of interrelated projects which includes, for instance, the supply of clean water, sanitation, electricity, telecommunication, roads, schools, local parks ...etc. In cases where the existing power supply capacity is stretched, the programme could also include the erection of a new power generation plant.

1.4 PROJECT MANAGEMENT

A) PROJECT SUCCESS

A lot of research has been conducted in order to quantify project success rate. Unfortunately, it appears that most infrastructure projects are either or both behind schedule and over the approved budget. In 2002, Flyvbjerg *et al* [2003] examined 258 transportation infrastructure projects worth US \$90 billion representing different geographical regions, project types and historical periods. They concluded that 90% of projects overran their initial cost estimate. Similarly, Kaliba *et al* [2008] investigated more than 15 selected road projects, worth USD \$600 million, which were executed by the Government of Zambia during the past two decades. It was found that most of the 15 projects reviewed were completed beyond the agreed schedule.

The literature has also offered many other cases in which projects were not completed on time or within budget. Some of the well-known cases include the construction of the *New Wembley Stadium* whose delivery was delayed by almost one year [BBC³, 2006], the cost overrun of *Concord* supersonic jet from an initial estimate of £150 million to an estimated end cost of £975 million [Concorde SST], and the building of the *Sydney Opera House* which suffered of a cost escalation of %1400 [Flyvbjerg, 2005].

Therefore, it is sensible to investigate the factors that lead to successful completion of projects and list the main challenges that organizations shall overcome in order to consistently achieve highly satisfactory project results. However, before doing so, it is important to distinguish between a number of project-success related terminologies, namely project success vs. project management success and success criteria vs. success factors.

³ BBC = British Broadcasting Corporation

Although commonly used as having the same meaning, the terms project management success and project success are quite different. On one hand, project management success depends on ability to complete projects on time, within budget and to required specification and can be measured during the life of the project [Cooke-Davies, 2002; Cooke-Davies, 2004]. On the other hand, and following a series of researches during the 1980s and 1990s, project success depends on a several dimensions that are measured in different ways by different people at different times [Bryde, 2003; Cooke-Davies, 2004; Milosevic & Patanakul, 2005]. Project success can only be measured after project completion [Cooke-Davies, 2002]. Furthermore, project success is often realized by the operations manager rather than the project team [Cooke-Davies, 2002]. Moreover, as reported by Cooke-Davies [2004], the subject of project success is a complex one, with researchers generally agreeing on some points and disagreeing on others. In addition, a project could be seen as successful even though if project management of that particular project is deemed unsuccessful [Bryde, 2003]. For instance, a project that is cost and time overrun could be considered as successful if customer satisfaction is achieved or if stakeholders' quality-related criteria are met. In many cases, clients would define what is meant by quality [Bryde, 2003; Cooke-Davies, 2004].

Knowing the difference between project management success and project success, it is also important to differentiate between the success criteria and the success factors. Success criteria are the measures or metrics that are used to judge a project's success whereas the success factors are the variables of project management systems that have a considerable impact on project and project management success [Cooke-Davies, 2002; Milosevic & Patanakul, 2005]. Different researchers have attempted to list the various success criteria. However, as mentioned earlier, project success is a complex subject and is judged in different ways by different stakeholders. Some of the success criteria that have been mentioned in the

literature include completing project within schedule and/or budget, on time to market, meeting client's requirement, achieving customer satisfaction, meeting safety/quality standards, attaining a profitability index, maintaining ethical conduct ...etc. [Kerzner, 2003; Milosevic & Patanakul, 2005; White & Fortune, 2002]. In contrast, factors that lead to project success have been identified and consist of clear goals and objectives, standardized project management process/procedure, support from senior management, adequate resources, interpersonal relationships (e.g trust), realistic schedule, clear communications, effective risk management, appreciating the effect of human error, having a mature scope control process, existence of an effective benefit delivery process, availability of a portfolio and programme management practices/metrics ...etc. [Cooke-Davies, 2002; Milosevic & Patanakul, 2005; White & Fortune, 2002].

When discussing the topic of success factors, it is vital to consider the effects of project management standards, such as the PMBOK Guide, in enhancing project performance. During the development and use of project management standards, it often assumed that the standards describe the requirement of effective project management and that the use of those standards results in aids in improving the project management performance [Crawford, 2005]. Crawford [2005] carried out an empirical research, claimed to be the first of its kind, to question the above assumption and concluded that there is '*no statistical significant relationship*' between the use standards and enhanced project management performance.

B) MAIN CHALLENGES

As they are empowered to develop and execute development programmes, local governments face fresh, yet diverse, challenges that are associated with the management of those programmes. The primary challenge that faces any local government when managing development programmes is the delivery of the programme on time, within budget and to the required quality while ensuring that all community requirements are met [Rwelamila, 2007]. In general, those challenges can be classified into two categories; challenges related to management of individual projects and challenges related to the management of multiple projects related to one or more programme.

When examining the reasons for why organizations, whether government or private, fail to complete projects on time and budget, a lot of causes have been identified. Some of the most common causes are shown in Table 4 below. However, the primary cause of increased rate of project failure which was identified by various researchers was the lack of use of project management tools in managing the projects [see for example Abbasi & Al-Mharmah, 2000; Chan A.P.C *et al*, 2001]. Moreover, lack of use of appropriate project management tools appears to cause dissatisfaction among clients who run projects [Morledge *et al*, 2006].

List of common causes for Project delays and cost overrun	
1.	Poorly defined scope.
2.	Unclear deliverables.
3.	Scope creep.
4.	Lack of information / communication.
5.	Poor communication.

6. Poor / inadequate planning.
7. Poor initial cost estimates.
8. Poor supervision.
9. Construction mistakes.
10. Delays in material procurement.
11. Lack of experience.
12. Lack of technical or project management competence.
13. Technical difficulties.
14. High documentation requirements.
15. Excessive top management control / bureaucracy.
16. Slowness of decision making by the stakeholder.
17. Obtaining necessary approvals from local authorities.
18. Delays in contractor payments.
19. Economic / financial problems.
20. High inflation rate.
21. Social / culture / political barriers.
22. Labour strikes.
23. Poor weather conditions.

Table 4 – Main causes of project delays and cost overrun as identified in literature
[source of data: Abbasi & Al-Mharmah, 2000; Faridi & El-Sayegh, 2006; Flyvbjerg *et al* 2003; Hussain & Wearne, 2005; Kaliba *et al* 2008; White & Fortune, 2002]

On other hand, many researchers claim that projects are rarely managed as individual projects. As a great number of projects (large and small; simple and complex) are simultaneously being raised in a relatively short period of time, project managers find themselves under the pressure of managing multiple projects. Turner & Speiser [1992] indicated that an estimated 90% of projects are managed in a multi-project context. Platje *et al* [1994] and Payne [1995] have shown signs of agreement to this. Therefore, top management of various organizations are starting to appreciate the importance of multiple project management [Cooper *et al*, 2000].

Multiple project management can generally be classified into either *Programme Management* or *Portfolio Management*. Programme management is the management of a group of related projects to achieve a benefit that would not be attained if the project were managed individually [PMBOK, 2004]. In contrast, portfolio management is the management of a group of unrelated projects/programmes to meet specific business objectives [PMBOK, 2004]. In this research, the word portfolio management will be used to describe both portfolio and programme management.

Researchers have always tried to identify the main challenges facing multiple project management. Traditionally, there have been few studies related to portfolio management [Elonen & Artto, 2003; Engwall & Jerbrant, 2003]. However, recent research trends indicate that this is likely to change.

Various researchers have identified different challenges facing portfolio management, which in general differ from the challenges of managing individual projects. The main challenges identified by literature are resource

management/allocation, project selection and conflict of interest in addition to other miscellaneous reasons.

When dealing with portfolio management, researchers rank Resource Allocation as the top issue that needs careful consideration for the portfolio to be successful. It should be noted that by stating resources, the indication is for the human resources in projects. For a project to progress and be completed successfully, the supply of the required resources into a project shall be available regularly [Elonen & Artto, 2003; Turner & Speiser, 1992]. Cooper *et al* [2000] went even further by stating:

'Portfolio management is about resource allocation'

Cooper *et al*, 2000, pp.1

Uneven allocation of resources and/or non-availability of ample resources raise a number of problems. In relation to time, projects tend to get regularly delayed as projects await resources to be available [Cooper *et al*, 2000]. Other non-time related issues include high failure rates as employees tend to haste and/or leave out certain activities [Cooper *et al*, 2000].

When reviewing the resources allocation issue, it has been found that one of the main issues that have a direct effect on availability of slack resources is the number of projects being simultaneous executed. Companies, in general, have more projects than what the existing resources can effectively manage [Cooper *et al*, 2000; Engwall & Jerbrant. 2003]. The main concern is not only that high number of projects lead to delays, but the fact that many projects do not necessarily carry high value. A survey was carried out among professionals to evaluate new project ideas. 86% of respondents stated that their organization had no selection criteria to distinguish feasible

projects from those that are not [Elonen & Artto, 2003]. When the project to resources ratio is high, project teams are under an increased pressure of multi-tasking their activities, which results in the requirement of longer time to complete projects [Elonen & Artto, 2003; Engwall & Jerbrant, 2003]. However, Cooper *et al* [2000] appear to disagree with this. In a survey that included the management of 35 organizations, about 80% of respondents stated that their companies had appropriate project selection methods [Cooper *et al*, 2000]. Another factor affecting the selection of feasible projects is organization's tendency of selecting short term, easy and low cost projects, which is due to different reasons such as non-availability of cash flow for larger projects [Elonen & Artto, 2003].

Another problem that has been identified by literature in the management of multiple resources is the conflict of interest when managing projects. There are two issues related to this problem. The first is related to understanding the interrelationship of projects in a portfolio. As stated by Platje *et al* [1994], the resource allocation is a complex process in which interests of different parties have to be considered. This can be further elaborated by considering, for example, the case of engineers working in a particular project. By assigning the same engineer on another 2-3 projects, the time the engineer spends on his first project will be reduced. Turner & Speiser [1992] identified common deliverables and shared resources, information and technology as the common links between projects under the same programme or portfolio. Therefore, it is very important to prioritize the projects so that the coordination to use the common resources can be effective and, hence, avoid conflicts and use of politics between project managers. Cooper *et al* [2000] suggest that the problem lies in the fact that projects are rated against objective criteria rather than against each other when assessing the feasibility. The second issue related to conflict of interest is the project prioritization. This issue has been noticed in matrix form organizations [Payne, 1995]. The main conflict arises between

personnel's commitment to project and their functional responsibilities. As rewards are generally based on functional achievements, projects are given second priority [Payne, 1995].

In addition to the above, other factors have also been identified in the multi-project management environment. As it can be observed from the list below, some of the challenges are also related to managing individual projects. These challenges are:

- Improper scope definition during the initial stage of the project [Elonen & Artto, 2003].
- Change of key personnel in projects, such as the project manager or the designer. The newly appointed members carry new ideas which, if not controlled, could lead to major changes in the project, and hence to delays [Payne, 1995].
- Lack of definition of project boarder, which leads to unrealistic changes in project objectives [Elonen & Artto, 2003].
- Uncertainty among employees with regard to their employment status at the end of the project [Payne, 1995]. Employees who have been specifically hired for the duration of the project fear that their contractor might not get renewed. As a result, they tend to extend the project beyond its initial completion date.
- Lack of competency in managing multiple projects. This facts is further worsened by the fact that most literature, and specifically books, are based on the assumptions of that projects are managed as single projects [Payne, 1995].
- Too strict schedules and lack of appropriate progress monitoring [Elonen & Artto, 2003].

- Decentralization of project related information [Elonen & Artto, 2003].

In general, many researchers have pointed out to the importance of considering all issues related to managing multiple projects when approving new projects as those factors are interrelated. Cooper *et al* [2000] have given an example on the interrelation of different factors, which is shown in Figure 4 below.

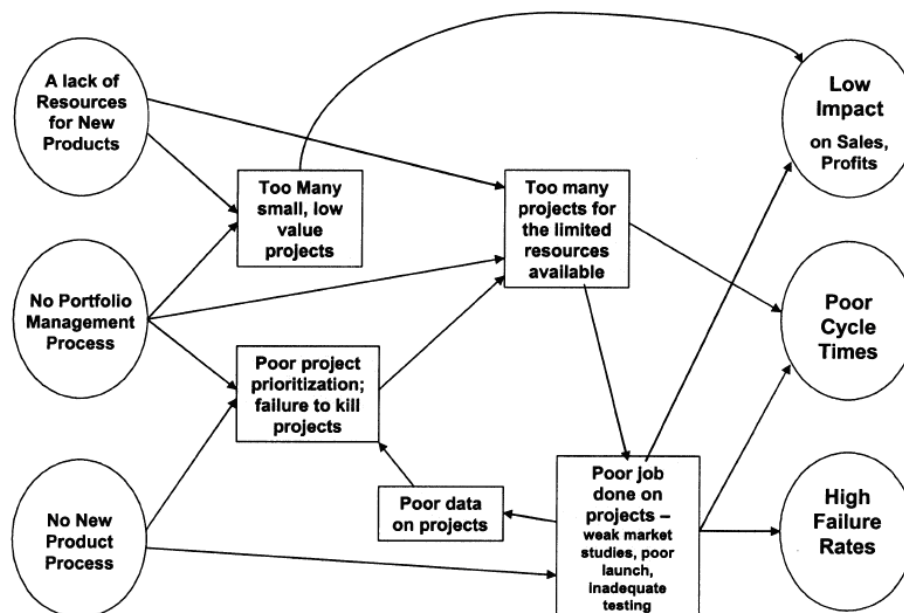


Figure 4 – A model taken from Cooper *et al* [2000, pp.3] to demonstrate the interdependency of various factors in portfolio management.

C) NEED FOR PROJECT MANAGEMENT

Having established that managing projects is not simple and requires sound knowledge of project management and its tools, it can be said that

project management is a must in any organization that is engaged in executing projects and programmes. Given the fact that local governments are managing development programmes that consume a large share of public's scarce resources, the need of project management in local government, particularly in infrastructure development related departments, is indispensable. In addition, the use of project management results, in general, in a better customer relations, an increase in project's return on investment, maximization of competitive benefits, higher employee morale, decrease in uncertainty...etc. [Meredith & Mantel, 2006; Hillson, 2003].

A lot of researchers have indicated that organizations have started to realize projects as a tool to implement new strategies [Johnson *et al*, 2006]. Projects are today seen as tools for mastering business and change [Andersen & Jessen, 2003]. A number of studies have even suggested that successful implementation of any strategy is linked with the successful completion of projects [e.g. Cooke-Davies, 2004; Johnson *et al*, 2006]. In addition, project management helps in delivering the required benefits through an effective, intra-organizational integration [Cicmil, 1997]. Moreover, some organizations have adopted project management as a mean for executing major maintenance programmes [Voivedich & Jones, 2001].

D) NEED TO MEASURE PROJECT MANAGEMENT CAPABILITY

As the importance of projects and projectizing, adopting a project management based approach, is being recognized, many organizations have implemented project management as a core competency [Hillson, 2001, Hillson, 2003; Ibbs & Kwak, 2000]. However, as project management is being implemented, or about to be implemented, in organizations, top

management of those organizations are questioning the financial benefits of investing in project management [Judev & Thomas, 2002; Ibbs & Kwak, 2000]. Furthermore, organizations who have initially invested in project management question whether their present project management capabilities are sufficient or require further improvement [Ibbs & Kwak, 2000]. Many businesses, in simple terms, would like to have a full picture of the effectiveness of the project management capability [Crawford, 2006].

In order to address the above issues, it is important that the concerned organization be able to measure its existing project management capability, commonly known in literature as project management maturity [Rwelamila, 2007]. By knowing the maturity of its project management, organizations are able to assess whether existing project management competency requires improvement [APT, 2004]. Companies generally do not pay attention to improve the project management skills until the need for project management becomes critical [Crawford, 2006]. An example of this is the case where a company employs a competent project manager who is responsible for a set of important projects. Because of the project manager's heroic efforts, in oppose to organization's mature project management environment, all projects are completed successfully. Nevertheless, should the project manager be taken out of the scene, an entire portfolio of projects starts to underperform and eventually fail.

E) INTRODUCTION TO PROJECT MANAGEMENT MATURITY

The words 'maturity' and 'competence' are often being used simultaneously in the literature. While some researchers pointed out that they both indicate the same things, others have disagreed. Many reasons could exist for this confusion. The Oxford dictionary defines maturity as "*the*

state of being fully grown or developed". Competency is defined as "*the ability to do something well*". The confusion, perhaps, occurs from the fact that in order to do something perfectly, an organization needs to be fully developed in that particular area of knowledge. Another reason could be that the word maturity and capability/competency carry specific technical definitions that are different from those when the words are used in common dialogue [Cooke-Davies & Arzymanow, 2003]. For example, while Andersen & Jessen [2003] stated that project maturity could, literally, be defined as the state of an organization to deal with its projects, project maturity could be used as a measurement of organization's ability to use projects for various purposes. Ibbs & Kwak defined project management maturity as "*Level of sophistication of an organization's current PM practices and processes*" [Ibbs & Kwak, 200b, pp.38]. On the other hand, Gareis & Huemann [2000] simply defined project management competency as organization's project management knowledge and experience that is stored in its *collective mind*, which is represented by organization's operational procedures, work processes, role descriptions, database of project management knowledge ...etc.

Until the last decade, the concept of maturity was rarely used to describe an organization's effectiveness in performing specific tasks. The concept of process maturity originated firstly as part of the total quality management (TQM) movement [Cooke-Davies & Arzymanow, 2003]. Phil Crosby, in his book *Quality is Free* issued in 1979, appears to be the first to introduce the concept of maturity model, or grid, and proposed that the model can be used to assess an organization's quality management capabilities [Harpham & Kippenberger, 2004; Paulk *et al*, 1993]. Nevertheless, the maturity models were only widely adopted by different disciplines following the emergence of the Capability Maturity Model (CMM) created by Software Engineering Institute (SEI) [Harpham & Kippenberger, 2004]. SEI's CMM was developed between 1986 and 1993 by Carnegie Mellon University and was sponsored

by the US Department of Defense [Bach, 1994; Harpham & Kippenberger, 2004; Wiegers, 1996]. Since its emergence, maturity models have, in general, been used to assist organizations in gaining competitive advantage, identifying ways to cut costs and improving quality [de Bruin *et al*, 2005].

Most maturity models are based on a five-point Likert scale, which was also used in SEI's CMM, with level 5 represents the highest level of maturity [de Bruin *et al*, 2005]. However, in reality, no company has been or would be able to achieve the maximum maturity [Andersen & Jessen, 2003]. In fact, as pointed out by Crawford [2006], many organizations would achieve significant benefits by attaining a level 3 maturity and might not need to be fully matured. Organization should always tend to improve those areas that are less mature and achieve an optimum level of maturity [Crawford, 2006]. If an organization is interested in improving its maturity, a thorough examination of the value of improvement and the anticipated rates of return needs to take place [Crawford, 2006]. Aiming to increase maturity just for the sake of achieving a higher score is unwise and is not recommended [Crawford, 2006]. Project management maturity of the project managers, the individuals and the project team have to be correlated [Gareis & Huemann, 2000]. Furthermore, it is generally recommended that project management maturity is maintained in harmonization with corporate process maturity [Crawford, 2006]. In addition, the type of organization and projects will dictate on how mature an organization should be [Cooke-Davies, 2004].

F) PROJECT MANAGEMENT MATURITY IN ORGANISATIONS

Many researchers conducted various studies to assess project management maturity in organizations. Some studies measured maturity in organizations from different sectors, while others conducted research on organizations across different countries. Moreover, some studies, albeit being few, tried to measure project management maturity in public sector.

When reviewing the results of various studies, it appears that organizations which adopted project management earlier are more mature than those which adopted project management at a later stage. Two particularly interesting studies to look at are the works of Ibbs & Kwak [1997; 2000a; 2000b] and Cooke-Davies & Arzymanow [2003]. Ibbs & Kwak conducted survey across 38 organizations from four different sectors, namely Engineering & Construction, Information Systems, Telecommunication and Hi-tech Manufacturing. While findings of the survey indicated that all organizations achieved a level 3 maturity, Engineering & Construction scored the highest (3.36) while Information Systems scored the lowest (3.06) [Kwak & Ibbs, 1997; Ibbs & Kwak, 1997; 2000a; 2000b]. Similarly, Cooke-Davies & Arzymanow [2003] surveyed 21 organizations from seven sectors which were categorized as Big Pharmaceutical R&D, Medium Pharmaceutical R&D, Telecommunication, Defense, Financial Services, Construction and Petrochemical. Results of the survey concluded that the so called *Industries of Origin*, Petrochemical and Defense, were more mature than industries that have adopted project management more recently, which include Pharmaceutical R&D, Telecommunication and Financial Services organizations.

On the other hand, studies to determine project management maturity in government departments and public organizations are scarce. Rwelamila [2007], who claims to be the first to measure project management maturity of public infrastructure departments in non-industrial countries, conducted a

research to measure project management maturity in a South African public infrastructure department. Moreover, Rwelamila [2007] stated that public infrastructure development related organizations could be qualified as *Project Oriented Organizations*. However, after obtaining results of a thorough research and investigation on one anonymous public infrastructure department in South Africa which scored a level-1 maturity on a scale of 5, it appears that the organization under question is, in reality, dependant on accidental, successful project managers [Rwelamila, 2007]. According to the model deployed in the study, a level-1 organization is characterized as having *Ad-hoc*, informalized project management processes and procedures and is inconsistent in product delivery. Similar studies conducted on South Africa supports, in general, Rwelamila's findings [e.g. Nel, 2001]. This appears to be a huge problem given the fact that almost 25% of South Africa's infrastructure departments' procurement budget is spent on acquiring project management services and policy advice from the private sector [Rwelamila, 2007]. A similar study was conducted by Abbasi & Al-Mharmah in 2000 which included 50 Jordanian public firms. The study concluded that Jordan's public sector lacks modern project management tools and techniques required for successful planning and controlling of projects.

1.5PROJECT MANAGEMENT MATURITY MODELS

A) OVERVIEW OF MATURITY MODELS

Project management maturity in organizations is usually measured using maturity models. Depending of the scope of the assessment, maturity models assess organization's skills, knowledge, processes, approach to risk...etc. Maturity models often compare organization's capability and

practices to a standard. In case of project maturity, the standard could any one of the existing bodies of knowledge, such as the PMI's PMBOK Guide. As maturity models involves the assessment of organization's processes and identifies its strengths and weaknesses, many researchers have linked the process of maturity assessment to benchmarking [e.g. Hillson, 2001; Hillson, 2003]. However, one of the main differences between maturity models and benchmarking is that the former involves the assessment of capability against an established standard which, in general, represents a set of *best practices*. Moreover, once developed, maturity models and its assessment tools can be repeatedly used by different organizations to assess their capability. This reduces the timescale and costs associate with conducting maturity assessments. Where industrial feedback on assessment methodology and model structure is sought, the model itself can be modified and updated in order to enhance its effectiveness. A particular example of this is the case of the *Documentation Process Maturity Model* which was developed in mid 1990s. During the life of a 5-year research which assessed the maturity of documentation process in 78 projects across 28 organizations and involving 355 professionals of whom continuous feedback was sought, the *Documentation Process Maturity Model* has evolved from its initial version into a second and third version [Visconti & Cook, 1998]. Each update addressed the limitations of the previous version.

Because of its advantages, maturity models have been gaining considerable momentum among project management academics and practitioners. Some of the main advantages of project management maturity models include the ability to identify organization's strengths and weaknesses in relation to project management knowledge and processes [e.g. Hillson, 2003; Judev & Thomas, 2002]. Moreover, where the same model have been repeatedly used, maturity models provide benchmarking information [Judev & Thomas, 2002]. Another advantage of project

management maturity models, particularly in models in which characteristics and requirements of maturity model is clearly defined, is that it offers organizations with an opportunity to forecast the expected rate of return of investment in project management tools [Kwak & Ibbs, 1997; Judev & Thomas, 2002].

On the other hand, project management maturity models are also associated with certain disadvantages and limitations. Many researchers have criticized maturity models as being very disciplinary and impractical [Judev & Thomas, 2002]. Moreover, most of the models identify problems and do not offer solutions or action plans [Judev & Thomas, 2002]. Furthermore, and as will be detailed further in the following paragraphs, many models focus solely on project management knowledge and work process with no consideration to the soft skills or organization aspects [Judev & Thomas, 2002]. In addition, many models are rigid and inflexible in their structure and do not facilitate for the measurement of progress over time [Judev & Thomas, 2002]. For example, in Kerzner's project management maturity model, the progress from level 2 maturity to level 3 maturity is seen as the most difficult development step among the model's structure [Kerzner, 2001]. In this view, there could exist two organizations of which one is heavily investing to develop its PM maturity to level 3 whereas the other is satisfied with its level 2 project management maturity. When using Kerzner's maturity assessment, both organizations are recognized as level 2 on the maturity scale. No recognition is given to the organization that has been investing in its project management development.

Because of its advantages, maturity models have been widely used in various disciplines such as Project Management, Programme Management, Innovation Management, IT Service Capability, Strategic Alignment, Knowledge Management ...etc [de Bruin *et al*, 2005]. More than 150

maturity models have been developed so far [de Bruin *et al*, 2005]. Moreover, a survey at the turn of the 21st century has identified more than 30 project management maturity models that are being used in the market [Hillson, 2003], with each model being different than the other. Some models are simply used to measure project management knowledge in the company. Others are used to assess organizations ability to complete projects successfully.

B) DIFFERENCES AMONG VARIOUS PROJECT MANAGEMENT MATURITY MODELS

Differences among various project management maturity models can, in general, be attributed to several factors. Firstly, there is no universally accepted model or methodology to measure project management maturity, or competency, in organizations [Ibbs & Kwak; 2000]. Secondly, there exists a general lack of agreement on project success factors [Cooke-Davies, 2004]. Finally, there are a number of issues that need to be considered when deciding on the scope of the maturity model which could have a significant effect on how the model is structured [de Bruin *et al*, 2005].

The lack of a universally accepted project management maturity model is one of the main reasons that have motivated different researchers into exerting efforts to develop their own maturity models. Even the most widely accepted and distributed project management guide, PMBOK Guide – with an estimated 1,400,000 million copies worldwide by October 2004 [Cooke-Davies, 2004], has not proposed nor referred to a universally accepted maturity model. However, with the lack of a proper definition of the project success factors, as detailed in the following paragraphs, different researchers have used different measures and practices to construct their

models. For example, although most of the project management maturity models assess project management capability against bodies of knowledge, a number of researchers claim that the sole use of project management bodies of knowledge is not enough and that other attributes should also be measured if organizations are to get a full picture of their project management maturity [e.g. Hillson 2006; McConachy & Caine, 2003]. In their research, McConachy & Caine [2003] reported that soft skills (motivational and emotional) account for two-thirds of project success whereas hard skills (Project management knowledge, expertise and training) account for only one-third. Hence, with this, it can be said that a portrait of a fully matured organization is yet to be defined [Cooke-Davies, 2004].

Another reason for the differences between different project management maturity models is the inability to differentiate between project success and project management success and the disagreement on what compromises project success, as stated earlier [de Bruin *et al*, 2005]. With the lack of agreement on project success factors, each maturity model developer would have a different idea on what leads to success which in turn would be directly translated as the main contents of the maturity model.

The third and final factor that results in differences among the numerous project management maturity models is scope of model and the decisions that are taken during the design stage of the maturity model. Different decisions that are taken at different stages result in the differences among the models. In order to demonstrate this, it is important to know how the steps through which maturity models are constructed.

C) DESIGNING A NEW MATURITY MODEL

de Bruin *et al* [2005], proposed a generic, development framework aimed at outlining the methodology of constructing maturity models which can be applied across multiple disciplines. The main phases of the framework are shown in Figure 5 below. Moreover, Table 5 gives a brief description of each of the six phases.



Figure 5 – The maturity model development process [as presented in de Bruin *et al*, 2005, pp.2]

PHASE	DESCRIPTION
Phase 1 – Scope	Decide the scope of the model to set the outer boundaries for the application and use of the model.
Phase 2 – Design	Determine the design of the model. This shall incorporate client needs and ways of attaining them. The model shall have an appropriate balance between simplicity and reality complexity. Main decisions include number of maturity levels, logic of progression between the levels and format of presenting the results. At this phase, the levels are also named and briefly described.
Phase 3 – Populate	Identify what needs to be measured. Breakdown the domain into main components and sub-

	components. Moreover, the assessment instrument needs to be constructed. The domain components and subcomponents, in addition to the literature review, can aid in deriving the appropriate questions.
Phase 4 – Test	Test both the construct of the model and the model instrument for validity, reliability and generalisability.
Phase 5 – Deploy	Application of the model across a wide range of organisations, in addition to the main client. This could help in standardisation of the model.
Phase 6 – Maintain	Scope of the model decides resources required to maintain the model. If applied globally, resources could be required not only to maintain the database, but to train others on the application for the model.

Table 5 – Description of the phases of the maturity model development process [source of data: de Bruin *et al*, 2005]

1.6 REVIEW OF MAIN PROJECT MANAGEMENT MATURITY MODELS

As mentioned earlier, a great number of maturity models have been developed in the past few decades, with an estimated of more than 30 models developed in the field of project management. Moreover, the differences among those models were reviewed. This section presents a brief introduction of a number of those models. The models were selected based on the importance of and availability of literature on each model. In particular, the following models were reviewed:

A. SEI CMM

- B. PMI OPM3
- C. OGC P3M3
- D. Kerzner's PMMM
- E. Ibbs & Kwak's (PM)² Model
- F. PM Soution's Model
- G. PMPA
- H. Qualidex PM Model

A) SEI CMM

The SEI CMM model was developed between 1986 and 1993 by Carnegie Mellon University, as mentioned earlier. It was initially developed as an instrument to assess the capability contractors to perform software projects for the government [Bach, 1994; Wiegers, 1996]. It should be noted that the SEI CMM relates to organisations' process capability only; it does not give any judgment in relation to the performance or profitability levels of organisations [Wiegers, 1996].

The SEI CMM is a guideline for organisations to improve their software development processes [Bach, 1994]. It is claimed to represent the best practices of the software industry [Bach, 1994; Paulk *et al*, 1993]. The CMM is compromised of five maturity levels, namely *Initial*, *Repeatable*, *Defined*, *Managed* and *Optimizing* and are indicated by levels 1 – 5 respectively [Bach, 1994; Paulk *et al*, 1993; Royce, 2002; Wiegers, 1996]. Each maturity level, with the exception of level 1, is compromised of a number of key process areas (KPAs) with each KPA having a number of goals [Paulk *et al*, 1993; Royce, 2002; Wiegers, 1996]. Moreover, each KPA describes a number of key practices [Paulk *et al*, 1993; Royce, 2002; Wiegers, 1996].

The CMM utilises a very precise assessment tool to assess organisation's maturity level. Official assessments are usually conducted by a certified person/team [Bach, 1994].

The SEI CMM has been criticised by a number of researchers. One of the main criticisms is its lack of flexibility [Bach, 1994; Royce, 2002;]. One of the main arguments is model's utilisation of minimum requirements as a criterion of achieving a maturity level [Bach, 1994; Royce, 2002]. For example, an organisation might fulfill all but one of the KPAs required to achieve level 2 in addition to fulfilling some additional KPAs of higher maturity levels. Despite this, the organisation would be deemed as having level 1 maturity. Other concerns were also raised with regard to model's lack of theoretical basis [Bach, 1994]. Moreover, the model was criticised for obscuring the 'true dynamics' of the software discipline and for considering individual excellence as less important than the process itself [Bach, 1994].

In relation to project management, many researchers have adopted the SEI CMM structure as the basis for developing a project management maturity model [Crawford, 2006; Hillson, 2003; Ibbs & Kwak, 1997, 2000a & 2000b, Kwak & Ibbs 1997]. The works of Ibbs & Kwak and Crawford are detailed in sections E and F respectively.

B) PMI OPM3

The Project Management Institute (PMI) developed the Organizational Project Management Maturity Model (OPM3) in 2003 due to the existence of

various different, non-standard project management maturity models [Rao]. The development of the OPM3 aimed at creating a standard that aids the use of project management in helping organizations meet their objectives, as compared to a project meeting its objectives [PMI, 2004; Rao]. The OPM3 was developed by combining the efforts of more than 800 volunteer project management practitioners from 35 countries working over a period of 6 years [PMI, 2004].

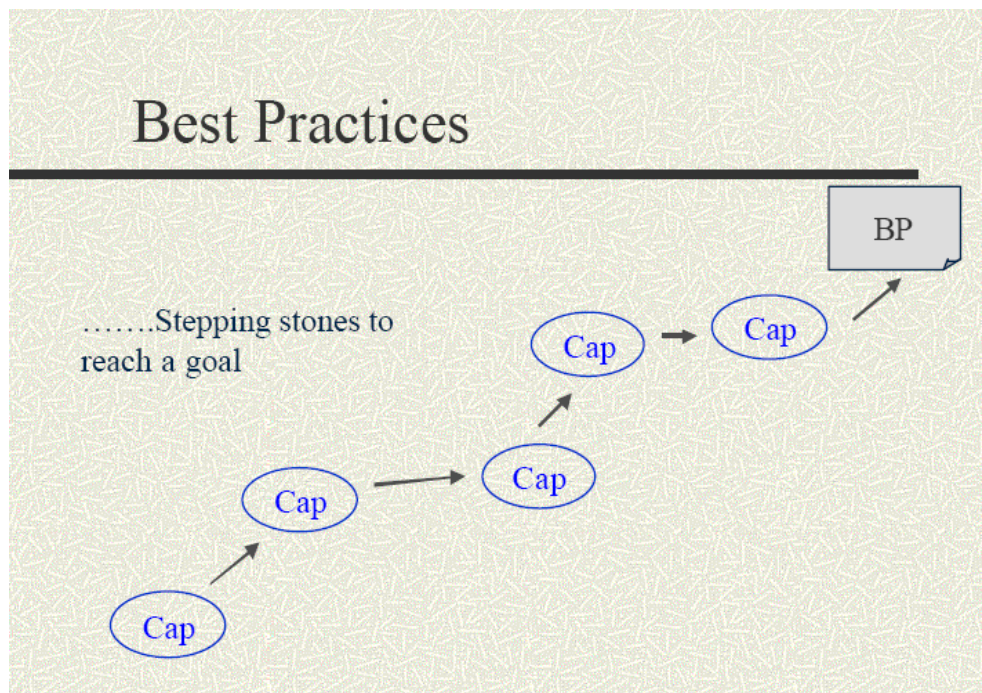


Figure 6 – Incremental improvements sums up to achieve the Best Practices [as presented in ROA, pp.5]

The OPM3 consists of three elements, namely *Knowledge*, *Assessment* and *Improvement*. The *Knowledge* element is the first element and a prerequisite of *Assessment* and *Improvement* [Rao]. The OPM3 *Knowledge* contains a list of more than 600 *Best Practices* [Rao]. The OPM3 utilizes self assessment questions to measure an organization's maturity [Rao]. Following this, the *Improvement* element of the model is used to aid organizations improve their maturity. In OPM3, maturity level of an organization is substituted with the level of progression of each knowledge

area from preliminary competency up until achieving the *Best Practices* [Rao], as shown in Figure 6 above. The progression levels are Standardization, Measurement, Control and Improvement (SMCI).

The OPM3 follows a 5-step process for improvement [Rao]:

Step 1: Prepare for Assessment → Learn and understand the concepts and contents of OPM3 and how to use them. This could involve attending workshops, seminar ...etc.

Step 2: Perform Assessment → Self assessment and comprehensive assessment.

Step 3: Plan for Improvement → A look at prioritizing the “*Best Practices & Capabilities*” that an organization would like to develop. This, obviously, depends on resources, time available and strategic plans.

Step 4: Implement Improvements → This needs to be implemented as a project as the OPM3 has no detailed information on this step.

Step 5: Review → Review if the stated goals were achieved. If gaps exist, repeat steps 2-4.

It should be noted that no literature has been found with regard to applying this model to any organization(s).

C) OGC P3M3

One of the main aims of the Office of Government Commerce (OGC), a UK government department, is to aid the Central Government and other public sector organizations to deliver projects successfully; i.e. on time, cost

and quality [OGC]. However, it was noted that most public sector organizations do not have an organizational wide programme and project infrastructure, which is vital for a long term success and improvement of those organizations [OGC, 2006]. Public organizations seem to depend on individuals with a proven track record. As a result, the OGC developed the Portfolio, Programme and Project Management Maturity Model (P3M3) in 2006 [OGC, 2006].

The P3M3 is an enhanced, project management maturity model version of SEI's CMM. Moreover, the P3M3 was developed as a descriptive model. This was done in order to provide organizations with a clearer and more effective methodology for planning process improvement programmes [OGC, 2006]. The descriptive model could also be used to identify the key *Best Practices* that need to be implemented to achieve a better project management performance [OGC, 2006].

Because of its descriptive nature, the model has got a unique structure. In general, the P3M3 describes the Key Process Areas (KPAs) that are needed to successfully complete projects [OGC, 2006]. Furthermore, the model indicates which KPA needs to be implemented at initial stage and those that shall be implemented at higher maturity level [OGC, 2006]. The model itself is divided into 5 maturity levels, as shown in Table 6 below. Each level has got a set of KPAs that need to be implemented before moving up the maturity ladder. This is detailed in Table 7 below. Moreover, each KPA is structured identically to be descriptive and focused on outcomes.

Maturity:	Project	Programme	Portfolio
Level 1 - initial process	Does the organisation recognise projects and run them differently from its ongoing business? (Projects may be run informally with no standard process or tracking system.)	Does the organisation recognise programmes and run them differently to projects? (Programmes may be run informally with no standard process or tracking system.)	Does the organisation's Board recognise programmes and projects and run an informal list of its investments in programmes and projects? (There may be no formal tracking and reporting process.)
Level 2 - repeatable process	Does the organisation ensure that each project is run with its own processes and procedures to a minimum specified standard? (There may be limited	Does the organisation ensure that each programme is run with its own processes and procedures to a minimum specified standard? (There may be limited	Does the organisation ensure that each programme and/or project in its portfolio is run with its own processes and procedures to a minimum

Table 6 – Description of the 5 levels of OGC's P3M3 [as presented in OGC, 2006, pp.7-8]

Level 1	
1.1	Project definition
1.2	Programme management awareness
Level 2	
2.1	Business case development
2.2	Programme organisation
2.3	Programme definition
2.4	Project establishment
2.5	Project planning, monitoring & control
2.6	Stakeholder management & communications
2.7	Requirements management
2.8	Risk management
2.9	Configuration management
2.10	Programme planning & control
2.11	Management of suppliers & external parties
Level 3	
3.1	Benefits management
3.2	Transition management
3.3	Information management
3.4	Organisational focus
3.5	Process definition
3.6	Training, skills & competency development
3.7	Integrated management & reporting
3.8	Lifecycle control
3.9	Inter-group co-ordination & networking
3.10	Quality assurance
3.11	Centre of Excellence (COE) role deployment
3.12	Organisation portfolio establishment
Level 4	
4.1	Management metrics
4.2	Quality management
4.3	Organisational cultural growth
4.4	Capacity management
Level 5	
5.1	Proactive problem management
5.2	Technology management
5.3	Continuous process improvement

Table 7 – List of KPAs within each maturity level of OGC's P3M3 [as presented in OGC, 2006, pp.9]

The structure of each KPA is shown below and is followed by an example:

- ☐ Functional Achievement / Process Goals.
- ☐ Approach.
- ☐ Deployment.

- Review.
- Perception.
- Performance Measures.

Portfolio, Programme & Project Management Maturity Model Level 1: Initial process
<p><u>Lifecycle function / Key process area description:</u></p> <p>1.1 Project definition</p> <p>The purpose of project definition is to gain a common and agreed understanding within an organisation that it conducts discrete projects, and that these projects are explicitly recognised. In defining projects the organisation should identify some project objectives.</p> <p>A project should also be managed i.e. subject to at least some management activities, including activity identification. A project is also likely to have some form of project lifecycle, which may be of benefit in high level planning.</p> <p><u>Functional achievement / Process goals</u></p> <ul style="list-style-type: none"> • Recognise and establish the objectives for the project. • Gather the necessary resources to achieve the project objectives, within a specific timescale and agreed budget. <p><u>Approach</u></p> <ul style="list-style-type: none"> • Each project should have <i>agreed objectives</i> and be given the necessary resources to achieve those objectives. • The organisation should <i>recognise</i> the <i>projects</i> they are undertaking. • Each project manager should possess the ability to <i>identify</i> the <i>key activities</i> that must be carried out. <p><u>Deployment</u></p> <ul style="list-style-type: none"> • <i>Outline Project plans</i> are <i>drawn up</i> to distinguish project phases and/or stages. • Any <i>changes</i> in project requirements should be <i>recognised</i>. <p><u>Review</u></p> <ul style="list-style-type: none"> • The <i>projects should ideally be reviewed</i> by senior management on a periodic basis. <p><u>Perception</u></p> <ul style="list-style-type: none"> • The <i>views of stakeholders</i> should be sought regarding the project progress. <p><u>Performance measures</u></p> <ul style="list-style-type: none"> • Projects may have either qualitative or simple measures of their planned and actual performance relating to <i>budget and/or timescale</i>. • <i>Change</i> in project objectives or customer requirements should be <i>identified</i>.

Figure 7 – An example of the structure of a typical KPA within the OGC P3M3 [as presented in OGC, 2006, pp.11]

D) KERZNER's PMMM

Many researchers argue that in order to develop project management competency, organizations must plan for such a process. With a specific aim of developing a strategic plan for improving project management in organizations, Kerzner developed the Project Management Maturity Model (PMMM) in 2001. The model is seen by many researchers as a successful model which could be adopted by a large number of organizations. For example, in a search for an appropriate project management maturity model to be applied to a client, Voivedich & Jones [2001] reviewed many of the available maturity models. However, no model was deemed as suitable to meet the attributes of the required assessment. Hence, they developed their own model. However, Kerzner published the PMMM just before Voivedich & Jones's [2001] published their work in which the following was stated:

"a recently published book (Kernzer, 2001) might have saved us a great deal of time, had it been published a year or so earlier"

Voivedich & Jones, 2001, pg.2

The PMMM has 5 maturity levels, as shown in Table 8 below, which is similar to many other models. However, the main difference with the PMMM is that each level is associated with a different set of questionnaires. For examples, Level 1 is associated with 80 questions relating to the knowledge of project management basic whereas a Level 4 assessment involves 25 questions on benchmarking [Kerzner, 2001]. It should be noted that, at certain times, the maturity levels can overlap, although the sequence of their completion can not be changed [Kerzner, 2001]. Moreover, the completion of each maturity level comes at a different difficulty level, as shown in Figure 8 below [Kerzner, 2001].

LEVEL	DESCRIPTION
Level 1 – Common Language	<ul style="list-style-type: none"> □ <i>Ad hoc</i> processes □ Management awareness
Level 2 – Common Processes	<ul style="list-style-type: none"> □ Basic processes; used on large, highly visible projects. □ Management encourages use. □ Estimates based on expert knowledge and generic tools. □ Mostly project centric focus.
Level 3 – Singular Methodology	<ul style="list-style-type: none"> □ All process; standard for all projects. □ Management has institutionalized processes. □ Summary and detailed information □ Estimates & schedules based on industry standards and organizational specifics. □ More organizational focus. □ Informal analysis of project performance.
Level 4 – Benchmarking	<ul style="list-style-type: none"> □ Processes integrated with corporate processes. □ Management mandates compliance. □ Management takes an organizational entity view. □ Solid analysis of project performance. □ Estimates & schedules are normally based on organizational specifics. □ Management uses data to make decision. □

Level 5 – Continuous Improvement	<ul style="list-style-type: none"> □ Processes to measure project effectiveness and efficiency. □ Processes in place to improve project performance. □ Management focuses on continuous improvement.
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Table 8 –Description of the 5 maturity levels of Kerzner's PMMM [source of data: Kerzner, 2001]

Level	Description	Degree of Difficulty
1	Common Language	Medium
2	Common Processes	Medium
3	Singular Methodology	High
4	Benchmarking	Low
5	Continuous Improvement	Low

Figure 8 – Degree of difficulty associated with the achievement of each maturity level of the PMMM [as presented in Kerzner, 2001, pp.46]

E) IBBS & KWAK's MODEL

As part of the PhD dissertation, Kwak developed a Project Management Process Maturity (PM)² Model [APT⁴, 2004]. The model was developed in 1997 in University of California in Berkeley under the supervision of Prof. Ibbs [APT, 2004]. The model is also known as the *Berkeley PM Process Maturity Model* [Ibbs & Kwak, 1997; Kwak & Ibbs, 1997]. The model was

⁴ APT = Advanced Project Techniques

developed with the aim of quantitatively investigated the financial benefits, i.e. Return On Investment (ROI), of implementing project management tools, practices and processes in organizations [Ibbs & Kwak 1997; 2000a; 2000b]. Like many other models, the (PM)² Model is made of 5 maturity levels, as shown in Figure 9 below (Ibbs & Kwak 1997; 2000a; 2000b). The model is based on six project management lifecycle phases (Initiate, Define & Organize, Plan, Track & Manage, Close out and Project-Driven Organization Environment) and eight project management knowledge areas (Scope management, Time management, Cost management, Quality management, Human Resource management, Communication management, Risk management and Procurement management) [Ibbs & Kwak 1997; 2000a; 2000b]. One of the main critiques of this model is its lack of requirement of conducting external benchmarking as an improvement tool in any of its maturity levels [APT, 2004].

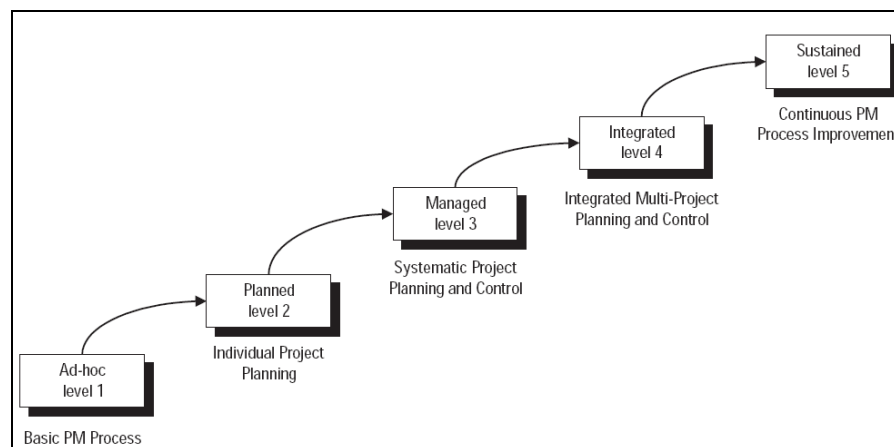


Figure 9 – The 5 maturity level of (PM)² model [as presented in Ibbs & Kwak, 1997, pp.108]

One of the most vital points of the model which makes it unique from other models is its ability to calculate Project Management's Return on Investment (PM/ROI). This is done by examining the relationship between organization's project management maturity and actual project performance,

which can be measured by either CI or SI, which can be defined as [Ibbs & Kwak 1997]:

CI = Cost Index = (Actual Project Cost) / (Original Budget)

SI = Schedule Index = (Actual Project Duration) / (Original Duration)

The relationship between project management maturity and CI, for example, can be presented as in the graph below:

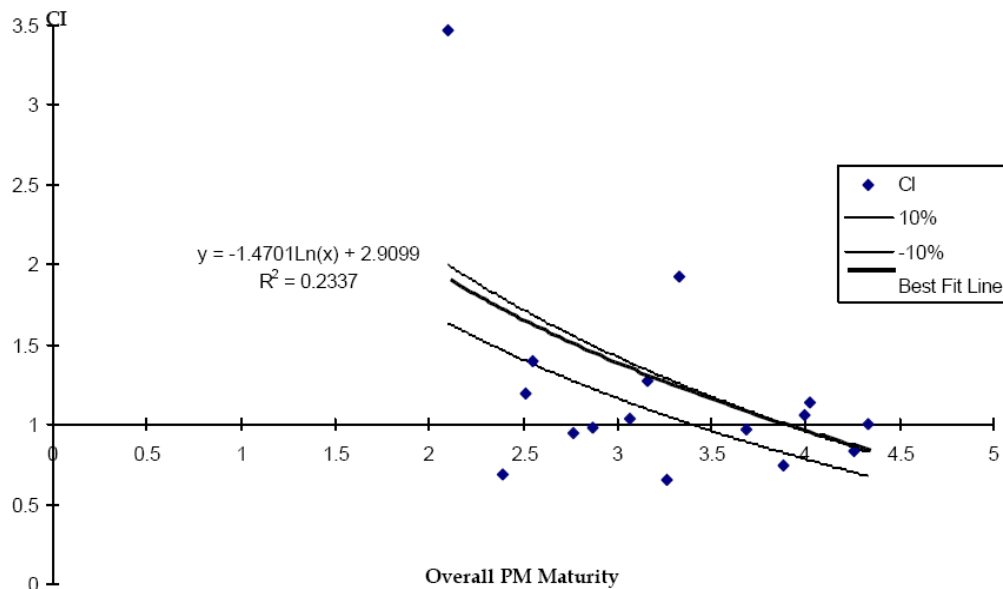


Figure 10 – Relationship between organisation's overall project management maturity and the cost index (CI) [as presented in Ibbs & Kwak, year, pp.xx]

Furthermore, Ibbs & Kwak (2000a) propose the following steps to calculate the PM/ROI:

Step1: Identify organization's current project management maturity ($PM_{current}$), $CI_{current}$ or $SI_{current}$ and the profit margin ($P\%_{current}$).

Step 2: Determine the desired project management maturity ($PM_{desired}$)

Step 3: Using the CI-PM maturity curve, as in Figure 10 above, determine the anticipated CI ($CI_{forecast}$) at $PM_{desired}$.

Step 4: From the $CI_{forecast}$, calculate the estimated profit return ($P\%_{predicted}$) using the equation:

$$P\%_{predicted} = (CI_{current}) \times (P\%_{current}) / (CI_{forecast})$$

Step 5: Forecast the annual PM/ROI using the following formula:

$$PM/ROI = (P\%_{predicted} - P\%_{current}) \times (\text{annual project revenues}) / (\text{annualized project management expenditures})$$

As mentioned earlier, this model has been used across 38 organizations in order to examine if any particular industry was more mature than the others.

F) PM SOLUTION's MODEL

PM Solutions, a management consulting, training and research firm in USA whose aim is to optimize business performance through various project management initiatives, developed a project management maturity model in 2001 that is greatly based on PMI's PMBOK Guide and is patterned after SEI's CMM [Crawford, 2006]. The model has 5 maturity levels which measure organization's project management capability across nine knowledge areas, in accordance to PMBOK Guide [Crawford, 2006]. In addition, because of the large amount of information present in the PMBOK, each of the nine knowledge areas is broken down into key subcomponents, as shown in Figure 11 below.

LEVEL	DESCRIPTION
Level 1 – Initial Process	<ul style="list-style-type: none"> □ <i>Ad hoc</i> processes □ Management awareness
Level 2 – Structured Process & Standards	<ul style="list-style-type: none"> □ Basic processes; used on large, highly visible projects. □ Management encourages use. □ Estimates based on expert knowledge and generic tools. □ Mostly project centric focus.
Level 3 – Organizational Standards & Institutionalized Process	<ul style="list-style-type: none"> □ All process; standard for all projects. □ Management has institutionalized processes. □ Summary and detailed information □ Estimates & schedules based on industry standards and organizational specifics. □ More organizational focus. □ Informal analysis of project performance.
Level 4 – Managed Process	<ul style="list-style-type: none"> □ Processes integrated with corporate processes. □ Management mandates compliance. □ Management takes an organizational entity view. □ Solid analysis of project performance. □ Estimates & schedules are normally based on organizational specifics. □ Management uses data to make decision. □

Level 5 – Optimizing Process	<ul style="list-style-type: none"> Processes to measure project effectiveness and efficiency. Processes in place to improve project performance. Management focuses on continuous improvement.
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Table 9 –Description of the 5 maturity levels of PM Soltion’s model [source of data: Crawford, 2006]

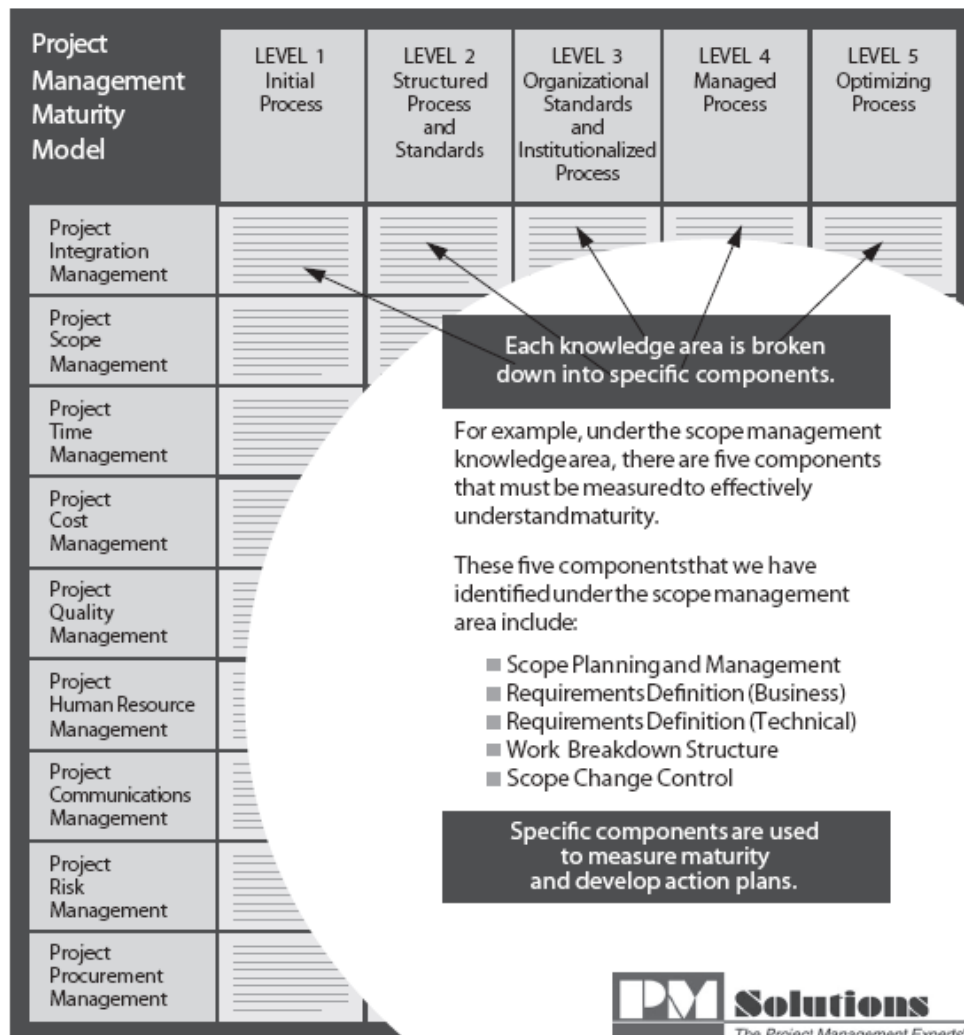


Figure 11 – Example of the breakdown of each knowledge area [as presented in Crawford, 2006, pp.53]

In PM Solution's model, three subcomponents were identified as being the most influential in organization's acceptability and success of project management [Crawford, 2006]. These subcomponents are the *Project Office*, *Management Oversight* and *Professional Development* [Crawford, 2006]. The PMBOK Guide defined the *Project Office* or *Project Management Office (PMO)* as:

"... an organizational unit to centralize and coordinate the management of projects under its domain ... The PMO focuses on the coordinated planning, prioritization and execution of projects and subprojects that are tied to the parent organization's or client"

PMBOK, 2004, pp.17

Moreover, the *Project Office* has many responsibilities which includes, but is not limited to, ensuring that the *Best Practices* are implemented and that the lessons learned from one project is communicated to the entire organization [Bolles, 2002; Meredith & Mantel; 2006]. In addition to the PMO, *Management Oversight* and *Professional Development* are also important in an organization. *Management Oversight* relates to organization's top management's interest in project management [Crawford, 2006]. *Professional Development* in the discipline of project management is also important. Project management is composed of a mixture of technical, management and leadership skills [Crawford, 2006].

Crawford, who was the CEO of PM Solutions during the period in which the article was published, claims that the model was successfully implemented across many organizations [Crawford, 2006]. Nevertheless, details of the input and results were preserved.

G) PMPA

In 2003, David James Bryde argued, in his pursue to assess project management performance in organizations, on the suitability of utilizing Quality Management assessment models to develop a project management performance assessment tool [Bryde, 2003]. The use of the European Foundation of Quality Management (EFQM) Excellence Model was particularly highlighted.

The EFQM Excellence Model was developed in 1992 with the aim of providing a structure to assess organizations for the European Quality Awards [EFQM]. In general, the EFQM Excellence Model is based on a set of 9 criteria; 5 *Enablers* and 4 *Results*, as shown in Figure 12 below [EFQM, 2003]. The *Enablers* describe organization's current processes while the *Results* represent organization's achievements. The *Results* are used to improve an organization's *Enablers*.

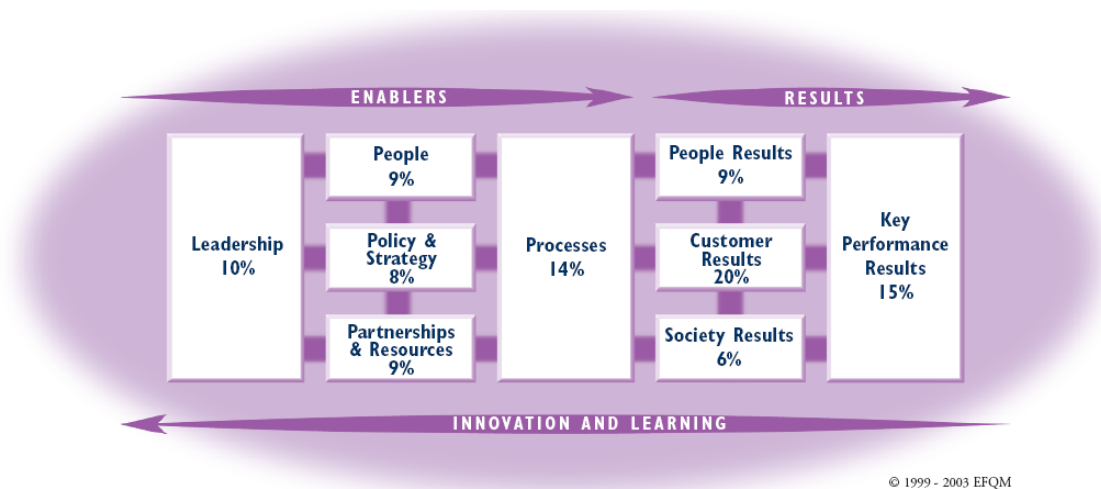


Figure 12 – The EFQM Business Excellence model [as presented in EFQM, 2003, pp.5]

The EFQM claims that the model can be applied on any organization, regardless of its size, maturity or sector [EFQM]. However, due to

differences between the management of operations and the management of projects, certain limitations exist [Bryde, 2003]. To address such limitations, the Project Management Performance Assessment (PMPA) model was developed [Bryde, 2003]. As shown in Figure 13 below, the PMPA model is similar to the EFQM model. However, certain differences exist. These differences are shown in Table 10 below.

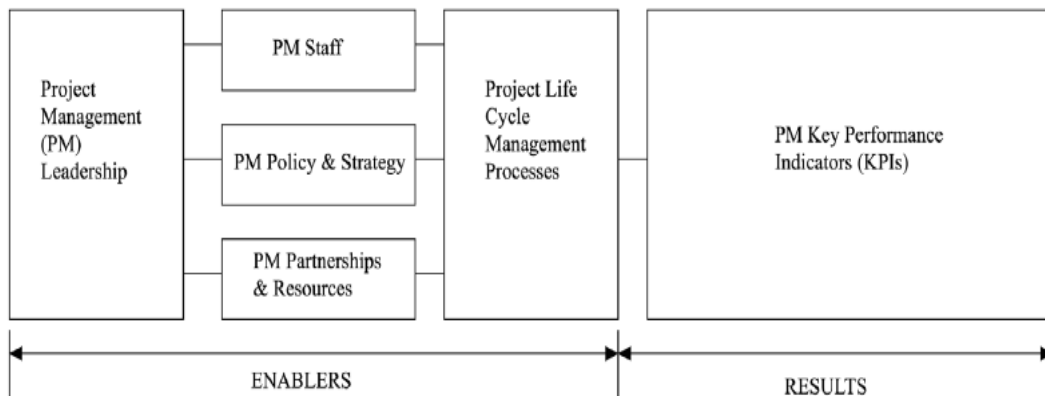


Figure 13 – The PMPA model [as presented in Bryde, 2003, pp.233]

	EFQM		PMPA	
Enablers	Leadership	Leaders establish systems to support culture of excellence.	PM Leadership	Leaders promote for PM and encourage use of projects to manage a change.
	People	Manage human resources and provide reward and recognition.	PM Staff	Increase PM capability through provision of PM training and career development.
	Policy & Strategy	Measure how organisations	PM Policy & Strategy	Focuses on how PM is integrated into the

		formulate, review and turn policy/strategy into plans/actions.		organisation at all levels.
	Partnership & Resources	?	PM Partnership & Resources	Involvement of external project stakeholders through partnerships and managing them.
	Processes	Includes process management methods, highlighting on customer-focused processes.	Project Life Cycle Management Processes	Focus on the inclusion of all project team, and possible stakeholders, in all project phases.
Results	People Results	Includes activities for managing performance indicators and measuring key performance outcomes.	PM KPI	Focus on meeting stakeholder requirements and PM methods used to improve performance against KPIs.
	Customer Results			
	Society Results			
	Key Performances Results			

Table 10 – Comparison between the EFQM Business Excellence model and the PMPA model [source of data: Bryde, 2003; EFQM, 2003]

Upon the development of the PMPA model, a questionnaire was distributed to 63 subjects within 22 organizations across 9 different sectors

in UK, including public organizations [Bryde, 2003]. In brief, findings of the survey are as follows:

Criteria		Main Findings
Enablers	<i>PM Leadership</i>	Findings indicated a widespread awareness of the role of projects in managing all types of business change. Moreover, it appears that most of the features of project culture seem to be established in organizations.
	<i>PM Staff</i>	Survey data showed the existence of a variety of methods for increasing project management capabilities in organizations, with the simplest methods surrounding the influencing of supply or demand or project management. This is done by either changing project staffing levels or changing the amount of committed project work. However, it appears that only a small portion of the sample realized the potential of processes to improve capability. For example, only 8% of organizations identified Training & Development as a capability enhancing method. Nevertheless, on the positive side, 73% of the companies involved linked project work to rewards and recognition.
	<i>PM Policy & Strategy</i>	Results indicated that organizations with good project management experience were engaged in raising the awareness of the benefits of project management. Moreover, where management was evolved formally, a general perception of the success of the process existed. <i>General Change Fatigue</i> was identified as the major obstacle in

		introducing project management.
	<i>PM Partnerships & Resources</i>	Findings indicated the existence of open two-way partnerships with the clients and suppliers. However, organizations failed to establish partnerships with internal customers.
	<i>Project Lifecycle Management Processes</i>	It appears that most organizations identified the critical business processes that are related to the management of project lifecycle which generally leads to the formation of a project lifecycle mode. 33% of the sample always used the model while 47% used it occasionally. Moreover, it appears that organizations pay more attention to the early project activities (e.g. planning, defining ...etc) than to the later activities (e.g. performance review, handover ...etc.)
Results	<i>PM KPIs</i>	Findings showed that the formal methods for managing project KPIs focused on client/customer perception (35%) and meeting specific project objectives (65%)

Table 11 – Main findings of project management assessment using PMPA model [source of data: Bryde, 2003]

H) THE PM QUALIDEX MODEL

In a similar approach to the development of the PMPA model, the Project Management Qualidex model has progressed from Quality Management. In 1997, McConachy & Bourne [1997] developed the initial Qualidex model. The main aim of the original model was to graphically represent the benefits of implementing Total Quality Management (TQM) and ISO standards which, at the time of the development of the model, often caused confusion among people [McConachy & Bourne, 1997]. Industries showed no willingness on the implementation of such a costly process without having strong evidences of its success in their unique environment [McConachy & Bourne, 1997]. In 2003, following the escalated interest in *project maturity models*, McConachy & Caine [2003] updated the Qualidex model into a project management oriented model; the PM Qualidex model.

When the early Qualidex model was developed, the main aspects of TQM were split into two main groups, *Conventional Quality* and *Contemporary Quality* [McConachy & Bourne, 1997]. The *Conventional Quality* involved meeting specifications through controlling variables in order to minimize variations in the production and outcomes [McConachy & Bourne, 1997]. Thus, it can be said that the *Conventional Quality* is technically oriented. In contrast, *Contemporary Quality* riveted on preventing the variations from occurring and seeks to motivate and increase the competency of personnel [McConachy & Bourne, 1997]. Moreover, *Contemporary Quality* can be seen as a representation of corporate culture [McConachy & Bourne, 1997].

On the other hand, the PM Qualidex model divides the nine knowledge areas of the PMBOK Guide. Moreover, the model's two dimensions are the *Enablers* and *Project Results*. *Project Results* includes four 'hard' PMBOK knowledge areas; Scope, Time, Cost and Quality [McConachy & Caine, 2003]. *Enablers* consists of a progression of all seven 'hard' knowledge

areas and two 'soft' knowledge area, Human Resources and Communication, as shown in Figure 14 below [McConachy & Caine, 2003]. Moreover, Leadership, Integrity and Team Building were included as element of *Enablers*' soft skills [McConachy & Caine, 2003].

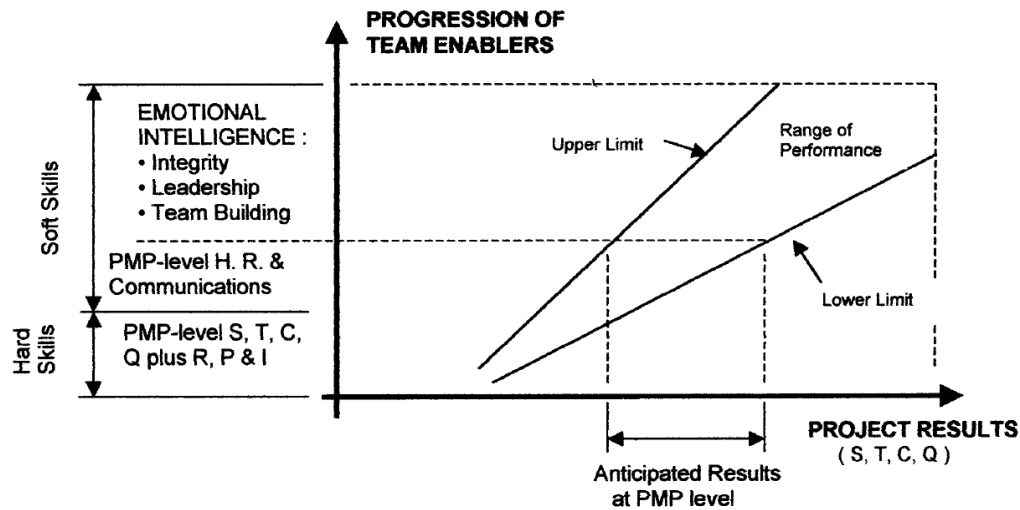


Figure 14 – The project management Qualidex model [as presented in McConachy & Caine, 2003, pp.6]

As it is clearly noted from the model above, the 'soft' skills account of almost 2/3 of the *Enablers* requirements whereas the 'hard' skills represent only 1/3 despite the fact that seven of the nine knowledge areas of the PMBOK were classified as 'hard' knowledge area. The main reason is that most of the research and surveys in the literature indicated that 'soft' skills account for about 60% – 70% of the factors required for success [McConachy & Caine, 2003]. However, it should be noted that the in order to move up the *Enablers* scale, accomplishment of 'hard' skills is a prerequisite of progression [McConachy & Caine, 2003].

The Qualidex model has been applied a number of times. The initial Qualidex model has even been applied to projects environment. For

example, a survey across 13 mega projects indicated that the greater the commitment and involvement of the team members to the project goals (*Contemporary Quality*), the better the results (*Conventional Quality*) [McConachy & Bourne, 1997].

CHAPTER 3 – CASE STUDY

1.7INTRODUCTION

Chapter 3 gives a brief introduction to the case study of the research and reviews earlier research that has been conducted with regard to project management maturity in Dubai. First, a brief overview of the UAE and Dubai is given. The main points of the Dubai Strategic Plan (DSP) 2015 are then presented. Following this, a review of the economy, the economic growth, the infrastructure, the role of the local government and the status of project management of Dubai will take place.

1.8OVERVIEW OF THE UNITED ARAB EMIRATES

The United Arab Emirates (UAE) is an Arab country that is located in the Middle East. The UAE was formed on 2nd of December 1971 [Al Tamimi, 2006;Pacione, 2005; UAE Ministry of Economy, 2007; World Fact Book]. It is comprised of seven states, termed as emirates, namely Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaima and Fujairah [Al Tamimi, 2006; Pacione, 2005; UAE Ministry of Economy, 2007; World Fact Book]. Abu Dhabi is the capital and is the largest emirate [Al Tamimi, 2006; World Fact Book]. The UAE is an oil rich country, with the bulk of its oil reserves located in Abu Dhabi [Al Tamimi, 2006]. Its gross domestic product (GDP) was estimated by AED 729.7 billion (USD 198.7 billion)⁵ in 2007, with oil comprising 35% of the total GDP [UAE Ministry of Economy, 2008]. The UAE has an area of about 83,600 km² [UAE Ministry of Economy, 2007; World Fact Book] and has a population of approximately 4.2

⁵ at rate of 1 USD = AED 3.6725 [UAE Ministry of Economy, 2007]

million⁶[UAE Ministry of Economy, 2007]. Figure 15 below gives the distribution of the population across the emirates.

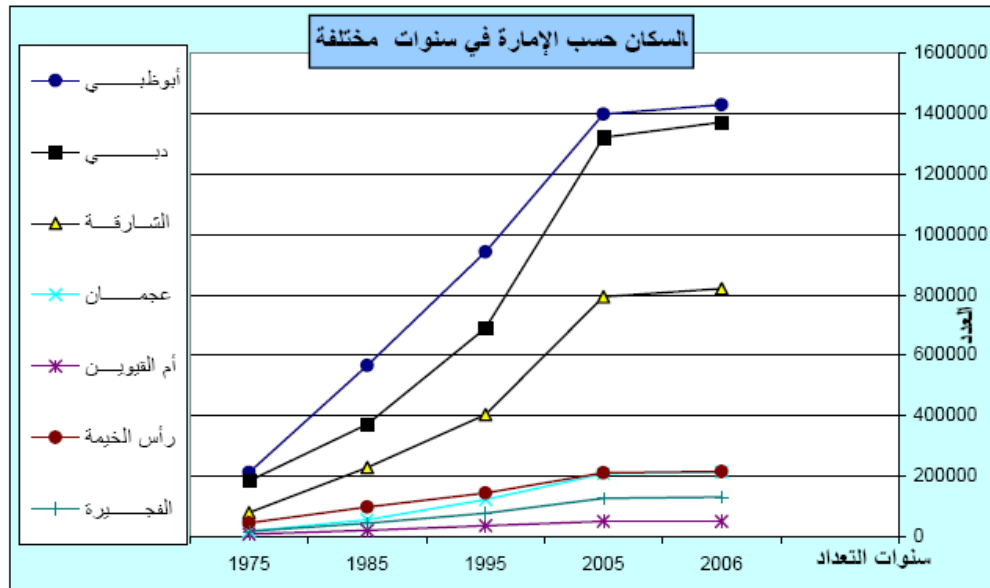


Figure 15 – The population of the UAE (1975-2006) by emirate [as presented in UAE Ministry of Economy, 2007, pp.1]

The UAE government can be best described as an Islamic federal constitutional monarchy government [Al Tamimi, 2006; World Fact Book]. Each emirate has its own ruler and its own local government [Al Tamimi, 2006]. The ruler of each emirate is responsible for the reform of the emirate falling under his jurisdiction and for enacting the laws [Al Tamimi, 2006]. As per the initial 1971 constitutional, the local government of each emirate is provided with substantial powers [Al Tamimi, 2006; DeNicola, 2005]. Not only are the local governments responsible for the internal affairs, such as municipal works, but they also seize full authority and control on the natural resources of the emirate, primarily oil revenues [Al Tamimi, 2006; DeNicola, 2005]. On the other hand, the federal government is accountable for a

⁶ As of December 2006

number of areas, such as health, education, defense, foreign affairs ...etc.
[Al Tamimi, 2006; DeNicola, 2005]

1.9OVERVIEW OF DUBAI

Dubai is the second largest emirates in the UAE, having an area of around 3,885 km² [Al Tamimi, 2006]. It is located on the southern coast of the Arabian Gulf and to the north of the capital Abu Dhabi. Dubai is commonly known as being the commercial centre of not only the UAE, but of the Middle East [Pacione, 2005]. Dubai has a large share of UAE's total population, with an estimated of 1.37 million inhabitants (32.4%) residing the city in 2006 [UAE Ministry of Economy, 2007]. Dubai city, differentiated from the emirate of Dubai, is divided by a creek, locally known as *Al-Khor*, into two main parts, namely Bur Dubai and Diera [Al Tamimi, 2006].



Figure 16 – Burj Dubai, the highest building in the world⁷

1.10 DUBAI STRATEGIC PLAN (DSP) 2015

The Dubai Strategic Plan (DSP) 2015 was developed in 2005 to complement earlier 2010 strategic plans, whose targets were met and exceeded in half the time planned [DSP 2015, 2005]. The DSP 2015 was developed to serve as an agenda which defined the future direction and targets of the government of Dubai. The main aim of the plan was to ensure a common understanding of Dubai's vision among all local government units and direct their efforts and initiatives to meeting the targets set by Dubai's government [DSP 2015, 2005]. The DSP 2015 could be considered as the development plan of the emirate.

⁷ Taken from: <http://www.burjdubaiskyrcraper.com/2005/renders/burj-dubai.jpg> Access date: 27 November 2008

Dubai's leadership had developed the DSP 2015 along five dimensions. Each of the five dimensions included a set of guidelines, as shown in Figure 17 below.

(1) Economic Development:

- Adoption of Free Market Economy Principles
- Innovation in Launching Initiatives
- Speed and Accuracy in Project Execution
- Unique Relationship and Partnership with the Private Sector

(2) Social Development:

- Protection of the National Identity, Culture and Way of Life
- Development of National Human Resources
- Promoting Social Justice and Equality
- Openness to the World while Maintaining Uniqueness

(3) Security, Justice and Safety:

- Ensuring Justice and Equality for All
- Maintaining Security and Stability
- Protecting Human Rights

(4) Infrastructure, Land and Environment:

- Provisioning of World-Class Infrastructure Designed to Suit the Requirements of all Users
- Preserving the Environment in line with International Standards

(5) Public Sector Excellence:

- Transparency
- Sound Financial Performance and Effectiveness
- Accountability and a Result-Based Culture
- Excellence in Customer Service
- Development of Human Resources
- Working Effectively within the Federal Framework

Figure 17 – The five dimensions of the DSP 2015 [as presented in DSP 2015, 2005, pp.12-13]

The following sections of Chapter 3 will review some of the above points, particularly those in relation to economic growth, infrastructure development and the role of the government.

1.11 THE ECONOMY AND ECONOMIC GROWTH OF DUBAI (PRESENT STATE)

The year 1966 witnessed the discovery of oil in Dubai, which turned out to be a turning point in the economical history of Dubai [Al Tamimi, 2006; Pacione, 2005]. The discovery of oil led to influx of large amounts of capital. However, the political and economical framework of Dubai did not change a lot. It remained in the vision of Sheikh Rashid Bin Saeed Al-Maktoum, former ruler of Dubai (1958-1990), that dependence on trade and business would be more beneficial in the long term. Thus, Sheikh Rashid took the decision to reallocate the oil revenues into developing the infrastructure [Pacione, 2005].

Dubai continued to produce oil. The oil production peaked at 410,000 barrels per day in 1991 [Pacione, 2005]. However, since the turn of the millennium, the oil production in Dubai started to decline and dropped to approximately 170,000 b/d [Hvidt, 2007]. In addition, many reports indicated that Dubai's oil reserves would be fully consumed within 20 years [UAE Government].

Since the announcement of the decline of oil production and the expected utilization of the entire oil reserves, Dubai government has taken prompt action to further diversify its income and stimulate the economic growth [Hvidt, 2007; Pacione, 2005]. In particular, attention was given to promoting tourism and services sector [Hvidt, 2007].

The efforts of the government of Dubai have been met with a significant economic “boom”. This has seen Dubai transforming into one of the highly rated business and tourism attracting city in the world. In fact, Dubai is currently seen as an excellent investment destination [DSP 2015, 2005].

The economic “boom” has had pleasant effects on Dubai’s economic statistics. Between the years 2000 and 2005, Dubai’s economy has had a double-digit real GDP growth, with the growth rate estimated at 13% [DSP 2015, 2005]. This, by far, is much higher than the neighboring GCC countries, and even than some of the big international economies, as it can be observed in Figures 18 below.

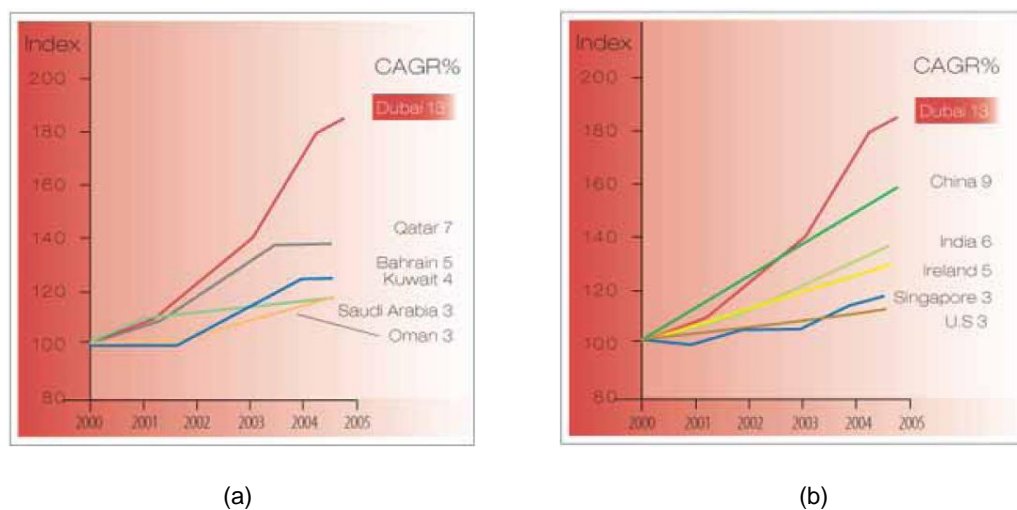


Figure 18 – Comparison of Dubai’s GDP growth (2005) to that of the (a) GCC countries and (b) world’s developed countries [as presented in DSP 2015, 2005, pp.16-17]

In 2005, Dubai's GDP was estimated by AED 137.7 billion (USD 37.5 billion) [DSP 2015, 2005]. The oil sector represented only 5% of Dubai's total GDP [DSP 2015, 2005]. This represents a significant improvement on the 54% oil dependence noted in 1975 [DSP 2015, 2005]. Non-oil sector contributed to 95% of Dubai's 2005 GDP [DSP 2015, 2005]. The service sector was the key driver to the economic growth. It accounted for AED 101.4 billion (USD 27.6 billion) of Dubai's GDP, which equates to approximately 74% of the total GDP in 2005 [DSP 2015, 2005]. The service sector includes trade, construction, transport, storage, communication, real estate ...etc. Figure 19 below gives the breakdown of Dubai GDP in the years 2000 and 2005.

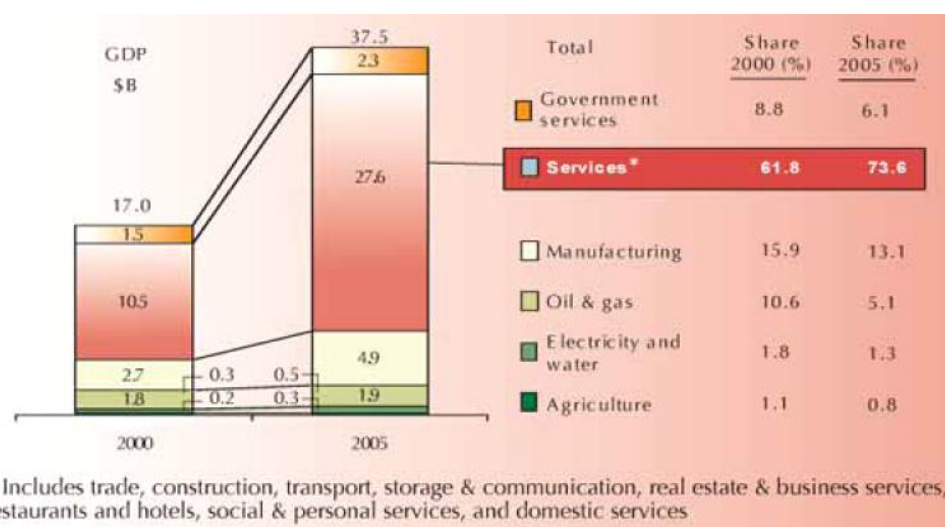


Figure 19 – Breakdown of Dubai GDP in the years 2000 and 2005 [as presented in DSP 2015, 2005, pp.19]

1.12 INFRASTRUCTURE OF DUBAI

As a result of the economic growth of Dubai in the past few decades, the population of the emirate considerably increased. Table 12 below indicates the recent increase in the number of housing units in UAE, and more specifically in Dubai. As the population increases, so does the demand on infrastructure services, such as electricity, transportation, health, education ...etc. However, as discussed in chapter 2, the scope of this research only tackles the economic infrastructure. In particular, electricity, water, sanitation, telecommunications and transportations would be reviewed.

الوحدات السكنية حسب الإمارة *					
HOUSING UNITS BY EMIRATE *					
EMIRATE	2005	1995	1985	1980	الإمارة
Abu Dhabi	242324	153803	105749	60643	أبوظبي
Dubai	205518	111722	69909	45102	دبي
Sharjah	167142	78051	49167	29054	الشارقة
Ajman	39700	21626	10717	6497	عجمان
Umm Al-Quwain	8828	6921	4499	2272	أم القيوين
Ras Al-Khaimah	39815	28828	23898	13763	رأس الخيمة
Fujairah	19532	12227	8852	5168	الفجيرة
Total	722859	413178	272791	162499	جملة الدولة

* Census Data

* بيانات تعداد

Table 12 – Increase of number of housing units (1980 - 2005) by emirate [as presented in UAE Ministry of Economy, 2007, pp.20]

Electricity and was first introduced to Dubai in 1952 [www.sheikhmohammed.ae](a)⁸]. Following the discovery of oil, the electricity along with water supply, as with most infrastructures at the time, were notably improved and continued to increase as the population increased. Table 13 below gives some of the main statistics related to growth of electricity between 2001 and 2007.

⁸ www.sheikhmohammed.ae is the official website for H.H.Shiekh Mohammed, the ruler of Dubai

	ELECTRICITY		WATER	
Year	2007	2001	2007	2001
Installed Capacity	5,932 MW	2,913 MW	314 MIGD	143 MIGD
Consumption	24,750 GWh	12,240 GWh	72,588 MIG	41,354 MIG
No. of consumers	403,669	240,855	331,518	190,335

Table 13 – Major electricity and water statistics [source of data: DEWA 1; DEWA 2; DEWA 3; DEWA 4]

In 1974, H.H. Sheikh Rashid Bin Saeed Al-Maktoum issued a decree to establish the Dubai Municipality [Dubai Municipality 1; Wikipedia]. As part of its services, the municipality initiated plans to develop and build the infrastructure of Dubai, including, among others, sewage and drainage. As of June 2008, Dubai has a 260,000 m³/day sewage treatment plant [Dubai Municipality 2].

Dubai roads were initially planned and built in 1974, as part of the municipality first responsibilities [Wikipedia]. Since then, Dubai transportation system has undergone major developments. An integrated public transport system was established, linking buses, taxis, water buses, Abra and, in future, the metro. Moreover, the International Dubai Airport was first built in 1960 [Dubai International Airport] and was then expanded and became the 27th busiest airport in the world [Airports Council International, 2008]. In addition, Dubai has two main ports, Port Rashid and Jebel Ali Port, which were initially built in 1972 and 1979 respectively [DP World 2]. At the time, the Jebel Ali Port was the world's largest man-made harbour [DP World 2]. Table 14 below gives some of the main statistics with regard to the transportation system in Dubai. However, despite government's best efforts, Dubai roads remain congested [Gulf Talent, 2007]. This is mainly due to the pace of the economic growth during the past few years. In 2007, it was

estimated that traffic congestion inflicted losses worth AED 4.6 billion per year, which was equivalent to 3.15% of Dubai's AED 146 billion 2007 GDP [Shariff, 2007].



Figure 20 – The Abra⁹ transporting people across the creek¹⁰.

MAJOR TRANSPORTATION STATISTICS	
ROADS	
Average Travelling Time	1 hr 45 min (compared to 1 hr 33 min in Cairo and 48 min in Abu Dhabi)
Car Ownership Rate	541 cars per 1,000 population (compared to 444 in New York and 345 in London)

⁹ Abra is a traditional means of water transport in UAE and is considered as one of the oldest modes of transportation. There are two types of Abras, rowing and motorised. The public transport utilizes the motorised Abra

¹⁰ Taken from: http://www.tropicalisland.de/united_arab_emirates/dubai/dubai_creek/pages/DXB%20Dubai%20creek%20-%20abra%20boat%20with%20passengers%20crossing%20the%20creek%2001%205340x3400.html
Access date: 29 November 2008

Cost of Ongoing Road Projects	AED 74 billion ¹¹
PUBLIC TRANSPORT (BUSES)	
Number of Buses in Service	504
Number of Major Bus Stations	9
Number of Bus Stops	1600 (153 sheltered and air conditioned)
Number of Routes	62
Number of Bus Trips	5,500 trips per day
Total number of passengers (2007)	91,000,000 (approx.)
PUBLIC TRANSPORT (METRO)	
Number of Stations	47 (37 elevated; 10 underground)
Number of Routes	2
Total Length of Routes	75 km
Cost of Execution	AED 15.5 billion
Total Capacity (maximum)	45,219 pphpd ¹²
PUBLIC TRANSPORT (MARINE)¹³	
Number of Transport Units	149
Number of Stations	4
Number of Routes	6
Total Length of Routes	1.35 km
Total number of passengers (2007)	14,800,000

¹¹ As of July 2006.

¹² pphpd = person per hour per direction.

¹³ Services along Dubai creek to link Diera & Bur Dubai. Statistics for Abra only and excludes water bus services.

AVIATION	
Number of Passengers (2007)	34,348,110
Number of Flights (June 2008)	5,100 per week
Number of Airlines (June 2008)	140
Number of Destinations (June 2008)	260
Amount of Cargo Handled (2007)	1,668,505 Tons
SEA PORT	
Handling Capacity	10.65 TEU ¹⁴

Table 14 – Major transportation statistic of Dubai [source of data: Ahmed, 2006; ACI¹⁵, 2008; ACI 2, 2008; DP World 1; Gulf Talent, 2007; RTA Marine Agency; RTA Public Transport Agency; RTA Rail Agency 1; RTA Rail Agency 2; RTA Rail Agency 3; Shariff, 2007]. Note: RTA = Roads & Transport Authority

1.13 ROLE OF THE GOVERNMENT

The government of Dubai has succeeded in making Dubai one of the major cities in the world. One of the main factors to its success was the denial of the government to lure on the success of past. This was confirmed by Sheikh Mohammed, ruler of Dubai, who stated:

“Unlike others, we are not content to settle for what was accomplished in the past, because life doesn't stop and it doesn't care about those who stop because they are content with what they have achieved.”

[www.sheikhmohammed.ae\(b\)](http://www.sheikhmohammed.ae(b))

¹⁴ TEU = Twenty foot Equivalent container Units

¹⁵ ACI = Airports Council International

When reviewing the role of the government of Dubai, it can be said that the government acts as a services provider. It build the transportation system, generates electricity, provides water and sanitation services and ensures security. This was also confirmed by Sheikh Mohammed when stating:

“The first duty of an official is to make his people happy and provide them with security, stability, welfare and progress.”

www.sheikhmohammed.ae(b)

As it can be noted above, one of the roles of the officials, i.e. the government, is to provide progress and development to its citizens. However, Dubai’s policy directs the government to stimulate the development and regulate it. It encourages that private sector to take part of the development. In fact, Dubai considers the private sector as the main driver of the development, as noted in the statement below:

“We believe that the role of the government should be restricted to legislation and regulation, in addition to the continuous development of the infrastructure - thus making the private sector the engine of the development process.”

www.sheikhmohammed.ae(b)

The above has so far been a brief and scattered view of the role of the government. However, the DSP 2015 clearly defines the role of the government. In the DSP 2015, the following was stated as the mission of the government of Dubai:

- Achieving comprehensive development and building human resources
- Promoting economic development and government modernization
- Sustaining growth and prosperity
- Protecting Nationals' interests, public interest and wellbeing
- Providing an environment conducive for growth and prosperity in all sectors

Figure 21 – Mission of the government of Dubai [as presented in DSP 2015, 2005, pp.12]

In relation to infrastructure, the following were stated as the aims of the government:



Figure 22 – Aims of the government of Dubai in relation to infrastructure development [as presented in DSP 2015, 2005, pp.32]

1.14 PROJECT MANAGEMENT IN DUBAI

As it can be concluded from the above, the government of Dubai tends to focus on the future and continuously develop. This indicates that the economy is expected to continue its high growth rate. Along with the growth rate comes the increase in population, as seen earlier. Moreover, as the population increase so does the demand on local services, such as electricity, water, sanitation and transportation. For example, the RTA,

Dubai's transportation regulator and intergrator, recently announced its plan to invest AED 44 billion, USD 12 billion, to build 500km of roads and multi-level interchanges [Sambidge, 2008]. The project is expected to be completed by 2020 [Sambidge, 2008]. Another example is Al-Maktoum International Airport. When completed, it is expected that the airport would be the world's largest and would have a handling capacity of 120-150 million passengers and 12 million tons of cargo and is estimated to cost around AED 30 billion [AME Info, 2007; Hvidt, 2007; Zawya, 2008].

As it can be seen, there are a great number of projects which are expected to be undertaken in the near future. Moreover, given Dubai's high ambitions and its recent performances, the focus on timely and successful completion of projects is even higher. In fact, the requirement of successful project completion was highlighted in DSP 2015. This can be clearly visible in Figure 17 above under point 1, bullet no.3.

Unfortunately, there exists no information on the maturity, competency or performance of project management in public sector in Dubai, which is the main aim of this study. Nevertheless, by reviewing some of the recent events, it can be seen that there exists some issues with regard to project and program management. In August 2007, concerns have been raised by some of the major property developers in Dubai, such as DAMAC and Nakheel, with regard to the ability of DEWA to expand its electricity and water capacity at the same rate as Dubai's real-estate boom [Bianchi, 2007]. Moreover, in September 2007, H.E. Mattar Al-Tajer, Chairman of the Board and Executive Director of RTA, announced that the 3 year plan to smooth the traffic flow would be extended to four years due to rapid changes and massive developments [Ahmed, 2007].

On the other hand, studies on the project management performance of organisations in Dubai are scarce. It has been indicated that around 50% of construction projects in UAE suffer delay [Faridi & El-Sayegh, 2006]. The 10 most significant causes of the delays are shown in Table 15 below.

Top 10 Causes of Delays	
1	Preparation and approvals of drawings.
2	Inadequate early planning of the project.
3	Slowness of the owner's decision making process.
4	Shortage of manpower.
5	Poor supervision and poor site management.
6	Productivity of the manpower.
7	Skill of manpower.
8	Non-availability of material on time.
9	Obtaining permit/approval from local authorities.
10	Financing by contractor during construction.

Table 15 – Top causes of delay in construction sector in the UAE [source of information: Faridi & El-Sayegh, 2006]

Thus, it can be concluded that organisations in Dubai, whether public or private, do have limitations and shortcomings in relation to project management.

CHAPTER 4 – METHODOLOGY

1.15 INTRODUCTION

Chapter 4 details the methodology that was applied in attaining the aim of the research. First, the purpose and approach of the research were defined followed by the identification of the sample to be selected. A review of the suitability of the existing assessment tools took place before deciding to develop a new assessment tools exclusively for this research. Distribution of the questionnaire is finally described.

There are many ways in which the research process can be viewed. Many researchers have described the process simply by listing and explaining the research strategies, commonly known as research approaches. Other researchers gave a more comprehensive view on the subject. Due to being comprehensive enough and containing most of the relevant information, the works of Saunder *et al* [2003] has been selected to base the outline of the research process described below. In particular, the research process *onion*, Figure 23, has been used to detail the research process.

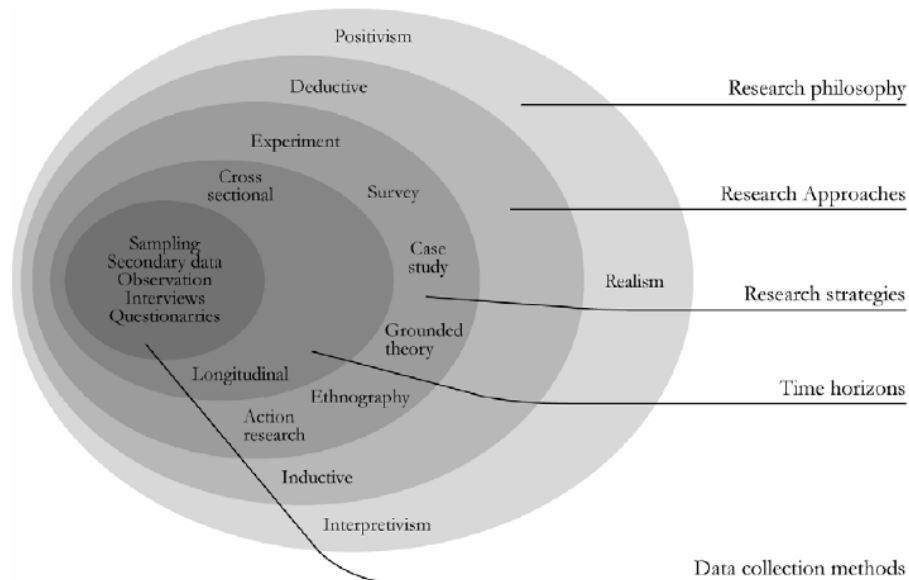


Figure 23 – The research onion process [as presented in Saunders *et al*, 2003, pp.83]

1.16 THE RESEARCH ONION

A) RESEARCH PHILOSOPHY

The first layer of the process onion relates to research philosophy, which is the way in which researchers think about the development of the knowledge [Collis & Hussey, 2003; Saunders *et al*, 2003]. There are three views of the research philosophy; positivism, interpretivism and realism. The positivism philosophy assumes that if a theory can be applied to one case, then it can be applied to all situations; i.e. it can be generalised [Collis & Hussey, 2003; Saunders *et al*, 2003]. The interpretivism, however, criticizes positivism's 'law-like generalisations' as reducing the complexity, and thus the rich insights, of the social world of business and management [Collis & Hussey, 2003; Saunders *et al*, 2003]. Interpretivists often argue that generalisability is not important as organisations are unique and face a lot of changes in a relatively short period of time [Saunders *et al*, 2003]. The interpretivism view usually calls for the researchers to interpret and understand people's motives, actions and intentions and make sense out of them [Collis & Hussey, 2003; Saunders *et al*, 2003]. The final view of research philosophy is the realism. As stated by Saunder *et al* "*realism is based on the belief that a reality exists that is independent of human thoughts and beliefs*" [2003, pg.84]. Figure 24 below demonstrates the differences between the three philosophies.

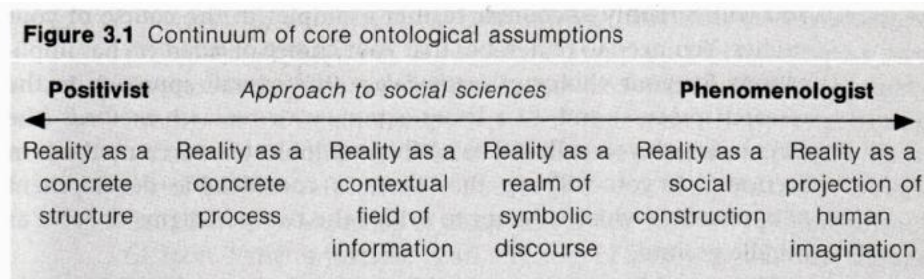


Figure 24 – Difference between various research philosophies [as presented in Collis & Hussey, 2003, pp.51]

B) RESEARCH APPROACH

Research approach is represented by the second layer of the research process onion. Research approach can generally be classified into two approaches; deductive and inductive. Followers of the deductive approach generally develop a theory and then test it [Collis & Hussey, 2003; Saunders *et al*, 2003]. Researchers tend to explain the relationship between any two or more selected variables [Saunders *et al*, 2003]. In contrast, the inductive approach involves gathering data and information, analysing them and then form a theory [Collis & Hussey, 2003; Saunders, 2003]. By doing so, researcher gain an understanding of the ways in which the social world is being interpreted by the people.

C) RESEARCH STRATEGY

Research strategy is, in simple terms, the overall method of data collection [Saunders *et al*, 2003]. It sets out a plan of how the data would be gathered during the research (e.g. survey). It should not be confused with what can be termed as *research tactics*, which involves the selection of the actual data collection tools or methods such as questionnaires, interviews ...etc [Saunders *et al*, 2003].

Numerous research strategies have been identified in the literature. The most important and common strategies include survey, action research, experiment, ethnography, grounded theory, case study, cross-sectional studies and longitudinal studies. A brief description of each type is given in Appendix D.

D) RESEARCH PURPOSE

Research strategy forms the third layer of the process onion. As mentioned earlier, it classifies the different types of researchers in accordance to the overall methods of data collection. However, many researchers have classified the types of researches in a different way and used the '*research purpose*' terminology to note to it [e.g. Collis & Hussey, 2003]. Research purpose can be classified into four categories, namely exploratory, descriptive, explanatory and predictive. A brief description of each type is given in Appendix D. It should be noted that the research purpose could change as the research develops [Collis & Hussey, 2003].

1.17 ADOPTION OF A RESEARCH PROCESS

As the aim of the research was to measure the project management maturity, or competency, in the public sector, it was obvious that the research's philosophy direction was towards positivism. Positivism was required in order to ensure that a respectable amount of consistent information could be collected in a relatively short period of time. In order to do so, a model was required not only to measure the project management in various public sectors having different backgrounds, but also across semi-government and private sector from across the region.

The study adopted a deductive approach. A theory of project management maturity existed and was needed to be tested in a particular environment. This research did not aim at developing any novel theories.

During the planning of the research, it was decided that a survey was the most appropriate method for data collection. The use of survey would

enable a collection of a large amount of data within a reasonable amount of time. Although it was envisaged that a substantial amount of time would be required to develop the questionnaire, it was to the researcher's certainty that this would be time well-spent. Moreover, due to lack of research time, it was decided that the study would be a cross-sectional type of studies.

Finally, due to the novelty of the field of project management maturity, particularly in public sector organisations, the research purpose was deemed as exploratory.

1.18 SAMPLE SELECTION

Due to the nature of the government setup in Dubai, only three public / government organisations existed which were heavily involved in developing the city's infrastructure. Therefore, in order to expand the available sample group, semi-government organisations were also involved. However, only those organisations that were heavily engaged in large portfolio of projects carrying high values were involved. Only project management departments in the selected organisations were targeted.

After careful considerations of the available organisations and available access into each of them, 2 public organisations were selected, identified anonymously as P1 and P2. Moreover, two semi-government organisations were selected, also identified anonymously as S1 and S2.

1.19 SELECTION OF A PROJECT MANAGEMENT MATURITY MODEL

As stated earlier in the research, the development of a new project management maturity model is a time consuming process. Therefore, it is recommended to first consider the adaptation of an existing model. However, when selecting an existing project management maturity model, it is essential to ensure that the selected model meets the minimum requirement of the research. Moreover, it is important to check whether the selected model fully represents the selected domain, which in case of this research, is project management.

In order to assess which model most suits the requirement of the research, Table 16 was developed. Table 16 acts as a checklist for each model with the first column of the table representing the minimum criteria that the maturity model shall cover. Subsequent columns list a number of project management maturity models along with its suitability assessment.

The development of the list of minimum criteria that the selected model should meet was primarily based on three aspects; full coverage of main components of project management domain, avoidance of the disadvantages of maturity models and the scope of the model. Those aspects were covered in details in the literature review.

As it can be seen from Table 16 below, eight project management domains were selected. Further information on the main project management domains is available in section 4.9. In addition, due to the lack of any preliminary indication on project management maturity of the public sector in Dubai, it was decided that the model should be descriptive. This

was also required to minimize the assessment time. Moreover, it was decided that the progress criteria would be through average score, as opposed to meeting the minimum criteria. This was decided in order to give a better and more realistic picture of the status of project management and shall be considered as one of the most important criteria. This could be illustrated by considering a case where a company is well advanced in the field of project management. However, it is considered as a level 1 organisation because it failed to meet a single criterion which it does not believe would add a significant value to its process. Thus, its maturity level would not reflect the true state of its project management capability. Finally, any selected model should facilitate for self assessment. The involvement of external auditors or certified assessors is out of the scope of this study.

As it can be observed from Table 16 below, none of the reviewed models was able to fulfill all the criteria. However, prior to disqualifying them, it would be worth reviewing the models in more details. As mentioned earlier, the process of developing a new model is a difficult and time consuming process. Thus, if any of the reviewed models could be qualified for the study by compromising some of the criterions, without affecting the overall outcome of the study, then a considerable amount of time and effort could be saved.

As it can be observed from the table below, the original format of the SEI CMM is not suitable for the study as it does not measure any of the main project management domains. As reflected earlier in Chapter 2, the SEI CMM was mainly developed for the software industry. Even researchers who based their models on the SEI CMM have had to carry out a substantial amount of modifications to prepare the model for the project management discipline.

The second model that is listed in Table 16 is the PMI OPM³. However, the model was excluded from being reviewed as no sufficient literature was available.

PM Solution's Model and OGC P3M3 were two models that were very close to being adopted as the model of the study. However, they were not qualified for different reasons. As the case with PMI OPM³, the PM Solution's model lacked necessary literature which would enable for the assessment to take place. If adopted, and with the minimum information available, the time spent on developing a broader definition of the maturity levels and the questionnaire would have been similar to that of developing a new model. The OGC P3M3 was, on the other hand, disqualified as it failed to meet the most important criteria; progression through the maturity model by means of average score. Moreover, although the model enabled self-assessment, the model had rich contents which, even though could be considered as a major advantage in many situations, might cause confusion among the respondents who lacked the minimum knowledge of project management. Thus, the model was excluded.

Similarly to OGC P3M3, Kerzner's PMMM was primarily excluded as the progression through the model was based on meeting minimum criteria rather than average score. In addition, Kerzner's model was too detailed and excessively lengthy for it to be considered as a descriptive model. Moreover, Kerzner's PMMM gave no consideration to the staff development or the management of multiple projects.

Ibbs & Kwak's (PM)² Model was another potential model that was excluded. As it can be observed from Table 16, the model heavily relied on measuring PM Knowledge and PM Methods, with no consideration given to

the soft skills. As discussed earlier, this type of model, if used, would have certain limitations which could have a significant impact on the credibility of results of the study.

The two final models to be reviewed are the PMPA and the Qualidex PM Model. In addition to the main disadvantage of not meeting a number of the desired criteria, those models did not have any distinct maturity levels. The models aim at measuring any tangible improvement of enhancing project management overall, although it has to be noted that the models, in particular the PMPA, does facilitate to measure the project management competency along the main project management domains. Thus, because of the above, both PMPA and the Qualidex PM Model were excluded.

As none of the models listed in Table 16 succeeded in being qualified as suitable for this study, a decision was made to construct a new project management maturity model for conducting this research.

MAIN CRITERIA		SEI CMM ¹⁶	PMI OPM3 ¹⁷	OGC P3M3	KERZNER'S PMMM	(PM)2 MODEL [Ibbs & Kwak]	PM SOLUTION MODEL	PMPA	QUALIDEX PM MODEL
Project Management Domains	PM Knowledge	X		√	√	√	√	√	√
	PM Staff Development	X		√	X	X	√	√	√
	PM Culture	X		√	√	X	√	√	√
	PM Leadership	X		√	√	X	√	√	X
	PM Structure	X		√	√	X	√	√	√
	PM Policy	X		√	√	√	√	√	√
	PM Methods	X		√	√	√	√	√	√
	Multiple PM	X		√	X	X	X	X	X
Scope of the Model (including avoidance of Disadvantages)	Aim (Measure PM Maturity)	√		√	√	√	√	X	X
	Purpose (Descriptive)	√		√	X	√	√	√	√
	Progress by Average Score	X		X	X	√	√	X	X
	Self Assessment	X		√	√	√	√	X	X

Table 16 – Checklist for selecting a suitable project management maturity model.

¹⁶ When assessing the suitability of the model, the original, unmodified version of the model was taken as some of the modified versions are also included (i.e. Ibbs & Kwak' model and PM Solution's model)

¹⁷ Due to lack of sufficient literature information, it was decided to exclude the PMI OPM3.

1.20DEVELOPMENT OF A NEW PROJECT MANAGEMENT MATURITY MODEL

As stated earlier, detailed guidelines and instructions with regard to the development of a new maturity model are in general scarce, with the work of de Bruin *et al* [2005] being the only available source. Therefore, the process developed by de Bruin *et al* [2005] shall be abided in the construction of the new project management maturity model. In particular, phases 1 – 3 (scope, design and populate) of the development framework were followed. Phases 4 – 5 (test and deploy) were excluded as they form part of the overall methodology of this research. Moreover, consideration were made to ensure the easiness of maintaining (phase 6) the model should it be used for any further studies.

After consideration of the purpose of the research, the scope of the model was developed as described below. A summary of the scope is shown in Table 17.

Criterion	Characteristics		
Step 1 – Scope			
Purpose of Model	Descriptive		
Aim of Model	Measure organisations' project management maturity		
Focus of Model	Project Management		
Development Stakeholders	Public / government organisations	Semi-government and private organisations	Project Management departments only

Step 2 – Design		
Audience	Internal management	
Method of Application	Self assessment	
Respondents	All project management related staff	
Application	Multiple entities	Multiple regions
Driver of Assessment	Academic research project	
Model Complexity	Good balance between being short & simple and being comprehensive.	
Maturity Levels	6	
Demonstration of Results	Spider's Web diagram	
Model Flexibility	Allow visibility of incremental improvement	
Progression between Levels	By average scores	Similar difficulties between all levels
Step 3 – Populate		
Main Components	PM Knowledge	PM Staff Development
	PM Culture	PM Leadership
	PM Policy	PM Methods
	PM Structure	Multiple PM
Assessment Tool	Quantitative survey using 5-point Likert scale	Selection of additional multiple choice questions.

Length of Assessment	40 – 60 questions	Not exceeding 60 minutes
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Table 17 – Scope of the developed model.

Step 1 – Scope

The scope of the model was stemmed from the purpose of the research. With the lack of basic information on project management maturity in government organisations in Dubai, it was decided that the model shall be descriptive in its nature. Therefore, at the time of the research, the aim of the model was purely based on measuring organisations' project management competency. Nevertheless, considerations were made with regard to developing a model that could be evolved into a perspective one. In addition to the public sector, semi-government and private companies were also identified as stakeholders. This was required to ensure that the model can be generalised to all sectors so that comparisons can take place.

Step 2 – Design

The model was designed so that self assessment application of the model and its assessment tool would be used. The main reason for this is that the involvement of a third party consultant or a certified practitioner would result in higher costs and longer completion time of the research. All project management personnel in an organisation were targeted. It was also decided that the model should be designed so that it can be applicable to different entities from different regions. Every effort was exerted to ensure that sufficient interest in the model would be attracted. The model was designed to be short and simple while being comprehensive at the same time. Moreover, in order to reduce the rigidity of the model, it was decided that the maturity model would have six maturity levels rather than the traditional five. The six maturity levels along with their description are shown in Table 18 below. A top-bottom approach was used to define each maturity level. Determination of

maturity of an organisation would be done by calculating an average score of the assessment. In addition, a matrix type maturity model was used to increase the flexibility of the model, as it can be clearly seen in Table 19 below. Maturity levels and main project management components filled the two axis of the matrix. Finally, *spider's web* diagram, Figure 25, was used to present the results of the maturity assessment. This was done so that the main strengths and weaknesses of an organisation can be clearly presented to the audience.

MATURITY LEVEL	DESCRIPTION OF THE LEVEL
5 = Excellence	PM organization adopts a continuous improvement approach. PM processes are continuously reviewed and updated. Benchmarking and other improvement tools are introduced
4 = Comprehensive	PM is consistently applied to all projects. PM processes and procedures are fully defined and integrated with other organizational processes.
3 = Basic	Formal PM is introduced in the organizations and basic process exists. However, there exists an inconsistency in applying PM to all projects. Top management is ready to commit to PM development, although limited
2 = Informal	PM benefits awareness is in preliminary phase. Use of PM is informally encouraged by top management. Despite lack of PM procedures, certain guidelines could exist. Limited PM training

1 = Naïve	PM is used by experienced and competent personnel. Top management is not aware of the benefits, but neither encourages nor discourages the use of PM
0 = Denial	The use of PM is seen as useless and a waste of resources and is therefore discouraged. Top management is not aware of and not interested in knowing the benefits of PM

Table 18 – The maturity levels of the new model along with the description of each level.

	Main components	LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
GENERAL	<i>Name of level</i>	<i>Denial</i>	<i>Naïve</i>	<i>Informal</i>	<i>Basic</i>	<i>Comprehensive</i>	<i>Excellence</i>
	<i>Level Description</i>	The use of PM is seen as useless and a waste of resources and is therefore discouraged. Top management is not aware of and not interested in knowing the benefits of PM.	PM is used by experienced and competent personnel. Top management is not aware of the benefits, but neither encourages nor discourages the use of PM.	PM benefits awareness is in preliminary phase. Use of PM is informally encouraged by top management. Despite lack of PM procedures, certain guidelines could exist. Limited PM training.	Formal PM is introduced in the organizations and basic process exists. However, there exists an inconsistency in applying PM to all projects. Top management is ready to commit to PM development, although limited.	PM is consistently applied to all projects. PM process and procedures are fully defined and integrated with other organizational processes. Training offered to all PM related staff.	PM organization adopts a continuous improvement approach. PM process are continuously reviewed and updated. Benchmarking and other improvement tools are introduced.
MAIN METRICS	<i>Metric 1</i>						
	<i>Metric 2</i>						
	<i>Metric 3</i>						
	<i>Metric 4</i>						
	<i>Metric 5</i>						
	<i>Metric 6</i>						

Table 19 – Matrix-type structure of the new maturity model.

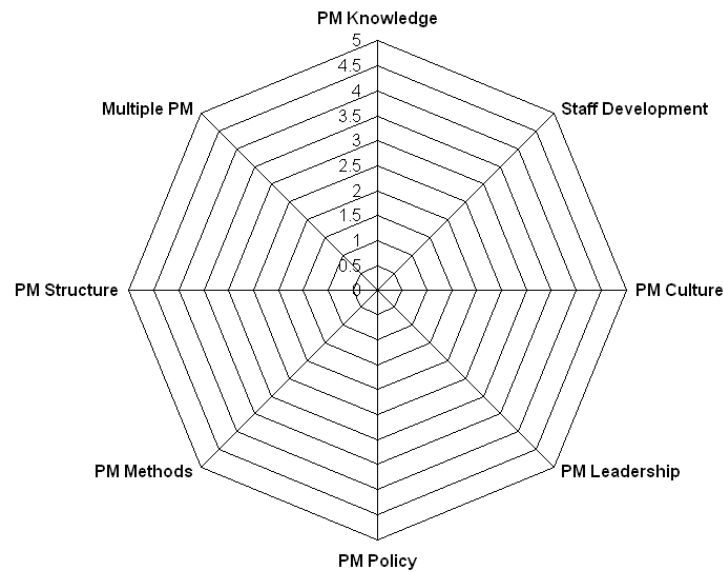


Figure 25 – Spider's Web presentation for the developed model.

Step 3 – Populate

After deciding on the main layout of the maturity model, the main components and subcomponents of project management discipline were categorised, as show in Figure 26 below. Eight main components were initially identified, namely PM Knowledge, Staff Development, PM Culture, PM Leadership, PM Policy, PM Methods, PM Structure and Multiple PM. It was decided to identify multiple project management as a separate component as it was to researcher's experience of the project management setup in Dubai that although many organisations are indulged in managing multiple projects, not many identify it differently than project management. Hence, it would be beneficiary to test this theory and support it with facts. The next step was to populate the model (Table 20). Following this, an assessment tool was devised for the model. Details of designing the assessment tool are given in the following section.

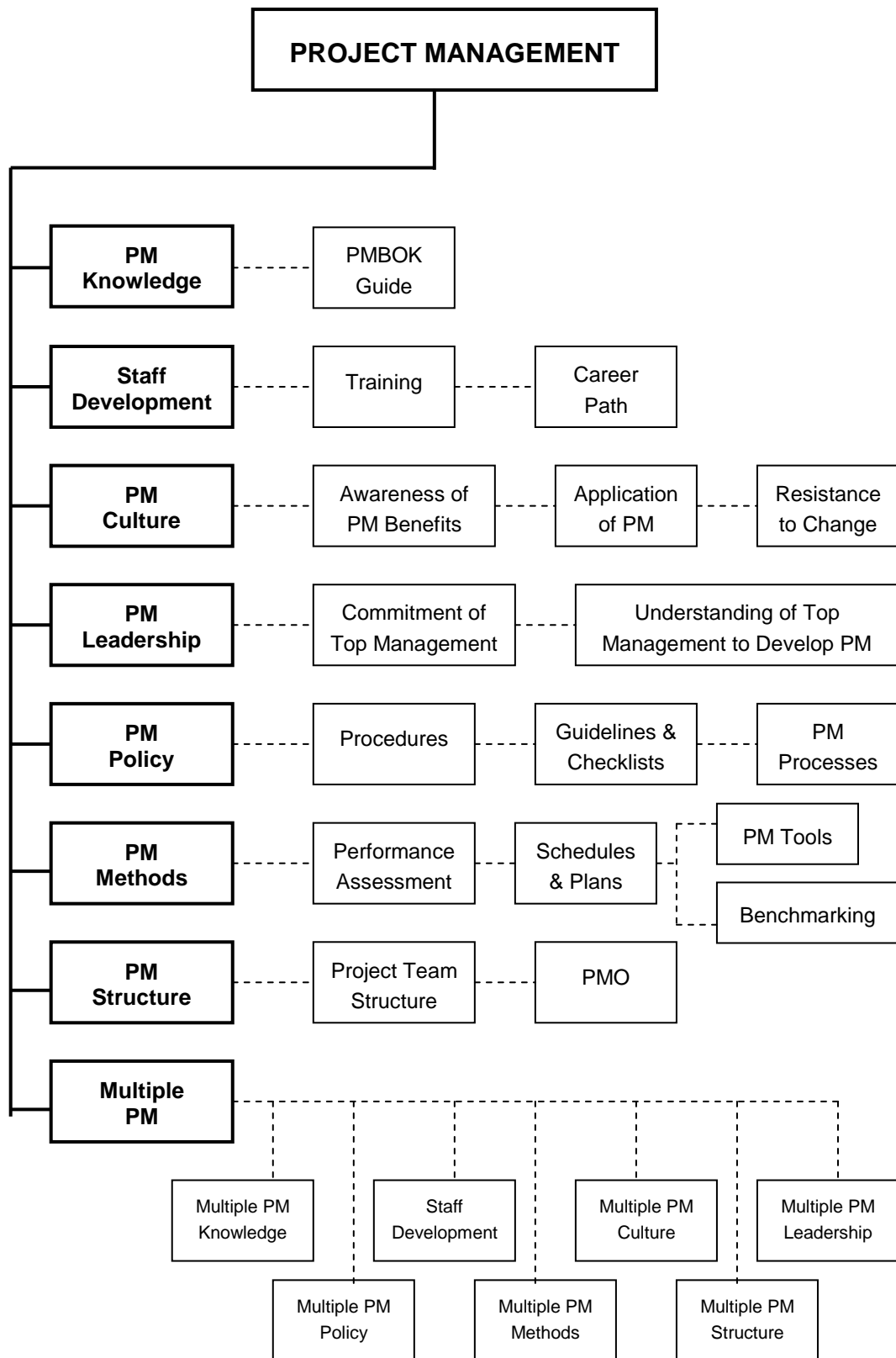


Figure 26 – Main components and sub-components of project management discipline.

Main components		LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
GENERAL	Name of level	Denial	Naïve	Informal	Basic	Comprehensive	Excellence
	Summary Definition	The use of PM is seen as useless and a waste of resources and is therefore discouraged. Top management is not aware of and not interested in knowing the benefits of PM.	PM is used by experienced and competent personnel. Top management is not aware of the benefits, but neither encourages nor discourages the use of PM.	PM benefits awareness is in preliminary phase. Use of PM is informally encouraged by top management. Despite lack of PM procedures, certain guidelines could exist. Limited PM training.	Formal PM is introduced in the organizations and basic process exists. However, there exists an inconsistency in applying PM to all projects. Top management is ready to commit to PM development, although limited.	PM is consistently applied to all projects. PM process and procedures are fully defined and integrated with other organizational processes. Training offered to all PM related staff.	PM organization adopts a continuous improvement approach. PM process are continuously reviewed and updated. Benchmarking and other improvement tools are introduced.
MAIN METRICS	PM Knowledge	→ No knowledge of what the PMBOK Guide represents.	→ Minimum idea of the PMBOK Guide concept but no knowledge of its contents.	→ Little knowledge of contents of PMBOK Guide (0%-25%).	→ Moderate Knowledge of PMBOK Guide contents (25%-50%).	→ Excellent knowledge of Contents of PMBOK Guide (50%-75%).	→ Full knowledge of PMBOK Guide contents (75%-100%). → Good knowledge of how to develop PM methods and processes.
	Staff Development	→ PM training is not approved nor encouraged. → PM skills are seen as not related to job requirements.	→ PM training is not offered. → PM knowledge is usually transferred from more knowledgeable & competent staff to the rest of the project team.	→ PM training is limited to project managers who are managing high value and/or complex projects. → No career path in PM.	→ Basic PM training is offered to all project managers. → Unclear career path in PM.	→ Basic PM training is offered to all project related staff. → Basic PM training is part of the procedures. → Additional PM training (including Masters in PM), seminars, conferences ...etc. is regularly offered to project managers. → A clear and fully visible career path in PM which is reflected in employees' positional title and job description.	→ PM certification (e.g. PMP) is a pre-requisite for all project managers. → Regular assessments of staff PM competences could take place. → PM training consultants could be hired to review how further developments could take place.
	PM Culture	→ The use of PM is seen as useless and a waste of resources and is therefore discouraged. → Organization is not aware of the benefits of PM. → Reservations on surrendering power and authority could lead to denial of the benefits of PM.	→ The organization is not aware of the benefits of PM. → Application of PM is not discouraged and is left entirely to the choice of the project manager.	→ PM benefits awareness is in preliminary phase. → Use of PM is informally encouraged. → PM formalisation is avoided due to fear that introducing change would disturb the balance of the organisation and/or not yield the desired impacts/results. → PM usually not used in critical projects.	→ Project managers are aware of the benefits of PM. → Use of PM is formally encouraged. → PM related staffs are willing to change the working methods and adapt to the introduction of PM. → Use of PM is inconsistent and is limited to highly visible projects.	→ All PM related personnel are fully aware of the benefits of PM. → The use of PM is mandatory for all projects. → Consistent application of PM on all projects is visible.	→ Awareness of PM benefits is extended to the entire organization, including the operational and supportive divisions. → Regular PM benefits awareness seminars are made available to all employees. → PM could occasionally be used for major maintenance programs.
	PM Leadership	→ Top management is not aware of PM benefits nor is it interested in committing its time on understanding those benefits.	→ Top management is not aware of the benefits of using PM. → The use of PM is not disallowed provided that it does not disturb the execution of the project.	→ Top management does have a preliminary understanding of PM benefits. → Top management is not ready to commit to developing PM benefits until further proof of PM benefits is presented. → Top management could support individual efforts of utilizing PM to manage projects.	→ Top management is aware of the benefits of PM and encourages its application. → Top management is committed to developing PM although it could lack knowledge on how to develop PM.	→ Top management is fully supportive of the use of PM. → Top management encourages and monitors the application of PM to ensure consistency. → Top management has a good understanding of what is required to develop PM. → The commitment of developing PM could be limited in cases where significant investment is required.	→ Top management supports any initiative to improve PM, even if it includes significant costs. → Top management have a full understanding of what is required to improve PM and encourages the exploration of new methodologies to manage projects effectively and efficiently.
	PM Policy	→ No PM related procedures exist.	→ No PM related procedures exist. → Limited number of guidelines and checklists could exist between members of the project team.	→ Very basic and <i>Ad-hoc</i> processes and procedures could exist. → Application of PM is mainly reliant on guideline, checklist and project manager's knowledge and experience. → PM life cycle is not defined in the procedures.	→ Most of PM processes and procedures are defined. → PM processes and procedures are the same for all projects. → Certain limitations and overlapping is evident. → PM life cycle is defined in the procedures.	→ PM processes are fully defined to the smallest details and are in line with organisational strategies. → PM procedure update adopts a reactive approach (i.e. whenever an overlapping, clash or any other problem is noted).	→ PM processes are not only fully defined, but also integrated with other organisational processes (i.e. TQM, ISO ...etc.). → A proactive approach is adopted in updating the processes.

	<i>PM Methods</i>	<ul style="list-style-type: none"> → No PM tools and/or methods are being used. 	<ul style="list-style-type: none"> → Use of PM tools and methods is dependant on the project manager. → No schedules or plans are used to manage projects. → No project performance evaluation usually takes place. 	<ul style="list-style-type: none"> → Limited number of PM tools might be available (e.g. MS Projects ...etc.). → Use of those tools, schedules and plans is entirely optional. → Informal assessment of project performance might take place. 	<ul style="list-style-type: none"> → Additional PM tools are available (i.e. WBS, PERT ...etc.). → Use of PM tools is inconsistent. → Most of the schedules and plans produced are "frames" that are not updated and are produced to meet the requirements only. → Project performance assessments are done at the end of the project for record keeping purposes and are not used to develop and update PM processes and methods. → Project performance assessments are conducted in a qualitative manner. 	<ul style="list-style-type: none"> → Advanced PM tools are available (e.g. EVA ...etc.). → Use of PM tools is consistent throughout the projects and on all projects. → Schedules and plans are continuously updated to reflect actual project status. → Project performance assessments are done for all projects in a quantitative way and the information obtained is used to update/upgrade the PM processes and methods. → Lessons learned are captured from each project and distributed to concerned PM related personnel. 	<ul style="list-style-type: none"> → Organisation continuously upgrades its PM methods and processes and uses the latest state-of-art tools. → Benchmarking activity is regularly conducted to ensure competitive advantage is maintained.
	<i>PM Structure</i>	<ul style="list-style-type: none"> → No PM structure exists. 	<ul style="list-style-type: none"> → No PM structure exists. → Project mainly solely managed by individuals, with limited or no assistance / co-operation from other functional departments. 	<ul style="list-style-type: none"> → No PM structure exists, although co-operation between functional departments could exist. 	<ul style="list-style-type: none"> → Weak-matrix project organisation could exist. → For large projects, temporary project organisation could be formed. 	<ul style="list-style-type: none"> → A visible strong-matrix project organization or a stand-alone PM department/division could exist in the organisation. 	<ul style="list-style-type: none"> → An established Project Management Office (PMO) exists in the organization which continuously looks at the existing PM processes and methods and attempts to improve them.
	<i>Multiple PM</i>	<ul style="list-style-type: none"> → The existence of multiple PM is denied and not accepted. → Organisation not aware of the existence of multiple PM knowledge. → Multiple PM skills are seen as not related to job requirements. → Multiple PM procedures are seen as not required. → No multiple PM tools and/or methods are being used. 	<ul style="list-style-type: none"> → Not able to differentiate between PM knowledge and multiple PM knowledge. → No knowledge of multiple PM. → Multiple PM training is not approved. → Organisation not aware of multiple PM benefits. → No multiple PM related procedures exists, although certain checklists and guidelines could exist. → Use of multiple PM tools and methods is dependant on the project manager. → No assessment to evaluate of success of multiple PM. 	<ul style="list-style-type: none"> → Able to differentiate between PM and multiple PM knowledge. → Minimum knowledge of multiple PM (0%-25%). → Multiple PM training is offered to a limited number of staff. → Limited awareness to benefits of multiple PM. → Very basic and <i>Ad-hoc</i> processes and procedures on multiple PM could exist. → Application of multiple PM is mainly reliant on guideline, checklist and project manager's knowledge and experience. → Minimum application multiple PM tools might take place. → Informal assessment of success of multiple PM. 	<ul style="list-style-type: none"> → Moderate knowledge of multiple PM (25%-50%). → Basic multiple PM training is offered to all project managers. → Programme / portfolio management is identified as vital to the organizations. → A number of employees are assigned to overlook programme / portfolio management as part of their responsibilities. → Full awareness of benefits of multiple PM among project managers. → No awareness of benefits of multiple PM is among top management. → Most of multiple PM processes and procedures are defined. → Certain limitations and overlapping is evident. → Inconsistent application multiple PM tools. → Formal assessments of success of multiple PM takes place regularly, but are done for record keeping purposes only. → Assessments are conducted in a qualitative manner. 	<ul style="list-style-type: none"> → Excellent knowledge of multiple PM (50%-75%). → More advanced multiple PM training is offered to all project managers. → The role of programme / portfolio manager is identified as a full time job. → Awareness of benefits of multiple PM is extended to all project related staff. → Preliminary awareness of benefits of multiple PM is among top management. → Multiple PM processes are fully defined to the smallest details. → Consistent application multiple PM tools. → Formal assessments of success of multiple PM takes place regularly and are used to update the existing methods and procedures. → Assessments are conducted in a quantitative manner. 	<ul style="list-style-type: none"> → Full knowledge of multiple PM (75%-100%). → Multiple PM training / knowledge is a pre-requisite for all project managers. → The promotion and development of multiple PM is part of the responsibilities of the PMO. → Full awareness of benefits of multiple PM is among top management. → Benchmarking activity is regularly conducted to enhance existing multiple PM processes.

Table 20 – The completed project management maturity model

1.21 DESIGN OF ASSESSMENT TOOL

To measure the project management maturity in an organisation, a questionnaire was designed. A full copy of the designed questionnaire is attached in Appendix A. The questionnaire was quantitative in nature. Certain considerations were made when designing the questionnaire. These include considerations to the simplicity and structure of the questionnaire and types and source of questions.

A) THE QUESTIONNAIRE

As was the case with the design of the model, the questionnaire was designed to give a proper balance between being short and simple and being comprehensive. This was one the most important aspects of the design which ensured that sufficient interest is attracted among the respondents to participate in the survey while ensuring that the collected data is inclusive, beneficiary and reliable.

The developed questionnaire included 59 questions that were distributed across three sections. Section 1 inquired about background information of the respondents and contained four questions. Information sought included the position, experience and qualifications of the respondents. Section 2 aimed at measuring project management maturity of respondents' respective organisations. 51 questions were included in this section and were categorised by the main project management components, as shown in Table 21. This was done to aid respondents' focus on that particular area of project management. It should be noted that the number of questions in each domain did not aim at distinguishing the importance of one domain over another. The number of questions in each category was decided based on ability of measuring all subcomponents with the least possible number of questions. Section 3 included four questions. The main goal was to get

feedback with regard to the length of the questionnaire, to respondents' belief that the results of the survey could be used to improve the performance of the department and whether the organisation's top management would actually take action upon receiving the results. A section was also included to allow for a written feedback.

Category	Number of questions
PM Structure	2
PM Policy	7
PM Methods	9
PM Culture	6
PM Leadership	3
Staff Development	3
PM Knowledge	10
Multiple PM	11
Total	51

Table 21 – Distribution of the 51 project management related questions along the main domains.

B) THE QUESTIONS

Section 1 and 3 of the questionnaire included a combination of multiple choice questions and written answer questions. In addition, in order to ease the response to the questionnaire and obtain consistent and reliable results, multiple choice questions were used for 50 of the 51 questions in Section 2.

The only exception was the question asking the respondents if they were aware of the PMBOK Guide and to describe it (Question 31). 13 questions regarding the knowledge of project management and multiple project management required a correct answer to be selected. 4 questions included multiple answer selection. The remaining 33 questions were mainly based on a 5-point Likert scale, with 27 questions having answers ranging from ‘*Strongly agree*’ to ‘*Strongly disagree*’. The remaining 6 questions were based on the same concept, albeit in a different format.

The scoring scheme for the questionnaire differed from one question to another. Full details of the scoring scheme are shown in Appendix B. Most of the questions were created based on the newly developed project management maturity model. However, certain questions were cited from the literature. Details of the questions being cited are shown in Table 22 below.

Number of question from the developed questionnaire	Reference
4	Bryde, 2003, pp.249, Q.7
33	Kerzner, 2001, pp.54, Q.24
34	Kerzner, 2001, pp.54, Q.26
35	Kerzner, 2001, pp.58, Q.47
36	Kerzner, 2001, pp.59, Q.54
37	Kerzner, 2001, pp.59, Q.53
38	Kerzner, 2001, pp.56, Q.35

39	Kerzner, 2001, pp.56, Q.40
40	Kerzner, 2001, pp.55, Q.28

Table 22 – Questions that were cited from the literature.

1.22 DISTRIBUTION OF QUESTIONNAIRE

In order to meet the interest of each organisation, surveys were conducted differently across the organisations. In case of P1 and P2, an electronic copy of the questionnaire was sent to each organisation. The number of questionnaires to be completed was agreed during a telephone conversation with the organisation representative. It had been agreed that 5 of the 15 project management employees of P1 would be targeted and 20 of the 80 employees in the project management department of P2. On the other hand, group sessions were conducted in S1 during which the questionnaires were completed. Two sessions were conducted in S1. 50% of the total project management related staffs (44) were invited to each session. Following the completion of the questionnaire, a brief illustration of the developed maturity model was given to the employees. Finally, 15 paper copies of the questionnaire were distributed to S2, which target all project personnel.

1.23 PILOT SURVEY

After conducting preliminary discussions with the top management of S1, it has been agreed that a pilot survey would be carried out first among a limited number of employees. The pilot survey was conducted by distributing 5 copies of the questionnaire to the employees. The pilot survey was conducted through a group session. Following the completion of the questionnaire, the group was asked for a feedback. This was done despite the fact that employees had completed Section 3 of the questionnaire, which was specifically aimed to get a feedback. This was done in order to obtain a better feedback in case employees did not feel confident enough in expressing themselves through a written feedback.

CHAPTER 5 – RESULTS

1.24 INTRODUCTION

This chapter summarises the main outcome of the survey. First, the main feedback of the pilot survey was presented and discussed. Following this, the main results of the survey were presented using a number of tables and figures. The results were categorised as response rate, general information (section 1), project management maturity (section 2) and feedback (section 3).

1.25 PILOT SURVEY

After completion of the questionnaires, all five S1 employees gave their feedback, both through Section 3 of the questionnaire and through open discussion involving the whole group. Table 23 below gives a summary of the main comments.

Overall, the respondents were fairly satisfied with the questionnaire. However, the respondents indicated that the questionnaire was slightly long. Moreover, there was a general agreement that some of the questions were difficult, particularly the questions relating to the PMBOK Guide. On the other hand, the respondents expressed their agreement with the general design and contents of the model. In particular, the respondents expressed their approval of having a separate classification for measuring organisation's maturity in multiple project management. In addition, all respondents expressed their agreement of the use of *Spider's*

Web as the most appropriate methods of expressing the organisation's project management maturity.

SUMMARY OF MAIN COMMENTS
<ul style="list-style-type: none">• The questionnaire was long.• The number of questions should be reduced.• The questions, particularly in relation to PM Knowledge, were very difficult.• The presented model was inclusive of all the main project management discipline.• Classification of multiple project management as a separate section was helpful in distinguishing it from the management of individual projects.• Spider's web method of presentation was appropriate as it simplified the visualisation of the main strengths and weaknesses.

Table 23 – Summary of feedback of the pilot survey

After reviewing the respondents' feedback, the questionnaire, the model, and the aim of the research, it has been decided not to alter the questionnaire or the model. The main reason was that any reduction in the number of questions was deemed as having a direct effect on the reliability and accuracy of the data, and therefore the determination of the project management maturity. As for the difficulty of the questionnaire, none of the questions were changed as it was ensured during the initial design the questionnaire that only the simplest questions were included.

As a result of not changing the questionnaire, it has been decided to consider the pilot survey response as part of the overall response of S1 survey.

1.26 RESPONSE RATE

As stated in Chapter 4, the questionnaire was distributed to two public organisations and two semi-government organisations. Table 24 below shows the number of respondents in each the organisations. Figure 27 represents the percentage of the respondents in relation to the entire project management staff in the organisations.

ORGANISATION	TOTAL NO. OF PM EMPLOYEES	TARGET	RECEIVED
P1	20	5	2
P2	80	20	5
S1	44	44	30
S2	15	15	6
Total	159	84	43

Table 24 – Number of respondents targeted within each organisation and response received

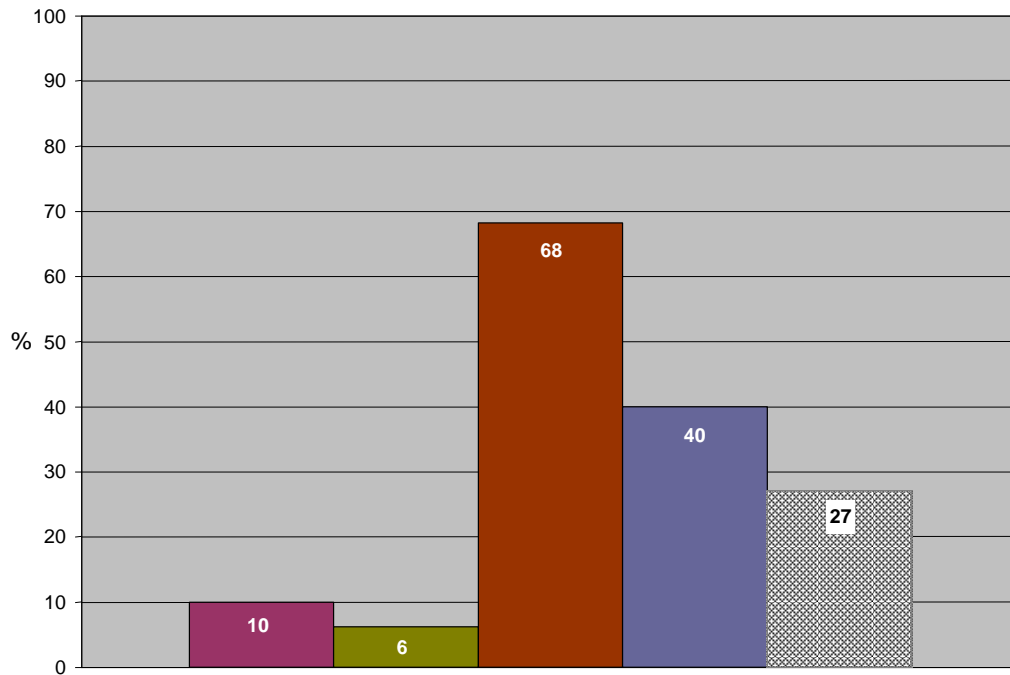


Figure 27¹⁸ – Response Rate in percentage (individual organisations and overall)

As it can be observed from the data above, the overall response rate was 27%. S1 has the highest response of 68% while P2 had the lowest response rate of only 6%.

1.27 GENERAL INFORMATION (SECTION 1)

Section 1 of the survey contained general information about the respondents. Results in relation to employees' position, experience and project management qualification are shown in Table 25, Figure 28 and Table 26 respectively.

¹⁸ The columns, from left to right, indicate the response rate of organisations P1, P2, S1, S2 and overall

POSITION	P1	P2	S1	S2	TOTAL
Senior/Project Manager	2	1	2	3	8
Project Director	0	0	0	0	0
Programme Manager	0	0	1	0	1
Portfolio Manager	0	0	0	0	0
Senior/Field/Project Engineer	0	3	19	2	24
Other	0	1	8	1	10

Table 25 – Position of respondents.

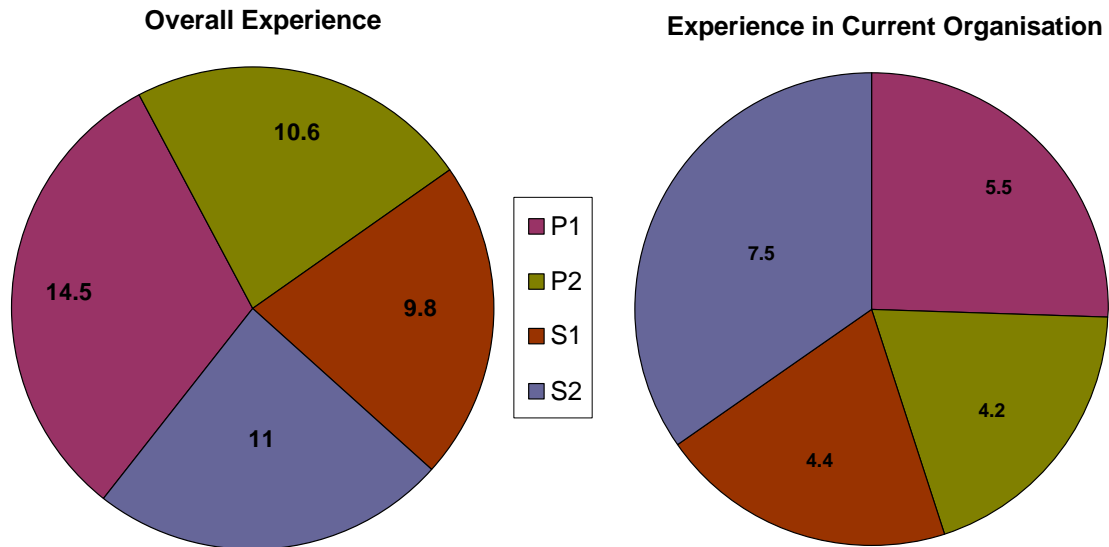


Figure 28 – Respondents' experiences.

QUALIFICATION	P1	P2	S1	S2	TOTAL
Ph.D. in PM	0	0	0	0	0
Master in PM	0	0	2	0	2
Bachelors in PM	0	0	0	0	0
As part of Bachelors/Masters degree	1	3	13	3	20
Short course	2	4	15	4	25
Other	0	1	1	0	2

Table 26 – Respondents' project management qualifications.

As it can be observed from Table 25 above, the majority of the respondents were project/field engineers. Moreover, project managers represented only 18% of the entire respondents. Furthermore, only one programme manager was identified. Respondents who identified themselves as '*Others*' included a design engineers, draughtsmen, a project management related planner/analyst, safety engineers and a senior manager of one of a project management department.

One important point to note at this stage is that due to the organisational culture restrictions in S1, the title '*manager*' is not easily assigned to employees. Thus, project manager has been substituted by project engineer. *Project manager* is only assigned to employees who have proved their capability in managing projects for an extended period of time, at least 8-10 years, and who are assigned with high value projects, typically above AED 50 millions.

Figure 28 illustrate the project management experience in the organisations. In particular, it shows that respondents total project management experience and gives the respondents experience in their existing organisation. As it can be observed, P1 had employees with the highest average project management experience while S2 achieved the highest value in terms of experience in existing organisation.

Employees project management qualifications can be seen in Table 26. Respondents' main source of project management knowledge were either gained by attending short coursers or were part of their Bachelors/Masters degree. None of the respondents had a Ph.D or Bachelors degree in project management while 2 had completed their Masters degree in project management. In addition, 2 employees indicated that they had acquired their project management knowledge through other means; one through obtaining PMP Certification while the other did not identify the method.

1.28 PROJECT MANAGEMENT MATURITY (SECTION 2)

Section 2 of the survey aimed at collecting data required to determine organisation's project management maturity. Table 27 below gives details of the organisations' overall project management maturity and the maturity in individual project management domains. Figure 29 represents those maturities in *Spider's Web* format. Detailed score of each question is shown in Appendix C. The method by which the score of each question was determined is shown in Appendix B. Table 28 gives some of the additional results that were obtained from section 2 of the survey.

DOMAIN	P1	P2	S1	S2	AVERAGE
PM Knowledge Maturity	3.33	1.67	2.22	2.22	2.36
Staff Development Maturity	2.92	3.72	3.30	3.22	3.29
PM Culture Maturity	3.38	2.33	4.09	3.87	3.42
PM Leadership Maturity	2.83	2.27	3.63	3.72	3.11
PM Policy Maturity	3.32	3.43	3.80	3.86	3.60
PM Methods Maturity	2.88	2.85	3.15	3.38	3.06
PM Structure Maturity	2.50	4.00	4.29	4.33	3.78
Multiple PM Maturity	1.29	1.75	2.74	2.54	2.08
OVERALL PM MATURITY	2.80	2.75	3.40	3.41	3.09

Table 27 – Summary of organisation's project management maturity (overall and individual domains)

As it can be observed from Table 27 above, S2 had the highest maturity (3.41) followed closely by S1 (3.40). On the other hand, P2 had the lowest maturity (2.75) followed closely by P1 (2.80). The average project management maturity of all organisations was 3.09. Moreover, the average project management maturity of public organisations was 2.78 while semi-government organisations had a maturity of 3.41.

With regard to project management domains, PM Structure maturity scored the highest average (3.78) while Multiple PM scored the lowest (2.08). Besides multiple PM, only PM Knowledge (2.36) had an average maturity below 3.0. All the remaining domains had an average maturity of 3.0.

In order to easily visualise the strengths and weaknesses of each organisation and compare the organisations to each other, a Spider's Web was developed to present the results, as shown in Figure 29 below.

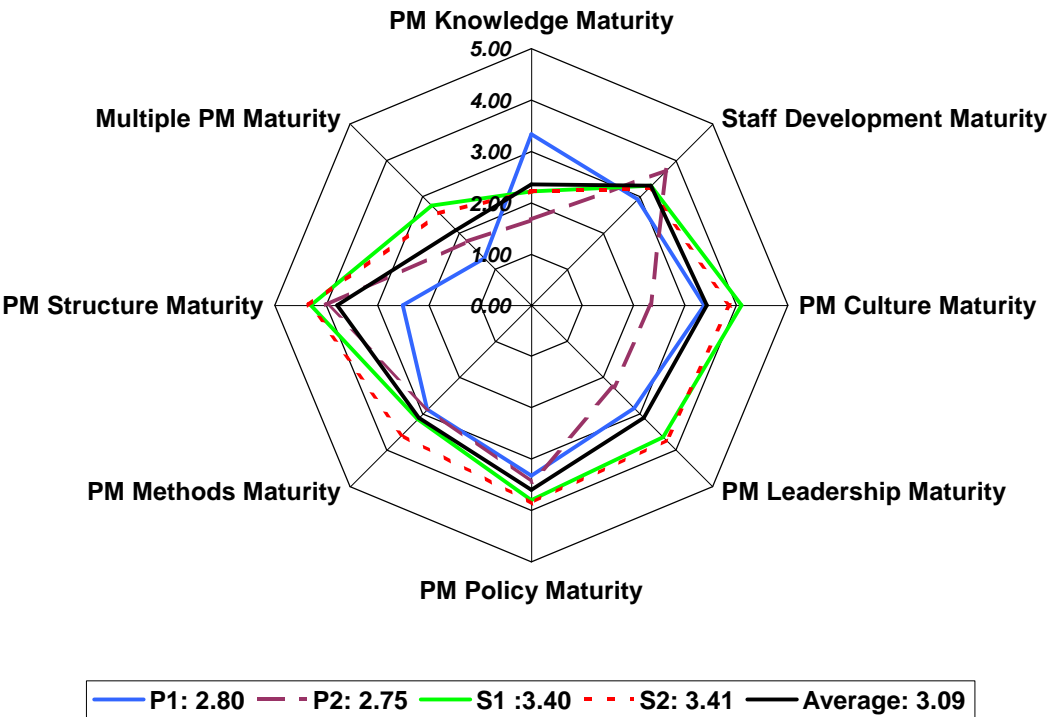


Figure 29 – Spider's Web presentation of organisations' overall project management maturity

Table 28 below gives some additional details that were collected in section 2 of the survey, particularly in terms of respondents' familiarity with the concept of PMBOK guide and organisations' involvement in multiple project management. On average, 35% of the respondents were familiar with the PMBOK guide contents. P1 had the highest average (100%) while P2 had the lowest average (20%). Moreover, all organisations were involved in managing multiple project management.

	P1	P2	S1	S2	AVERAGE
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FAMILIAR WITH PMBOK GUIDE	100%	20%	30%	50%	35%
INVOLVEMENT IN MULTIPLE PROJECT MANAGEMENT	Yes	Yes	Yes	Yes	Yes

Table 28 – Responses in relation to respondents' familiarity with PMBOK Guide and organisations' involvement in multiple project management.

1.29 FEEDBACK (SECTION 3)

The final section of the questionnaire was dedicated to document respondents' feedback. Table 29 below gives the final summary of the outcome. In addition, a written feedback was also requested from respondents. The main comments received are shown in Table 30 below.

Overall, there appears to be a difference in opinion with regard to the length of the survey. Most of the respondents from P1 and S1 stated that the survey length was suitable. On the other hand, P2 and S2 employees believed that the survey was a lengthy one.

	P1	P2	S1	S2
LENGTH OF SURVEY	<i>Suitable</i>	<i>Long</i>	<i>Suitable</i>	<i>Long</i>
BENEFIT OF SURVEY	<i>Agree</i>	<i>Agree</i>	<i>Agree</i>	<i>Agree</i>
MANAGEMENT ACCEPTANCE	<i>Niether Agree nor Disagree</i>	<i>Disagree</i>	<i>Agree</i>	<i>Niether Agree nor Disagree</i>

Table 29 – Summary of feedback (force choice questions)

On average, all respondents agreed that the survey would benefit in improving the project management performance of their respective organisation. However, only S1 believed that the results of the survey would be seriously considered by the top management. P1 and S2 had a

neutral stance with regard to top management's reaction while P2 did not believe that the top management are interested in the results of the survey.

In general, the written feedback of the survey was classified as in Table 30 below. As reflected from Table 29 above, a certain number of respondents believed that the survey was long and difficult. Moreover, many respondents requested for an update of the survey results. It should be noted that all such comments only emerged from respondents employed by S1. Moreover, a limited number respondent, particularly those working for S1 and S2, indicated that the survey should have been conducted electronically. Furthermore, a number of respondents indicated that the survey would be helpful in improving the organisational processes and procedures. In fact, some S1 respondents have even proposed a suggestion to be sent to the senior management recommending them to conduct a multiple project management related course.

SUMMARY OF WRITTEN FEEDBACK
<ul style="list-style-type: none">• The survey was long and should have been shorter.• Many respondents requested to be updated on the results of survey.• Survey was good and should be helpful in improving organizational processes.• Use of electronic surveys.• The survey was difficult.• Recommend Multiple PM courses.

Table 30 – Summary of feedback (written).

CHAPTER 6 – ANALYSIS

1.30 INTRODUCTION

This chapter analyses and discusses the main outcome of the survey. This is done by discussing the individual and overall project management domain maturities. Some of the project management domains, particularly those which are closely linked, were jointly discussed.

1.31 PM LEADERSHIP

Before analysing the results, it would be wise to review some of the main relationships and considerations between leadership maturity and other maturities.

Project management leadership could be considered as the domain which has the most influence on other domains. Since, in most cases, the senior management is the decision maker and the leader of any organisation, it is likely that their vision and opinion are shared among large number of employees. Thus, it is expected that project management leadership maturity, particularly when considering the commitment of the top management, would affect the project management structure, policy, methods and other maturities. For example, if the top management supports project management, it is likely that this would be reflected in the organisation structure and policies. Likewise, if the top management of an organisation is found not to be supportive of project management, then it is likely that project management investment would be strictly limited, even if the overall organisation culture is supportive of project management. This would reflect on the availability of project management tools, methods and training.

However, there are few clarifications to be made in relation to the influences of the leadership maturity. It should be noted that having a high project management leadership maturity does not translate to a high project management maturity. Leadership maturity should be seen as a gate through which other domains can pass and achieve high maturity rating. Moreover, having a certain leadership maturity does not restrict other domains from achieving high maturity scores. Leadership would probably only have significant effects if the organisation's project management leadership maturity was low. Having very low maturity restricts the development of other project management maturities.

Observing Table 27 in Chapter 5, it can be seen that the S1 and S2 achieved higher project management leadership maturity levels than P1 and P2. These results are simple and only indicate that leadership maturity is higher in semi-government organisations than public organisations. However, by analysing the project management leadership results in depth and reviewing the individual questions and their average answers (Appendix A and Appendix C), it can be clearly said that the top managements' commitment to develop project management is significantly higher than their awareness of the benefits of and understanding of project management.

These results can be interpreted in a number of ways. Firstly, there is exists a possibility that the top management shares an exceptional relationship with the middle or lower management. In such cases, the top management would sanction any investment aimed at improving project management provided that the proposal undergoes a reasonable amount of studies and evaluation. Secondly, lack of responsibility could be another reason for the increased commitment. With the availability of increased amounts of funds and the lack of accountability of investment decisions,

the top management of any organisation, in particular public organisations, could become more lenient in approving employees suggestions, with their main aim of achieving higher employee satisfaction and enhancing the image of the organisation. Such decisions could be referred to as having a 'white-elephant' effect.

1.32 PM KNOWLEDGE & STAFF DEVELOPMENT

The results of the survey, in relation to project management knowledge, were unanticipated. Generally, it is expected that the project management knowledge and staff development maturities to correlate and be close. The more staff development takes place, the better the project management knowledge.

However, there appears to be a mismatch in the results. This can be evident when comparing the project management knowledge and staff development maturities. Overall, the staff development had a maturity score of 3.29 whereas the project management knowledge maturity was only 2.36. With the exception of P1, all organisations also achieved a significantly higher score in staff development maturity than project management knowledge maturity. For example, P2's staff development maturity was 3.72 while the project management maturity knowledge was only 1.67.

When analysing the results, a number of reasons were identified that could have affected the results. These include ineffective training, low staff motivation (due to lack of promotion opportunities), lack of experience and problems with the model.

Ineffective training could be one of the reasons for the significant variance between the project management knowledge maturity and staff development maturity. However, ineffective training has a very remote possibility of being the main reason for the mismatch. When considering that the maturity assessment had taken place among four considerably large organisations, it is likely that those organisations would carefully select appropriate and reputed training organizers. Moreover, it is expected that the training is conducted across more than one vendor. Thus, the only possible reason for the training to be ineffective is that if all training vendors that exist in Dubai are deemed as ineffective, which could hardly be considered a possibility given the competitive nature of business in Dubai.

Low employee motivation is another possible cause of the difference between the knowledge level and the available development. However, in case of the surveyed organisations, it is unlikely that this could be qualified as a valid reason for the mismatch. This is based on the fact that all respondents indicated that their respective organisations had a clear career path, as shown in Table 31 below. Having a clear career path generally motivates employees in achieving higher scores. This is also supported by the fact the all three organisations had a relatively higher project management structure maturity.

DOMAIN	QUESTIONS	P1	P2	S1	S2
Staff Development Maturity	29	3.75	4.50	3.69	3.50

Table 31 – Average maturity of Question 29 which deals with project management career path.

Lack of experience could also contribute to the mismatch. However, this could only be effective if the organisations included a proportionally large

number of new employees. When reviewing the respondents experience in their current organisations, it can be seen the S1 has the least average of employee loyalty (i.e. least experience in existing organisation). Moreover, when reviewing the individual responses, it had been found that out of 30 respondents from S1, 10 respondents had spent 3 years or less in their existing organisation.

Finally, model deficiencies could be the reason behind the mismatch. However, due to the fact that the model is being used for the first time and the lack of any historical data from which similar trends can be identified, it is difficult to rule out the deficiencies as a possible reason for the mismatch.

1.33 PM CULTURE

Perhaps the response rate could be considered as the first indication of the organisations' project management culture maturity. One would assume that only if employees had an awareness of the benefits of project management and supported its use would they willingly participate in the completion of the questionnaire. By adopting this and assuming that higher response rate translates into higher culture maturity, it could be forecasted that S1 would have the highest project management culture maturity followed by S2 and P1. P2 would have the lowest. Comparing the survey response rate and the survey results, it appears that this assumption is valid, at least in relation to this study. Table 32 below lists the comparison.

ORGANISATION		P1	P2	S1	S2
RECEIVED AS PERCENTAGE OF	Total	10%	6%	68%	40%
	Target	40%	25%	68%	40%
PM CULTURE MATURITY		3.38	2.33	4.09	3.87

Table 32 – Comparison of survey response rate and project management culture maturity

In general, the project management culture, particularly among project manager and project team, appears to be healthy. Despite the fact that the obligation for the use of project management is not high, project management has been consistently used across the organisations. The project teams are aware of the benefits of using project management to plan and control a project. This theory is based on answers to questions 19 and 20 (Appendix C).

In addition, with the exclusion of P2, there exists an awareness of project management among the operational, administrative and other functional departments in the organisations. However, despite the awareness, none of these departments did utilise any of the project management tools or methods, with S1 being an exception. This, coupled with the leadership maturity, indicates that the awareness and support for the use of project management exists. However, some of the employees are hesitating in utilising the available tools, which if appropriately used, could yield much benefit to the organisations. On the other hand, it should be noted that the lack of awareness of project management benefits in the functional departments of P2 could be referred to the poor project management leadership maturity of P2, as discussed earlier.

Overall, S1 achieved the highest project management culture maturity. Valued at 4.09, many organisations would thrive to have a similar project

management culture. This result was not surprising given the high questionnaire response rate. Besides this, the respondents of the questionnaire ranged from the senior management to the lowest point of the organisational structure. When reviewing the responses, it was found that even the secretary of the project management department did involve in the survey. Another positive point is the fact that many of S1 respondents requested to be updated on the survey results.

1.34 PM POLICY

Project management policy achieved the second highest average maturity between the organisations. Looking at policy maturity levels of the organisations, it can be said that project management policies and procedures have been consistently well defined among all organisations.

By further analysing the results, certain points can be noted. First of all, it appears that the project management policies and procedures are at a basic level in the public organisations. However, despite certain limitations, they are well defined in the semi-government organisations. Nevertheless, it had been noted that the procedures and policies of all organisations cover a wide range of project management area. This suggests that only basic policies are defined for each area. For example, an organisation could have defined the procedures of assigning resources to projects. However, if certain confusion arises with regard to the use of resource across more than one project, a conflict arises.

Another important point to note from the results is the integration of project management with other management paradigms. This could

explain the reason for project management policy having a higher maturity than other domains. For instance, if an organisation has adopted Total Quality Management (TQM), then it is likely project management policies and procedures have been developed and updated as part of TQM's process of developing procedures for all processes of the organisation.

By examining the ties between project management policy and the other dimensions of the project management maturity model, it can be noted the project management knowledge is a particular area of interest. Project management knowledge could have an effect on how well the project management procedures are defined. An organisation would not be able to define a set of procedures if it lacks knowledge of what compromises a discipline, and thus the processes. Nevertheless, it should be noted that having a good project management knowledge base does not mean that an organisation must have a well defined project management policy. It rather is a sign that the organisation is able to define the process should it be interested in doing so, which are likely to be indicated by project management leadership and culture maturities.

1.35 PM METHODS

Project management methods domain could best be described as a representation of the availability and application of project management tools and techniques including, but not limited to, schedules, plans, project performance assessment ...etc.

By reviewing the results of the survey, it can be clearly seen that the availability and use of the variety of project management tools is non-

existent. The main reason for this is unknown. Organisations might be hesitant in investing in new tools. Alternatively, organisations could feel that the provided tools were more than sufficient in managing the projects and that the addition of further tools would not provide any substantial value. The most common tools that appears to be provided to all organisations was Microsoft Projects, project management software.

The use of the available project management tools seems to be consistent. In most cases, project schedules and plans are produced at the start of the project and are continuously updated. Moreover, the schedules and costs are well integrated.

One of the main weaknesses of the project management methods maturity could be the project performance assessment. No project performance assessment usually takes place in a formal manner. When formal project performance assessment takes place in a formal way, it is done in a qualitative manner and is done for record keeping purposes only. This is unhealthy as it introduces a lack of accountability culture among the employees, which in many cases is likely to negatively affect the performances. Therefore, this is one area an organisation should improve in case higher project management maturity levels are desired.

1.36 PM STRUCTURE

With the exception of P1, the all organisations have a distinct project management department which is responsible for executing projects. P1 on the other hand, has a matrix structure which, as claimed by the respondents, can be said to be weak. In addition, the semi-governement

organisations appear to have a dedicated project management office (PMO) which is responsible to update the project management processes and methods.

P1 have achieved an average maturity of 2.50. Moreover, as per the received response, no distinctive project management department exists. Projects are managed through co-operation between various departments. However, the organisation was deemed as having a weak matrix structure. Given the level of project management knowledge maturity achieved by P1, it could be said that the reason for having a weak matrix structure is either lack of leadership support and/or lack of basic project management awareness across the other departments that are participating in the execution of the project. Reviewing the project management leadership maturity and the project management awareness in other departments (question no. 22), it can be said that lack of a sound project management leadership could be the main reason.

In contrast, all other organisations who participated in the survey claimed to have a distinct project management department. This could explain the reason for having a higher project management policy maturity. More often than not, the development of any department in an organisation would generally accompany the development of a set of procedures specifically aimed at defining the associated processes. Moreover, the existence of a PMO should further increase the maturity of not only the project management policy, but also the project management methods and culture.

When analysing the results, it has been noted a general conflict of opinion with regard to the establishment of a PMO in S1. Despite being

deemed as having a PMO, the results of the particular question were close. In fact, 38% of the respondents did not believe that a PMO existed. There are many reasons which could explain this general disagreement. First of all, the PMO could be comprised of part time staff. This means that part of the project management staff, those who manage projects as part of the project management department, are also engaged in updating the project management methods, policies, processes, etc. as an additional responsibility to their main job. Thus, particularly in case of lack of appropriate communication, the visibility of such a PMO could be significantly reduced. Another reason could be the lack of effectiveness and authority of the PMO. If a PMO is seen as not have the necessary powers to initiate and implement new policies or if the PMO is not exerting enough effort to improve the processes, then, by time, its existence would be insignificant and would, therefore, be forgotten.

The availability of distinct project management division in organisations has even more advantages on the development of other project management maturities, besides project management policy and methods. As the case with any other division, such as maintenance or finance, the head of department, or even the manager, are generally concerned with the development of the staff. The same could apply to a project management department. This is supported by the higher staff development maturity levels achieved by P2, S1 and S2.

Furthermore, the availability of a distinct project management department should, generally, also increase the culture maturity levels. It would be logical for any department to be aware of the benefits of and support the use of its processes. It is those processes which gives each department its uniqueness. Consider the case of a quality management department. Without promoting and implementing the main aspects of

quality management, the existence of the department would not be justified. The same applies to project management.

1.37 MULTIPLE PM

The final project management domain is the multiple project management. As it can be clearly observed from Table 27 in Chapter 5, multiple project management attained the lowest average maturity score, as it was earlier assumed during the design of the project management maturity model earlier in chapter 4. There are many reasons which could be attributed to this. However, before discussing the reasons, it would be beneficial to review the position of multiple project management in relation to the general project management and other the maturities.

Multiple project management maturity could perhaps be treated slightly in a different way than the other maturities. Unlike other maturities, multiple project management is not part of project management discipline. It is rather a sub-discipline within the main project management area. Low multiple project management maturity would not directly affect the ability of managing single projects. It could rather be seen as a co-ordination for the management of a number of single projects.

Stating the above, it would be rational to assume that multiple project management maturity would comprise of a number of sub-maturities, as is the case with the main project management model that has been developed as part of this research. Table 33 below lists the questions and a reference of which multiple project management sub-topics does each question deal with. The last column gives the average maturity score.

QUESTION NO.	MULTIPLE PM SUB-TOPIC	MATURITY LEVEL
41	Organisation's involvement in multiple PM	YES
42	Multiple PM knowledge	1.88
43		
44		
45		
46	Multiple PM staff development	2.64
47	Multiple PM culture (awareness of benefits)	2.88
48	Multiple PM leadership	1.64
49	Multiple PM policy	0.99
50	Multiple PM culture (multiple PM performance assessment)	2.03
51	Multiple PM methods	2.49

Table 33 – Maturity scores for the multiple project management sub-topics

As it can be clearly noted, multiple project management methods, policy and culture maturities have, relatively, scored higher scores. However, following random discussions with various respondents and top management, it has been noted that certain misunderstanding took place. The main reason for this misunderstanding was respondents' inability to distinguish between project management knowledge and multiple project management knowledge, as clearly indicated by multiple project management knowledge maturity. The lack of multiple project management knowledge can be clearly reflected by reviewing the multiple project management maturities in relation to policy and leadership.

Looking at the results, one could argue that the above reasoning is invalid. The main support for this argument would be that the leadership

and policy maturities have achieved lower scores. However, this argument should not be considered as valid. The main conflict arises in multiple project management culture, methods and staff development maturities. Given respondents' lack of multiple project management knowledge, it is highly possible that the respondents' believed that the tools, training and processes of project management and multiple project management are the same. On the other hand, the respondents could have perceived the lack of appearance of the term *multiple project management* in the policies and top management communication as an indication lack of multiple project management, which reflected in lower, but realistic, maturities scores.

1.38 OVERALL PM MATURITY

As it has been discussed earlier, the maturities of different project management domains do affect each other. This could best be visualised by comparing the maturity model with a piece of sponge. It can not be expected that only one half of the sponge would be wet. The water would eventually travel from the wet areas to the dry ones. The same applies to project management.

The average project management maturity achieved by the organisation was 3.09. Moreover, public organisations have achieved an average maturity level of 2.78 whereas semi-government organisation achieved 3.40, as clearly seen in Table 34 below.

P1	2.80	Public Organisations	2.78
P2	2.75		
S1	3.40	Semi-government Organisations	3.40
S2	3.39		

Table 34 – Comparison between project management maturities of public organisations and semi-government organisations.

Overall, the results of the maturity assessment should be considered as encouraging. As described earlier in Chapter 2, previous studies on project management maturity in other public organisations yielded in a low maturity scores. Nevertheless, one should be extremely careful when comparing the results. The previous studies were based on a totally different maturity model and comparing the results would be inappropriate. For example, as described earlier, some of the maturity models are extensively based on the PMBOK Guide knowledge. Thus, by adopting such an approach in case of the organisations involved in this study, the overall project management of the organisations would have been 2.36 rather than 3.09.

One of the main questions to be asked is whether the existing maturity should be increased and to what extent should it be increased. Perhaps the best method to reply to the question is to consider what value does any improvement offers. This does not suggest that the improvement would not add any benefit. It rather recommends considering whether the proposed improvements are worth the investment and disturbances, which is generally associated with any change. Additional information on how the added value could best be considered can be found in chapter 7.

1.39 LIMITATIONS

Despite researcher's best efforts, this research, as the case with many other researches, is associated with certain limitations. First, the research utilised the forced choice survey in its questionnaire. As the respondents are not allowed to express their own opinion, it is likely that the selected answers only represent respondents' closest point of view. Thus, certain inaccuracy is attached to the results.

The second limitation is also the related to data collection. In an ideal world, where sufficient amounts of time and resources are available, the maturity assessment should have been conducted in a different method. For example, although the use of a questionnaire would be suitable to measure the project management knowledge, culture and leadership maturities, an additional number of questions would be required. Moreover, in case of project management policy maturity, for example, a review of the organisation's procedures and policies would have reinforced the reliability and accuracy of the assessment.

The third limitation is the size of the selected sample. In reality, not only would the inclusion of an increased number of respondents from the selected public organisation enhance the reliability and integrity of the results, but also the involvement of additional public organisations. The participation of a small number of populations, particularly in case of P1, introduces uncertainty in results. This is not to declare the results as irrelevant, but to state the necessity of further maturity assessment prior to carrying out any costly improvement.

The novelty of the developed project management maturity model is another limitation. As the model is being used for the first time, it is difficult

to judge the correlation of different project management domains' maturities. This does not suggest that the model can not be relied on. As per the initial results, the model seems to be well constructed. However, as more reliable and accurate data is being collected, it would be safer to do so.

The final limitation is associated with the aim of the study. Due to lack of even the minimum information on the status of project management in Dubai, it is difficult to carry out any comparisons of the results. As mentioned earlier, comparing the results of this research to previous works would be inappropriate.

When analysing the limitations above, it could be concluded that one of the main reasons for the limitations was the time constraint. Should an extended period of time be available, perhaps some of the limitations could have been avoided, or at least minimised.

CHAPTER 7 – RECOMMENDATION & **CONCLUSION**

1.40 IMPROVING PM MATURITY

The average project management maturity achieved by the public sector organisations did not indicate that projects were being run poorly. However, the results were neither impressive. There remains room for improvement, particularly when the semi-government organisations have achieved a higher and more acceptable result.

As mentioned earlier in chapter 2, an organisation's main aim for investing in project management must not simply be to increase the maturity scores. The main aim of improving project management and increasing maturity shall always be to add a value. It is always recommended that an organisation carefully considers its existing capability and requirements when endeavoring in a project management investment program.

However, as described in chapters 4 and 6, an organisation is strongly recommended to conduct an in-depth survey and analysis in order to get a full and accurate picture of its project management. The thorough survey ought to include collection of additional information. In addition, it shall also include techniques of verifying the results. This does not suggest that the preliminary results are to be ignored. In fact, the initial results are vital in that they aid the researcher, or consultant, in identifying the main dimensions of the project management maturities, which were earlier represented in spider's web diagram, and accordingly develop and adjust the advanced survey.

One of the main points that should be noted when developing an in-depth survey is the generalisation of the model. In order to generalise the model, and thus be able to reduce the time and cost involved in

developing project management, it is urged that future research shall mainly aim at developing a standard format of the comprehensive survey. This could be done in two ways, as seen when reviewing the earlier models in chapter 2. The first is through developing an extensively long survey which covers all aspects of the project management maturity domains, as was the case with SEI's CMM. Alternatively, in order to minimise the timescale involved in obtaining the accurate results, future studies could focus on developing a detailed survey for each maturity level, as was the case with Kerzner's PMMM. In this case, the preliminary results of this study, or any other study involving other organisations, could be used as an indication for the existing maturity level.

The above indicates a definite set of developments of the maturity assessment tools. This does not suggest that the existing tools are made obsolete. As mentioned previously in the literature review, it is typical for a maturity model, whose aim is the development of any type of maturity, to develop its purpose from being descriptive, as the case of this research, to being a prescriptive, as being recommended above.

When developing and conducting a comprehensive survey, there is one extremely important aspect to consider if any improvement program is to go beyond the initial funding. Like any other investment, organisations expect to gain an acceptable return on investment, i.e. ROI. If organisations are to justify any additional project management investments, the gained benefits would have to be visualised.

1.41 THE ROLE OF ORGANISATION

It is most likely that a dedicated researcher, or a nominated consultant, would have a strong influence on the course and outcome of the agenda of any project management development. Nevertheless, the concerned organisations, the stakeholder, are always advised to participate in the process and carefully review any recommendations prior to making the decisions.

As mentioned above, one of the most important tasks of any stakeholder is to ensure that the proposed project management improvement carries an acceptable value. What works for one organisation might not work for another.

Another issue that needs to be considered by the client is the anticipated disturbances. As the case with any other change activity, improvements on the existing project management practices are associated with a change. This change could be in the project management policies, methods, structure ...etc. It is the responsibility of the organisation to ensure that the impacts of any change remains minimum and does not adversely affect the main objectives and goals of the company.

Another important issue to consider, perhaps jointly with the researcher or consultant, is the effects of the maturity of other management paradigms on project management maturity. For example, it could prove to be more beneficial to improve certain aspects of organisation's TQM program in order to improve the exiting project management maturity and maximise the effectiveness and efficiency of the available tools, methods and policies.

1.42 RELIABILITY OF THE RESULTS

As stated in chapter 6, the reliability of results needs to be ensured when conducting a survey. Increasing the reliability of the data should not only increase the accuracy of the results, but also minimises the possibilities of any potential failure of the project management maturity enhancement program.

There are a number of ways by which the reliability of the results can be improved. First of all, it is recommended that a high percentage of project management staff participate in the survey. The more data collected, the better the accuracy. One way of improving the response rate is by involving the senior management in the survey. Not only would this aid in verifying the results of the survey, but also in transmitting a message to the employees in relation to the importance of the survey. Another way of increasing the number of respondents is by communicating the importance of the survey and its result.

The second method to increase the reliability of the results is by verification of the results. This could be done in a number of ways. Holding meetings and interviews with some of the key personnel would aid in confirming the results and interpreting them. In addition, increasing the number of questions, particularly when conducting a comprehensive assessment, should increase the accuracy. However, the questionnaire shall not be too long so that it deflects interest away. A good balance should be found. Conducting review of some of the available tools and the project management policies could further validate the results.

1.43 CONCLUSION

The relationship between economic growth and infrastructure development is complex. Despite the general agreement positive effects that growth and infrastructure have on each other, researchers have had mixed results with regard to the direction of causality between them. Moreover, there also appears to be a disagreement with regard to the extent of infrastructure benefits on education, health, poverty and income inequality.

Local governments play an important role with regard to the impacts of economic growth and infrastructure development. In general, the responsibilities of the government, in relation to economic growth and infrastructure, can be classified into two main roles. On one side of the scale, government could simple act as a services provider. On the other side of the scale, the government is development oriented. In either case, local governments are involved, to some extent, in infrastructure projects.

Local governments ought to evaluate its project management capability. One way of doing this is through maturity models. Maturity models identify organisation's project management strengths and weaknesses. Many project management maturity models have been developed and are in use by different organisations.

The aim of this research was to assess the project management maturity of public infrastructure organisations in Dubai. The importance of this study is supported by two facts. Firstly, due to undergoing major economic 'boom' during the past few years, the infrastructure departments are under pressure to upgrade the city's services in a relatively short period of time. This necessitates that infrastructure projects are executed quickly and

efficiently, which requires sound project management skills. Secondly, there exist no studies with relation to the status of project management in Dubai.

Findings of this project indicate that projects by the local governments of Dubai are not run efficiently. However, results do not indicate the projects are run in a chaotic manner. They rather indicate that project management should be improved if local authorities are to ensure consistency in project execution. It should be also noted that semi-government organisations have achieved a better maturity than public organisations.

Finally, it is recommended that future studies should focus on:

- Proving the integrity and reliability of the model and its assessment tool by measuring project management maturity, using the same model and questionnaire, across a broader range of organisations coming from different regions.
- Improving the reliability of the results by ensure an acceptable number of responses are received.
- Developing an assessment tool to comprehensively measure the maturities in organisations that have already undergone the initial survey and express a genuine interest in improving project management.

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