

How to Enhance the Efficiency of Business Units?
Exploring the Relationship between Organizational Structure,
IT Governance and Project Portfolio Management Efficiency

كيفية تعزيز كفاءة الشركات و وحدات الأعمال ؟
استكشاف العلاقة بين الهيكل التنظيمي، حكم تكنولوجيا المعلومات وكفاءة إدارة
محافظ المشاريع

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Title

How to Enhance the Efficiency of Business Units? Exploring the Relationship between Organizational Structure, IT Governance and Project Portfolio Management Efficiency

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Abstract

The purpose of this study is to investigate the factors that make project portfolios more efficient. This study takes on the business units that operate in the private sector and considers them as project portfolios due to the number of external revenue generating projects which run under them. The research investigates portfolios/ business units that belong to the engineering and consultancy industry only; however, this does not deny the possibility to generalize the results of this research to other similar industries.

The literature review concludes that the effectiveness of a project portfolio in the private sector consists of: the average projects success in that portfolio, economic success of the portfolio, client satisfaction, the ability to prepare for the future and the ability to balance priorities among the projects that constitute the portfolio.

The research results concludes that it is the degree of the authority that is given to the project manager towards his team members' status and personal matter that have the most of the influence on making an efficient business unit. The degree of involvement of a steering committee had shown a significant positive correlation with the efficiency of business units as well followed with the technical responsibility of the project manager.

On the other hand, the relationship of the IT governance has been investigated and the research did not find any statistical proof for its correlation with the effectiveness of the portfolio/ business unit, and if any, it was only negatively correlated with the "*preparing for the future*" part of the portfolio management.

KEY WORDS: Project Portfolio Effectiveness, Project Success, Project Manager Authority, Economic Success

ملخص البحث

الغرض من هذه الدراسة هو التحقق من العوامل التي تجعل حافظات المشاريع أكثر كفاءة وفعالية. هذه الدراسة تتمحور حول وحدات الأعمال, كالمكاتب و الشركات و أفرع الشركات, التي تعمل في القطاع الخاص, و تتعامل معها كأنها حافظات المشاريع لتلك الشركات و ذلك نظرا لعدد المشروعات التي تتولاها. جرت الدراسة لوحدات الأعمال التي تنتمي للمجالات الهندسية والاستشارات فقط, ولكن هذا لا ينفي إمكانية تعميم نتائج هذا البحث إلى المجالات الأخرى المماثلة طبعا".

البحث يخلص إلى أن فعالية محفظة المشاريع في القطاع الخاص تتألف من: نجاح المشاريع في في تلك المحفظة او وحدة العمل، النجاح الاقتصادي للمحفظة، رضا العملاء، القدرة على الاستعداد للمستقبل والقدرة على تحقيق التوازن بين أولويات المشاريع التي تشكل محفظة.

نتائج البحث تخلص إلى أن السلطة التي تعطى لمدير المشروع هي التي لديها أكثر تأثير ايجابي على صنع وحدة عمل فعالة. و يأتي في المرتبة الثانية درجة تدخل لجنة توجيهية بالمشاريع الجاري العمل بها متبوعة بالمسؤولية الفنية لمدير المشروع.

من ناحية أخرى، فقد تم التحقق في العلاقة بين حكم تكنولوجيا المعلومات و لم يجد البحث أي دليل إحصائي عن علاقته مع فعالية وحدة الأعمال، و في حال إذا وجدت، اعطت تأثير سلبي فقط على الاستعداد للمستقبل.

Abbreviations

BUD: Business Unit Director

CEO: Chief Executive Officer

COPS: Complex and high value Product System

CSF: Critical Success Factor

EA: Enterprise Architecture

EFQM: European Foundation for Quality Management excellence model

ERP: Enterprise Resource Planning

GDP: Gross Domestic Product

IS: Information system

IT: Information Technology

KPI: Key Performance Indicator

NPV: Net Present Value

PI: Power Index

PM: Project Manager

PPM: Project Portfolio Management

ROA: Return On Assets

ROE: Return On Equity

ROI: Return On Investment

R&D: Research and Development

SBU: Strategic Business Unit

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Chapter 1 Introduction

1.1 Background

Project portfolios

The effective management of organizations calls for an effective management of its constituent building blocks. Organization's building blocks are the projects that those organizations manage (Grundy 2000). These projects could either be external to the organization, in such a case they are considered as revenue generating, or internal with the purpose of fixing the organization's internal processes leading to better working efficiency (Artto & Dietrich 2007) - or a combination of both.

This research focuses on the layer that comes between both the levels of projects and the managing organization - i.e. portfolio management. This layer in between takes care of implementing the organizational strategy through its projects, it gathers the different organizational projects on its plate and in most cases there are several of such plates in an organization. All the projects on one plate have certain strategic criteria that get them inside a plate of certain strategic direction, and hence assist in forming the project landscape of the organization.

Business Units

In this research, the plate represents a business unit; a business unit is a constituent part of the organization which holds part/ or all portfolio of its projects. A business unit has been defined by the Business Dictionary (2012) as the "logical element or segment of [the organization] - such as accounting, production, marketing - representing a specific business function, and a definite place on the organizational chart, under the domain of a manager... [a]lso called department, division, or a functional area" (Business Dictionary 2012).

A Strategic Business Unit SBU, on the other hand, has been defined by Johnson et al (2008) as a "part of an organization for which there is a distinct external market for goods or services that is different from another SBU". Therefore, an effective management of a

business unit's portfolio of projects provides better business outcomes at the level of the organization as a whole.

Drawing from the above definitions of business units, it could be implied that the effective management of business units (project portfolios as is the case of this research), could not be achieved by the sole management of its constituent projects, or even by maintaining a high and efficient project management level for the management of external projects of the business unit or the organization. Plenty of other considerations should be taken care of and accounted for along with good project management off course. Those considerations cover longer term project success and wider benefits realization and management techniques. Considerations such as market and economic success, balancing priorities, inviting the right project into the plate, and many other factors - with more details provided in Chapter 2 - should be considered when analyzing portfolios to understand their measures of effectiveness.

Project management

Previous research focused on projects and projects' success, but very little research took the wider perspective and measured the efficiency of the portfolio infrastructure where the project is being managed from, such infrastructure is being taken care of by the business unit on behalf of the organizations. Researchers, in their bid to scrutinize project management and discover what could influence its success, studied and examined many organizational factors and tried to correlate those factors to the success criteria of projects. Plenty of those researchers focused on the type and structure of the organization itself to determine those factors affecting the success of projects; they broke down the structure and linked its different forms and attributes to the success factors of those projects. This is similar to what Gray et al (1990), Gobeli & Larson (1985) and Lechler & Dvir (2010) and many others did; a true relationship between the different organizational structures and their influence on the success of projects has been found and therefore established.

On the other hand, other researchers, such as Besner & Hobbs (2006, 2008), studied the effects those project management practices as adopted within organizations have on the success of projects. They researched the tools and techniques as used in different management contexts, and different stages of projects, and concluded which of those tools are the most effective and thus could lead into improving the project management practices and enhance the chances of those projects being successful. Other researchers linked project success to the procurement practices and the successful selection of procurement strategies within the organization (Morledge et al 2006).

The list of similar research types goes on and is considered a never ending exercise that strives towards improving project management practices and enhancing project success worldwide. Such proliferation of research implies the importance of project success within organizations, especially the projectized ones, and the role it plays to achieve their strategies and their planned growth. However, in order to truly achieve the growth and prosperity for those projectized organizations, the sole management and consideration of standalone projects may not be the answer. Managing sole projects without looking around and taking into account the other managed projects within the organization, their linkage to strategy, their requirements for resources and priorities, may not lead to the overall success of the organization and the portfolio of its projects and hence its growth. A project, therefore, should be managed as a part of the portfolio and the organization as a whole; the portfolio should be managed in a collective process to enhance the success of all projects within the portfolio and hence the organization. The success of the portfolio in such a case substantiates the growth of the organization and strengthens its strategic position.

Projects failures Versus Portfolios failure

Taking the above argument further; it is understood that a single project failure has a negative effect on the business, this negative effect may be assessed by some financial losses or part loss of the business reputation - the extent of such losses depends on the failed project characteristics. On the other hand, a single portfolio failure may load the

organization with huge burdens; those burdens could represent huge sums of investments or a complete wipeout of reputation. A portfolio could represent a business unit as discussed above, or a mere collection of strategic and key projects within the organization. Organizations, in some portfolio failure cases, could decide to pump out the affected portfolio or the business unit rather than looking at what contextual factors could have caused this portfolio or business unit to fail or be non-efficient.

An inefficient portfolio failure is represented by not achieving the portfolio objectives. The objectives of the portfolio should be aligned with the strategies of the organization, and those are achieved by effectively managing and realizing the portfolio benefits, as will be discussed in Section 2.3. Benefits of different portfolios can vary as the strategies of the mother organization and its mission vary. In the case of this research, and as will be discussed in Chapter 3, this research studies private portfolios represented by business units. In such a case, the benefits that should be realized by the portfolio are more or less limited to business units' economic success, profits and growth, and the contribution those units have towards growing the organization. Inefficiency of those business units in this case example is represented by not achieving the planned profits, growth and market and hence non realization of benefits.

On other case example, a portfolio with projects that do not match the strategy of the organization drains the organization's time and resources. Those resources could well be utilized in another profitable and strategy matching organizational efforts which could achieve the set organizational strategy and its intentions. A business unit, with a similar case of such wasted organizational time, could well miss market opportunities when not enough time is allocated to take care of market needs for the sake of matching them with the capabilities of the organization. Hence, market share dwindles for those organizations, volume of the business and number of projects within the portfolio as well. All this lead to inefficient business units and low portfolio management effectiveness.

Research limitations

It should be noted that neither this research study, nor the above mentioned examples about portfolio efficiencies apply to the public sector project portfolios. When considering a public sector portfolio, other factors for measuring efficiency should be considered. Other than economic or market share measures, factors such as meeting the public needs should be considered, which are not covered in this research. Examples of public portfolios are represented by governmental projects that take care of public interests; profits or market share may not fully apply in this case.

This research studies the factors that could be used to measure private sector portfolio efficiency. And similar to Gray et al (1990), Gobeli & Larson (1985) and Lechler & Dvir (2010) research, it studies the different organizational factors and structural forms and links it to the portfolio effectiveness measures. This research takes a further step and scrutinizes the effect of IT and its governance on the portfolio efficiency. It uses data from real private portfolios represented by business units, and hence its results could be well used by similar private organizations and their business units to enhance the management of their project portfolios.

1.2 Aim of the Research

This research aims to study the efficiency of project portfolio management within the private sector. The project portfolio within the private sector is examined very closely in order to determine what factors influence it and how important are they for the organization. Organizational understanding for the concept of portfolio and portfolio efficiency is researched; following the research, common measures of success factors for portfolios within the private sector is determined and utilized across this research to test its proposed hypotheses.

The research further intends to examine those factors that help in improving the efficiency of portfolio management. Those factors, as determined by this research, could be used for organizational improvement to enhance achieving their set strategy. Those factors, which this research intends to study, are organizational related factors and the research breaks them into two categories. First one concerns the organizational structural attributes that projectized organizations commonly are aware of. Those attributes are tested in this research against best portfolio practices for the purpose of determining which of those attributes leads to the most effective portfolio management. Second one, as will be discussed in Section 2.11 of this research, is the IT governance structure and its effect on enhancing portfolio management effectiveness.

The research answers the question of how to improve project portfolio management within the private sector by calibrating and better directing some of the known organizational factors - i.e. the organizational structural attributes and the governance structure. Those factors give the organization its identity, and it is by their calibration and direction the portfolio management can be improved. The research intends to provide the methodology to be used for better calibrating those organizational factors. The best set of calibration has been determined in this research by testing various portfolios/ business units, their effectiveness, their affecting organizational structure and IT governance structure and performance.

1.3 Objectives

This research covers plenty objectives, apart from those objectives, there are benefits as well. Those objectives and benefits come with a list of limitations which are discussed briefly here and in details in Chapter 5.

This research intends to cover the following list of objectives:

- To understand what is a project portfolio, and where those forms of portfolios are found - e.g. business units - and how they are being dealt with in the practical business life;
- To understand the intention behind the term *Portfolio Management effectiveness* and be able to take this understanding to better enhance portfolios in the real life;
- To understand what constitutes a project portfolio and how portfolios are linked to the organizational strategy;
- To understand the different organizational structural forms as used in projectized organizations;
- To understand and define the organizational governance structure, focusing on the IT one, and how it affects the management of its portfolios;
- To investigate the effects of the different organizational structural forms and attributes in combination with the IT governance on the portfolio effectiveness and business efficiency and hence be able to measure the overall success of the organization.

This research intends to benefit private organizations that deal with projects as means to generate their revenue (i.e. external projects that are sponsored by external clients). This research takes the consultancy type of business, especially the IT and the engineering ones, into account and studies the efficiency of their constituent business units being their project portfolios as previously defined. The benefits of this research are limited to understanding the best combination of the organizational structural forms and attributes represented by the responsibilities and authorities as assigned to project managers, technical leaders and top management, along with the IT governance performance, and thus be able to find the best combination of those for better improved business units.

Chapter 2 **Literature Review**

2.1 Introduction

This chapter provides findings from previous research materials on subjects that are related to the focus of this study. It starts with Section 2.2 by defining the Project Portfolio Management PPM and exploring its different approaches as researched by various scholars. It then justifies the purpose of such type of management in Section 2.3 when it explains the process of benefits management and benefits realization.

Section 2.4 defines project success and differentiates it from project management success. Section 2.5 follows lead and describes what is intended by the concept of portfolio management effectiveness and how it could be measured; this Section highlights the existence of a relationship between the portfolio efficiency and the success of the business, which leads us to Section 2.6 and the discussion about business assessment tools and models such as the balanced scorecards and the EFQM models.

Section 2.7 then takes a different path when it starts exploring the types of organizational structures. Section 2.8 goes into more depth into the matrix structure, and analyze it fully using a unidimensional approach. Section 2.9 offers another approach after finding some serious weaknesses in the unidimensional approach offering a multidimensional one. Section 2.10 takes on those structures and finds a correlation between them and the project success criteria as discussed in Section 2.4.

Section 2.11 lays the initial grounds to a new concept and a governance structure called the IT governance, it provides measures for its performance and links it to the portfolio effectiveness later in Section 2.12 along with the organizational structures discussed in Section 2.9. Section 2.12 lays the path to the conceptual framework and discusses the proposed set of hypotheses of this research.

2.2 Project Portfolio Management

A project portfolio is an assortment of projects, the projects within this assortment should be managed collectively to achieve the benefits of the portfolio and realize the overall strategy of the organization. This assortment does not necessarily have to contain projects of similar type, size or duration; but it is the strategic direction and objective of each one of those projects that gets it inside the portfolio, and keeps it inside. The project portfolio manager studies all the projects within the company's portfolios of which he/she is responsible for when deciding which of those should be given priority or which of them should be either removed or added to the portfolio (Lycett et al 2004). However, in reality, a specific title labeled as *portfolio manager* may not necessarily exist in all organizations; this title and the associated responsibilities may be assumed by the business director, the senior manager, the operation manager or the Business Unit Director BUD.

Organizations strive to have a suitable balance amongst those projects constituting their portfolios; such balance is derived from the organization's strategy and its desire to have the best distribution of its different needs; such as marketing, technological and investment needs (Archer & Ghasemzadeh 2007; Wheelwright & Clark 1992; Cooper et al 2000). The difficulty in maintaining this balance emanates from the wide range of possible project combinations that an organization can select from while having various durations and resources acting as perpetual constraints. Portfolio management, therefore, can be seen as a mean to help organizations maintain a suitable balance among project portfolio resources, it also contributes to an improved risk and financial analysis among the projects within the portfolio and hence within the organization. It ensures accountability during the selection process of projects when filtering them down to the portfolio level and provides a suitable governance scheme amongst all those projects (Reyck et al 2005). Reyck et al (2005, p.525) research reveals that better portfolio project management is developed around standardized processes that facilitate optimization via proper software tools. Their research also presented a "strong correlation between ... increasing adoption of PPM processes and a reduction in project related problems...and [increase in] project performance".

An effective and efficient portfolio management is carried out by carefully applying some carefully designed set of processes to manage those projects constituting the portfolio with the intention to achieve the overall growth and success of the organization (Levine 2005). Dye & Pennypacker (1999) defined portfolio management as the “art and science of applying a set of knowledge, skills, tools and techniques to a collection of projects in order to meet or exceed the needs and expectations of an organization’s investment strategy”. Jeffery & Leliveld (2003) proposed a high level process and framework that consists of: portfolio definition, portfolio management and the periodic review for those projects within the portfolio to better optimize and balance the portfolio. Such process should ensure to at least some level that projects are aligned to strategy.

Several pre-conditions should exist in organizations that are aspiring to achieve an effective portfolio management; such as having a good business strategy set in place to conduct and direct its long term vision, (Reyck et al 2005; Lycett et al 2004) - plenty of portfolio failure examples were found in the literature and were mostly attributed to poor strategic management (Matheson & Matheson 1998). The involvement of business leaders is another important pre-condition as those leaders can stream out and organize the utilization of resources within the portfolio and the organization as a whole (Kendall & Rollins 2003). Another pre-condition is the team skills in managing, analyzing and designing portfolios; their IT skills combined with their financial and strategic skills is very important when designing business cases, evaluating studies and selecting projects (Jeffery & Leliveld 2003).

Some of the key elements for an effective project portfolio management has been researched by Reyck et al (2005) and summarized as follows: (1) having a centralized view of the portfolio, (2) having good financial analysis tools, (3) having good risk analysis tools, (4) having good project prioritization and selection tools, (5) having tools for managing constraints, such as human resources, capabilities, infrastructure and budget, and (7) the existence of a specialized software, however, the need of such software has been found to be a controversial issue amongst various literature.

Datz (2003) describes the benefits of having a good portfolio management system in place by creating a “meaningful value for the business”. He further adds that a sound

portfolio management helps in maximizing investment values and regulates risks. He claims that it improves communication and organizes resources by having them allocated more efficiently to projects. On the other hand, the lack of it could result in too much of uncontrolled active projects, projects may not have values and yet are still running, no strategic alignment may be found between projects and hence an unbalanced portfolio may come into existence (McGrath & Macmillan 2000). Payne (1995) adds to that the lack of control and coordination between projects, conflicting objectives, un-met deadlines, and most importantly lack of benefit realization and general resistance to change. As a result, all this may lead to financial losses, reputation losses, customer dissatisfaction and plenty of other negative outcomes.

2.3 Benefits Management and Realization

The ultimate purpose of having projects, programs and portfolios in the business is to benefit the organization with the outcome of such endeavors. Benefits may be confused with project deliverables as thus may be poorly managed by practitioners. Thiry (2007, p.124) notes that it is a common “mistake to consider project deliverables as measures of benefits... it is the impact of the deliverables on the organization, not the deliverable itself, that constitutes the benefit”. In order to properly manage the benefits of such endeavors, those benefits should be identified at the early start and at the strategy formulation of the endeavor being it a project, program or a portfolio. This identification should be followed by a set of prioritization and quantification processes in order to understand the value pertaining to those benefits and thus be able to deliver them (Ward & Murray 1997). Bradley (2010) recommends the creation of a benefit profile which contains all the benefits that should be realized from undertaking the endeavor.

Another definition for the benefits management, which has been developed in a form of a model by Ward & Daniel (2006) upon studying the benefits realization for IS/IT projects, states that it is “the process of organizing and managing such that the potential benefits arising from the use of IS/IT are actually realized”. They illustrate that benefits management is related to other processes and methodologies within the organization, such as project management methodology, systems development methodology, change management methodology, risk management methods and techniques, and investment appraisal processes. And similar to Ward & Murray (1997), they have developed a model for benefits management and realization, this model constitutes an iterative process as to simulate the real implementation of benefit management.

Ward & Daniel (2006) benefit management model, Figure 2-1, firstly consists of benefits identification, which as per Thiry (2007) is related to strategy formulation of the portfolio under study. The identification of those benefits helps in creating a common knowledge of the purpose and the outcome of the investment (Ward et al 2007). The second stage of the process is planning to implement those identified benefits; such planning should take a wider look on the availability and capability of resources. Thirdly, this implementation

goes to execution, and this stage is mostly concerned with putting those organizational capabilities into action - i.e. project execution (Gibson 2003). The last two stages, which are normally known processes, are evaluation and review processes during execution, where noting of lessons learned could take place during such a stage along with the final stage of studying and considering any potential for including future benefits. Ward et al (2007) claimed that only few organizations implement those processes in full to ensure that projects and portfolios are being managed successfully and the actual benefits are being realized as planned.

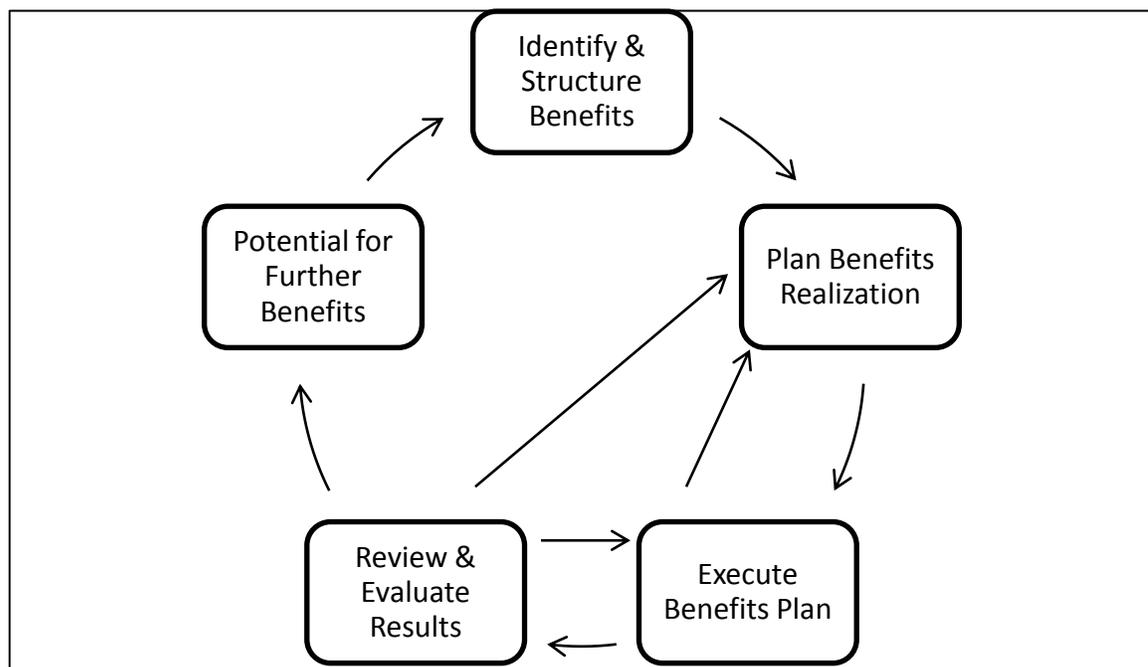


Figure 2-1: Benefits realization model, Ward & Daniel (2006)

Moreover, benefits management could be used as a tool for prioritizing those projects within the portfolio when resources are deemed insufficient to execute the entire projects of the portfolio, or the organization (Levine 2005). Projects could be prioritized based on their Return On Investment ROI values, strategic alignment, benefits prioritization and plenty of other factors which one of the most important is the probability and the ability of managing and delivering successful projects. This brings us to the next subject, which is managing single projects successfully to realize their benefits.

2.4 Project Management Success

The common indicator of project success is the successful realization of the triple constraints of cost, scope and time, or what Gardiner & Stewart (2000) call the “golden triangle”. This common contention has been identified by Davies (2002) & De Wit (1988) as the *project management success* due to its relation to short term and traditional success measures only. *Project management success* is applicable to any kind of a project and it does not look into the success of the business. *Project success*, on the other hand, measures wider and sensitive factors which are related to the overall objectives of the project and its effect on the business, its continuity, growth and prosperity. Munns & Bjeirmi (1996) related *project success* to long term success factors of the business, and the *project management success* to the short term ones - such as the efficiency of the process of managing a project (Davies 2002).

Davies (2002) made a clear distinction between both the *project success* and the *project management success* deeming the *project success* as the most difficult amongst both:

Delivering project success is necessarily more difficult than delivering project management success, because it inevitably involves “second order control” (both goals and methods liable to change) whereas the latter involves only first order control (hold goals constant, and change practices to meet predetermined goals). Davies (2002, p. 187).

Drawing from the above contention, Davies (2002) researched those practices related to *project success* and *project management success*. As for the *project management success*, he recognized those practices which are related to risk management and risk management control processes as necessary to achieve schedule efficiency. And having a mature scope control mechanism and proper baseline measurement tools were identified by him as necessary to have the top hand on the cost efficiency for projects. On the other hand, researchers such as Gardiner & Stewart (2000) advised the usage of financial measures such as NPV and ROI as a measure for the long term *project success*.

The *project success* practices are more difficult to implement than those of the *project management success* practices as they include the ever changing interests of project

stakeholders, and what do they expect out of the project as an end result benefit. It is as discussed in the relevant literature of *benefits management and realization* in Section 2.3; the project deliverables are not project benefits. Deliverables act as mere catalysts to process the awaited benefits. The success of this process enhances the success of projects and the success of its long term investments for the company. Such process is not controlled by the project manager alone or the project management team; it includes the combined efforts of those who operate the organization along with the project sponsor and the customer or end user - and hence is a complex process. Refer to Figure 2-2 for a diagrammatic explanation of the benefits realizations process as discussed by Davies (2002).

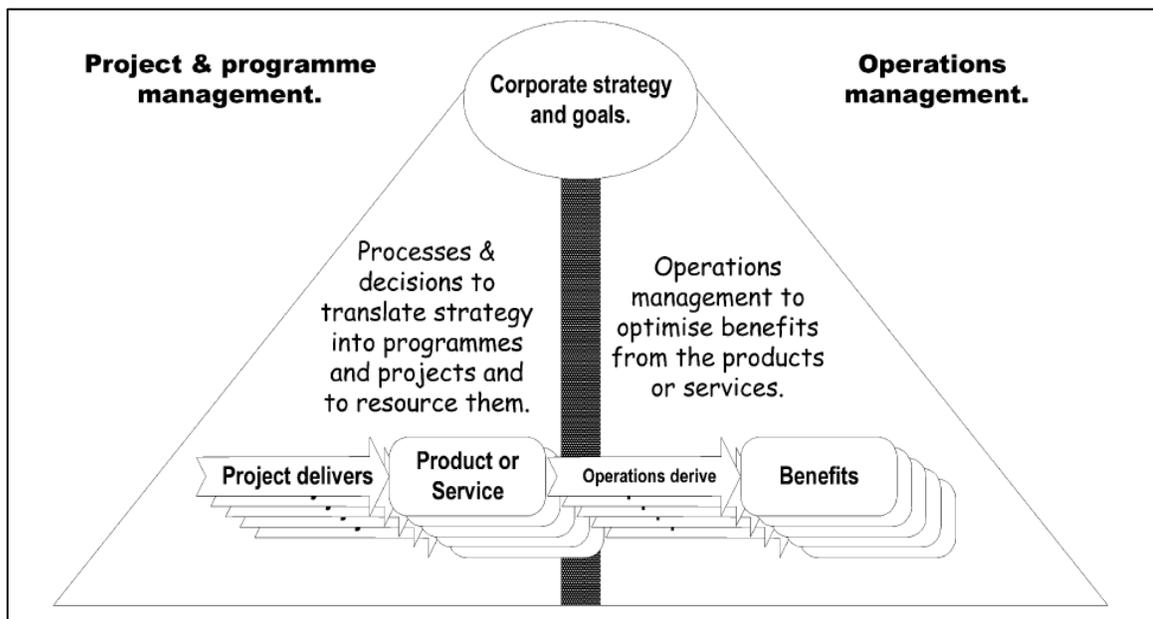


Figure 2-2: Benefits delivery process, Davies (2002, p. 187)

Another level of a “real project success” as identified by Davies (2002) and Munns & Bjeirmi (1996) is the continuous success of projects within the organization, or what Davies calls “doing the project right time after time”. Davies identified that such success is achieved by designing and integrating the project management processes along with benefits realization processes within the context of the organization. Such processes, when designed and integrated, should be susceptible to change and continuous improvement along with the ongoing project performance measurements that should take place as a normal monitoring and checkup process in successful organizations.

2.5 Portfolio Management Effectiveness

Since the importance of project portfolio management is growing; the significance of managing a single project - without looking at the long term portfolio benefits - has been declining, and started to seem less meaningful (Muller et al 2008; Sanchez & Robert 2010). Various researchers such as Munns & Bjeirmi (1996) and Cooke-Davis (2004) came up with the concept of managing a single project while aspiring to achieve the longer term benefits and growth of the organization - i.e. long term project success. This new concept complemented on the older and more widely known approach of short term project success. And unlike the short term success, which relies on time, cost and scope, long term project success factors consider achieving the overall business strategy (Artto et al 2007).

Similar to the portfolio management success factors, long term project success factors are related to the overall success of the business and the organization, nonetheless they are not the same. Apart from the project manager who takes care of project success, the executives within the organization play an important role supporting the success of the portfolio as a whole. They sit on top of the portfolio structure to support and manage the organizational investments (Yelin 2005) although they do not necessarily have to act as portfolio managers.

The effectiveness and success of a portfolio is exceptionally important as it reflects the investments the organization is pursuing; it represents the strategic intention of the organization and measures its direction and progression towards growth (Project Management Institute 2008). In order to measure the effectiveness of a portfolio against a set of key performance indicators, one should start by analyzing the mission and vision statement of that organization (Sanchez & Robert 2010).

However, researchers such as Haponava & Al Jibouri (2009) used financial measures along with the single project short term success factors - i.e. cost, schedule, time and quality - to measure the effectiveness of the portfolio. However, those measures did not seem to provide a proper indicator for the effectiveness of project portfolios which organizations are pursuing. The ultimate purpose therefore - rather than considering the

financial measures of few projects within the portfolio - should be to measure the strategic alignment of the portfolio as a whole while fulfilling the expectations of key stakeholders, (Artto & Dietrich 2007).

Muller et al's (2008, p.34) research identified three indicators that can measure the portfolio management performance and effectiveness; those are (1) achieving results, (2) achieving purpose and (3) balancing priorities. Those could be measured within an organization as depicted in Table 2-1.

Table 2-1: Portfolio Management Performance and Effectiveness Indicators

Indicator	How to measure it
Achieving results	Customer satisfaction, financial results, scope, time, cost, quality and user requirements
Achieving purpose	Achieving the project and/or the program purpose
Balancing priorities	Resource retention, timely accomplishments and stakeholder satisfaction

As claimed by Muller et al (2008), the above discussed indicators indicate effectiveness when there are proper control mechanisms set in place. Such mechanisms could be built into the organization as a bid to ensure good project portfolio selection process, sound reporting and consistent decision making processes. Those mechanisms can therefore enhance the effectiveness of the portfolio as measured by the above indicators. However, this relation may not always be true; it may be affected by the governance type the organization is exercising, the geography and the industry. The IT governance and organizational structure could also change the type of such relationship.

Martinsuo & Lehtonen (2007) linked the portfolio success with the average success of projects within the organization, the success of those projects - as discussed in the literature - are measured against long term and short term success factors. However, Martinsuo & Lehtonen research revealed that single project management success is not sufficient to measure the project portfolio effectiveness; hence, they rejected a full hypothesized link between both. This was also supported by Dietrich & Lehtonen (2005)

when they claimed that project evaluation is usually carried out separately on fully isolated projects and does not consider the portfolio level.

Cooper et al (2002) devised four dimensions for measuring and defining portfolio success. They linked the first dimension - similar to Martinsuo & Lehtonen (2007) - with the average success of those projects constituting the portfolio by being able to successfully meet budget, time, quality and scope. Those single project success criteria are complemented by the invariable customer satisfaction (Shenhar et al 2001; Pinto & Prescott 1988). The second dimension is the ability to successfully combine technical and market interactions within the portfolio. By having the ability to tune those into the portfolio along with the amalgamation of knowledge and successful resource organization, portfolio success could be improved.

The third dimension for measuring portfolio success lays in the organization's ability to have strategic alignment for all its projects and the projects within portfolios. This dimension has been emphasized by Coulon et al (2009) as well. The fourth dimension is to have the ability to balance the portfolio efforts; such as balancing the utilization of resources, or the risk taken through those projects.

Meskendahl (2010) proved that there is a link between business success and portfolio success, and explicated in his research measures/ dimensions for business success which could as well be used to define the success of portfolio. The first two dimensions are similar to the findings of other researchers being: (1) average projects success within the portfolio and its effect on the business, and (2) customer satisfaction. He adds to that (3) the economic success of the business, and (4) the ability to look ahead as a bid to prepare for the future.

The *economic success* could be broken down into market success and commercial success, (Shenhar et al 2001). Market success is more related to the project's product success (Killen et al 2008), and it refers to the achievement of the market objectives by those products or projects under study, and thus creating a unique market share. Commercial success refers to financial measures such as ROI or NPV (Gardiner 2000).

Preparing for future, as defined in Shenhar et al (2001), it refers to the long term success factors for the business, and the projects as described by Cooke-Davis (2004). It refers to the ability to create future opportunities from the work that has been carried out. Moreover, it is the ability to complement this work with the acquired knowledge that has been developed during the course of executing projects.

Referring to the benefits that should be realized by the portfolio - as discussed in Section 2.3 - it can be observed that the above mentioned researchers missed indicators for measuring the benefits when realized. However, and as explained in the scope of this study, the aim of this research is to study those organizations with projects that are considered external to the organization; such as managing projects on behalf of their clients for a fee. Any organization managing such type of projects would benefit from the deliverables of those projects by ensuring their economic success and their ongoing growth. Such indicators have already been covered in Shenhar et al (2001) and in this research. This research does not consider projects which are internal to organizations, such as R&D and IT projects, for if it would, then other set of benefit realization indicators and project portfolio effectiveness measure should be accounted for. Therefore, the results of this research could not be used to improve or build on the portfolio efficiency for the internal portfolios.

2.6 Performance Assessment Models for Business Success

Those previously discussed business success factors are insufficient measurements for an overall success evaluation of a business that is striving for better performance. There is a wide range of measurements used to evaluate, review, control, monitor and enhance business performance and improve its operations and processes (Ghalayini & Noble 1996). Since Meskendahl (2010) highlighted the link between portfolio success and business success; measurements discussed in this Section could be used as well for portfolio management success evaluation.

Kaplan & Norton (1996) suggested the model of Balanced Scorecards and used it as an assessment model to measure the maturity and the success of organizations. Wongrassamee et al (2003) compared the pros and cons of this model with those of the EFQM excellence model. Both models could be used as a measurement and evaluation tool for business success and portfolio effectiveness. The use of Balanced Scorecards as a measurement tool to measure portfolio effectiveness has been also supported by Meskendahl (2010) claiming that those evaluation measures as suggested in his literature missed the measurement of business maturity.

The Balanced Scorecards are used as a means to communicate the strategy and the vision and the mission of the company. Since each company has its own strategy, a developed Balanced Scorecard varies between companies and evaluates different required set of measures (Kaplan & Norton 1993). The scorecard framework includes various set of measures covering financial and non-financial measures. It covers financial, customers, business processes and learning and growth measures. Those measures are comparable with Meskendahl (2010) business and portfolio success indicators, with the exception of the evaluation of business processes that are not that easy to measure.

The EFQM Excellence model - Figure 2-3 - on the other hand provides a framework which is non-prescriptive. It reflects nine criteria denoting best management practices (Porter et al 1998). Five of those nine criteria are called the *enablers* and they represent those processes within the company that supports business results. Those five *enablers* represent the leadership style, approach to people management, policy and strategy,

dealing with resources and processes. The remaining four business results measure the criteria of excellence - which could be used to measure business success, hence portfolio success - and they are: (1) customer satisfaction; how the company targets and fulfills their customer base, (2) people and employee's satisfaction, (3) impact on society, and (4) business results; which deals with satisfying business shareholders.

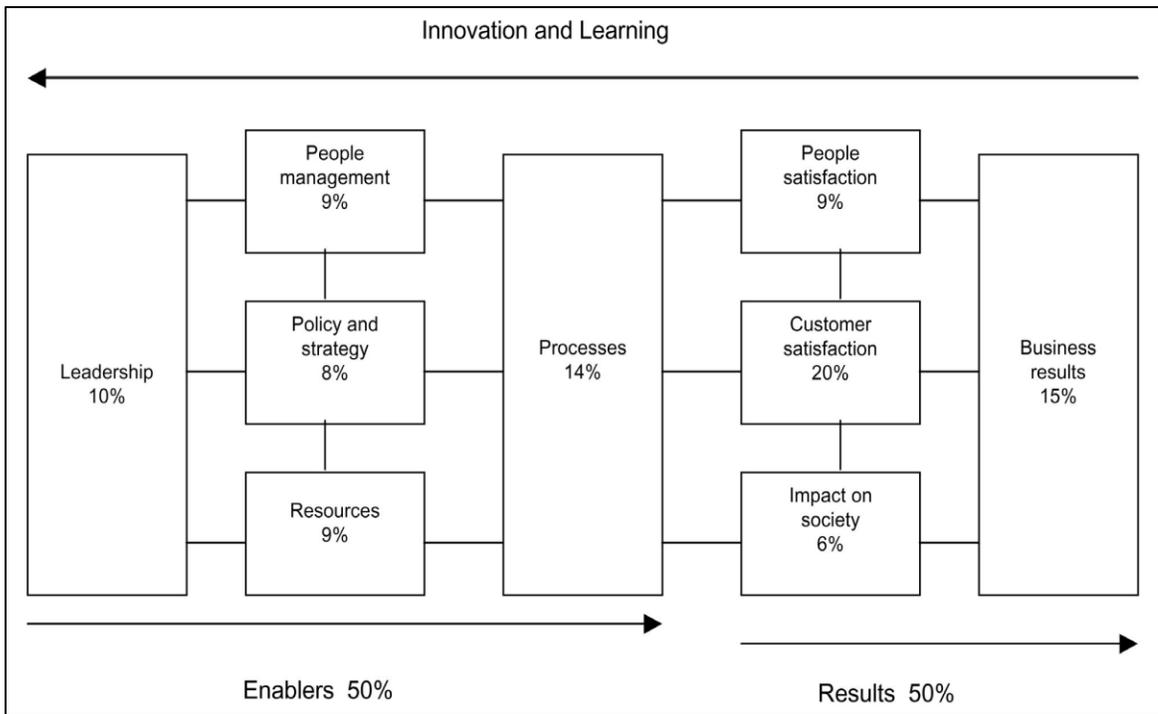


Figure 2-3: EFQM Excellence Model, Wongrassamee et al (2003)

Comparing the literature of portfolio and business success that has been developed by Meskendahl (2010), Muller et al (2008), Shenhar et al (2001), Cooper et al (2002) and many others, and the measures as mentioned in the Scorecard and the EFQM models; the resemblance of those measures that were researched and developed by those scholars can be noted. Such resemblance denotes the importance, hence the confidence of using such indicators to measure the success of portfolios. However, and due to the complexity of using these business assessment models, the methodology as discussed in Chapter 3 proposes the usage of those indicators as mentioned in Section 2.5 only.

2.7 Organizational Structure: Bureaucratic Versus Organic

Banner & Gagne (1995) linked the organizational structure with factors such as size, strategy, technology, environment and power. They claimed that such links are usually set in place as a bid to improve the effectiveness of the organization and the success of its projects. For example, an organization with hundreds of employees following an unsuitable organizational structure - such as a flat structure - may not be able to fulfill its strategy. Such organization should be structured with plenty of sufficient managerial levels (Robbins & Judge 2001) with which proper governance structure should be tuned in in order to ensure its effectiveness.

The *strategy* of an organization sets its long term growth and business vision; it determines those unique activities the business is trying to sell directly or indirectly along with their strategic way of protecting the business from imitators and straddlers (Porter 1996). The strategy therefore shapes the organizational structure that is required to achieve it. This argument can as well be noted in Mintzberg (1990, p.179) when he stated that “structure must follow strategy”. Since projects and portfolios are a product of the strategy, and the strategy shapes the structure; Thiry & Deguire (2007) explained that there exists a dichotomy among the strategic direction of organizations, their structure and their project delivery model represented by those projects and portfolios. They claimed that this dichotomy could create a negative effect that could minimize the organizational effectiveness and hence the business and portfolio success.

The *environment* in which an organization is operating has a tremendous effect on its structure; an organic structure for example is mostly suitable when trying to achieve a better organizational effectiveness within a dynamic business environment that is rapidly changing and that requires complex technological projects in which such a case decentralization is a blessing (Banner & Gagne 1995). On the other hand, a structure of bureaucracy is mostly suitable for static and stable environments where less critical projects are carried out (Bouraad 2010), and that breeds a culture of centralization. This structure is as well suitable for the implementation of routine, predictable and less complex technology.

Complex *technologies* require the ongoing interaction between technical staff, functional managers and project managers. Decisions should be taken on a timely basis during the course of the work, and thus, a bureaucratic structure may hinder the progression of the work and hence could obstruct the implementation of the organizational strategy (Banner & Gagne 1995). A more suitable organizational structure in this case would be the organic which allows less managerial level and more cross functional management.

The *power* that is vested in those who manage the organization can determine its organizational structure. Thiry & Deguire (2007) discussed the strategic dichotomy that can occur between the organization's strategy, project model and structure, and its effect on losing effectiveness. This can be noticed in this type of structuring, and it can happen especially when those with power do not have the enough experience to assign the suitable form of structure while neglecting the organizational strategy and project management model. Moreover, Mckenna (2006) claims that Hofstede Power Index PI could as well play a turn in determining the structure of the organization; for example within those countries with exceptionally high PI, Mckenna predicts that the dominant organizational structure would be one of a bureaucratic, whereas a low PI is more likely to qualify for an organic one.

2.8 Organizational Structure: Matrix Versus Functional

Drawing from the literature about organic and bureaucratic (mechanistic) organizational structures, it can be deduced that a bureaucratic organizational structure with too much of centralized decision making processes will not be effective in a dynamic environment. An environment that has too much of projects and portfolios running to keep up with the rapidly changing technology is classified as dynamic. An organic structure with decentralized decision making processes provides more flexibility to those organizations embedded in such environments (Banner & Gagne 1995), and hence, such structures can improve the efficiency of projects and portfolios running within those organizations.

The matrix organizational structure, similar to the organic, represents a dynamic interaction between the functional staff and the project managers within the organization, and is considered as a good simulation to the dynamic environment where the organization is operating. The extent of this interaction and the degree of the authority that is given to either the project manager or the functional manager shapes the matrix structure. Larson & Gobeli (1987, 1989) defined three distinctive matrix structures with which the authority of the project manager and the functional manager vary respectively: (1) the functional structure, there is more authority given to the functional manager in this type of structure, and as a result, the project manager would be acting as a mere coordinator for the project, (2) the matrix structure, where both the managers share an approximately equivalent authority, they should work in collaboration during the course of a project in order to ensure its success, and (3) the project (or product) structure, where most of the authority is vested in the project manager - in this form the functional managers and technical staff work within their technical shell awaiting instructions from the project manager.

Hobday (2000) stretched the relationship between the project manager and the functional manager authority and added three more (matrix based) organizational forms. By keeping the two extremes of the above discussed continuum, he redefined the in-between structural form as follows: (1) functional, here the organization is purely functional with no existence of project managers, (2) functional matrix, this one is similar to Larson & Gobeli's definition of a functional structure where the project manager has a weak

existence with some slight coordination authority only, (3) balanced matrix, where both authorities for the functional and the project manager are equal, (4) project matrix, this gives slightly more authority to the project manager than that of the balanced one, (5) project-led organization, this one is similar to Larson & Gobelli's definition of the project form, and (6) project based organization, which Hobday (2000, p.878) describes by the nonexistence of "formal functional coordination across project lines; the entire organization is dedicated to one or more [Complex and high value Product System COPS] projects and business processes are coordinated within the projects".

The above descriptions of the matrix structural forms follow a unidimensional approach for defining the structure, Lechler & Dvir (2010), which is evident by the sole usage of the dimension *authority* to determine the structural form the organization has. However, in reality, this approach may not be accurate as it could provide some equivocal performance related issues. There are lots of other attributes/ dimensions that can affect the structural form of an organization; the following Section discusses those attributes.

2.9 Organizational Structure: Multidimensional Approach

It is difficult to fixate or balance the authority of the project manager in relation to that of the functional manager within a matrix organization. This dimension, although bestowed to either of those by the organization based on its strategy, may be susceptible to change due to the various set of characters and leadership styles those employees have (Mckenna 2006). Thus, and as Cleland & King (1988) have concluded, a true balance of authority between both of the managers may not be achieved or realized, leaving some gaps in those structural forms when trying to explain the different organizational phenomena. Those gaps have resulted in the failure of the unidimensional approach as explained by Lechler & Dvir (2010).

It has been stipulated by Carper & Snizek (1980) that the definition of an organizational structure should be based on various attributes and dimensions. This supports a multidimensional approach to defining organizational structures rather than a unidimensional approach as guided by the sole authority of the project manager. Those attributes as per Carper & Snizek's (1980), and other than the authority of the project manager as discussed in Section 2.8, include some of the organizational processes (Soderlund 2002), governance (Gardiner 2005) and other attributes that are related to the environment and the complexity of projects being managed (Hobday 2000). The usage of the multidimensional approach, along with the various attributes and dimensions as used to define the structure, has been well supported by various case studies (Meyer et al 1993; Might & Fischer 1985).

Lechler & Dvir (2010), in their attempt to use a multidimensional approach for defining structure, suggested the usage of three dimensions. Their research and the suggested dimensions came into play as a bid to overcome the limitations the unidimensional approach imposed when previous researchers tried to correlate the organizational structure with the project success. Those three dimensions are: project manager authority, project manager responsibility and the steering committee level of support and influence.

Project manager authority; this dimension is the same as the dimension which was defined in the unidimensional approach. It refers to the influence the project manager has

over project decisions. Hobday (2000) included such authority over the project budget, material and resources. Other researchers such as Dunn (2001) analyzed this authority and its relation to employees' motivation during the course of a project. Katz & Allen (1985) included the authority over employees' remuneration and analyzed the relationship between the employees' salaries as influenced by the project manager in comparison with the same effect when influenced by the functional manager, and concluded that the project manager authority influence over salaries can produce better project outcomes.

Project manager responsibility; although it may be confused with the authority of the project manager, but it is different. The responsibility assumed by the project manager coincides with that of the functional manager in a functional department, although in the PMI it is treated as if the project manager's responsibility does not in fact coincide and that the project manager works as a part timer for the project. Here comes the emphasis that Clark & Wheelwright (1992) once established; they emphasized that a project manager when recruited from the functional department could enhance on the responsibilities that is carried out by the functional project manager towards the technical details dealt with in the project. However, such a functional project manager should be well trained to handle projects from a project management perspective or else the project may risk overruns and scope creeps.

Steering committee level of involvement in projects and project management is the third and last dimension as discussed in Lechler & Dvir's (2010) research. The steering committee acts as a high level supervisor for the project; it has an authority which exceeds that of the project manager's in controlling the project. They have authority over distributing scarce resources on all the projects as they see fit, and they are supported by top management. Lechler & Dvir (2010, p. 200), on emphasizing the importance of steering committees, state that their involvement "help integrating the project organization into the functional organization and are an important structural component to assure and to coordinate the involvement of senior managers in the process of project implementation". Other researchers, such as Porter & Kohanski (1981), identified the

existence and the involvement of steering committees as an important Critical Success Factor for the success of projects and the organization.

Lechler & Dvir (2010) conducted a research to test the various organizational structures that comes out of the above discussed dimensions and their relation to project success. They conducted the research in the US and Germany where they received 448 responses to their respective designed questionnaire. Lechler & Dvir (2010) research concluded 5 different clusters of proposed organizational structures which can influence project success. Each cluster represents a combination of different relative levels of the above discussed three dimensions as follows: (1) *authority*; project or personnel authority, (2) *responsibility*; project or functional responsibility, and (3) *steering committee* level of involvement, support and supervision.

Each of the five clusters describes the qualities of the project manager within the organization and specifically within the projects they are managing. *Cluster 1* represents a project coordinator with very low project and functional authority and responsibility being recruited from lower level functional departments, steering committee has low level of involvement if they ever existed in such type of organizations. Hence, this type of organizational structure is called the “project coordinator”. *Cluster 2* is similar in structure to cluster 1 with the exception of the full involvement of a steering committee; this structure is called therefore the “supervised project coordinator”.

Cluster 3 structure constitutes higher power for the project manager whether it consisted of a functional authority or responsibility, the steering committee gets very low level of involvement in projects; hence this structure is called the “autonomous project manager”. In both *cluster 4* and *cluster 5*, the project manager is recruited from high level personnel from functional departments, they both get higher levels of project and functional authority and responsibility related to either personnel, project or functional. The only difference between those two structures is the level of involvement of the steering committee; *cluster 4* gets a close eye supervision and high involvement from a steering committee, and hence is called a “supervised functional project manager”. And as for *cluster 5*, the functional manager receives very low supervision and close to nil level of

involvement from the steering committee deeming him autonomous, and hence this structure is called an “autonomous functional manager”.

The following list summarizes Lechler & Dvir (2010) multidimensional organizational structures:

Cluster 1: Project Coordinator

Cluster 2: Supervised Project Coordinator

Cluster 3: Autonomous Project Manager

Cluster 4: Supervised Functional Project Manager

Cluster 5: Autonomous Functional Manager

Lechler & Dvir’s (2010) five clusters categorization of organizational structure represents the new multidimensional approach for defining the different structural forms for projectized organizations, and represents a new era in the organizational science. Lechler & Dvir have proved in their research that the new clustering definition is more amenable to analysis and could produce better results when correlated with other organizational phenomena; they linked those structures with the project success factors and proved that their approach is more reliable than that of the previously discussed unidimensional one.

2.10 Organizational Structure Effect on Project Success

The organizational structure effect on project success has been extensively studied by researchers such as Lechler & Dvir (2010), Gray et al (1990) and Gobeli & Larson (1985). Similarly, this research studies the organizational structure effect on portfolio effectiveness and success.

Drawing from the literature on the unidimensional approach when defining organizational structures; it was highlighted by Gray et al (1990) that a *balanced matrix* and project matrix organizational structures are the most efficient structures that are perceived to enhance project success. Such relation was found to be country and region specific. In countries such as Germany - where it is known for its highly shaped intellectual culture - Gray et al found out that it is the *functional matrix* organizational structure is the mostly preferred and mostly used, and they found out that it is the *project matrix* structure that is perceived to be the one that is the most efficient when it comes to enhancing project success. This implies that the efficiency of projects tends to be enhanced when the authority indicator is inclined towards the project manager rather than the functional manager (Gray et al 1990). However, the project success factors that were used to measure project success in Gray et al's research did not include any of the *real project success* factors as discussed in the relevant literature in Section 2.4, they only included the *project management success* factors which denotes short term success only - i.e. achieving scope, cost and time.

Lechler & Dvir (2010) in their multidimensional approach literature criticized the unidimensional approach when defining structure, and hence challenged the previously researched correlation between structure and success - such as the correlations that were researched and highlighted by Gray et al (1990) and Gobeli & Larson (1985).

In their research, Lechler & Dvir (2010) found out that their previously discussed clusters of organizational structures - i.e. cluster 1 through 5 - could be correlated with the project success and thus affects its performance in different intensities. Their research indicates that it is the Cluster 4 "Supervised Functional Project Manager" and Cluster 5 "Autonomous Functional Manager" that have the most of the effect on project success for

their US sample. As for the German sample, they found out that it is cluster 2 “Supervised Project Coordinator” and Cluster 3 “Autonomous Project Manager” that have the most of the effect on project success, which is contrary to what Gray et al (1990) concluded in their study regarding the intellectual culture of the Germans.

As a summary, it could be implied that regardless of the country and the region, it is clusters 2 through 5 that have the major effect on project success, and it is only cluster 1 that was left out with the poorest project performance amongst the five clusters.

The project success factors as used in Lechler & Dvir (2010) research included long term project success indicators, such as measuring business results. It had customer satisfaction measures as well and other short term - process related - project management success criteria. Therefore, and drawing from those results, Lechler & Dvir (2010) multidimensional approach proved to qualify for the deduction this research is trying to achieve - which is the type of correlation between the organizational structure and project portfolio efficiency.

2.11 IT Governance and Enterprise Architecture

Governance is what holds the organization all together, it “underpins major ethical decision[s] in the face of uncertainty and tremendous competitive pressures” Gardiner (2005, p.56). It is a vital structural control mechanism necessary for the existence of organizations especially in highly competitive markets. The Asian Development Bank 1998 report declared that governance in organizations places layers of *accountability* amongst employees and their employer. The report further adds that governance breeds *predictability* for the ongoing governing law within the organization so that employees would predict the decisions as taken by their employer and thus be easily managed. It allows for *participation* as it give a chance for stakeholders to participate in the decision making process when possible.

Governance consists of a group of internal organizational rules and regulations that impose policies and procedures, and decides on the reporting mechanism within the organization. Gardiner (2005) calls such a system of governance the “corporate governance” and claims that it consists of:

a set of rules that define the relationship between shareholders, managers, creditors, the government and other stakeholder... [and the] set of mechanisms [that] enforce these rules directly or indirectly, Gardiner (2005, p.57).

Drawing from the above definitions of governance and corporate governance, Gardiner (2005) expands more on such a governance type and adds to it yet another critical type that deals with the usage and the organization of the information by using proper technologies; that is called the IT governance. Gardiner (2005) describes the IT governance by its concern with the system, rules, processes and procedures that governs the coordination and soft connection between all the systems within any organization, such as the HR system, finance system, processes and other business management systems. Mirela (2006) describes it by its representation of “the management, policies, and procedures necessary to ensure that an organization’s information system support the organization’s objectives, [and is] used responsibly, and that IT-related risk is minimized”.

The above contention leads to what is so called the “IT and Enterprise Architecture” and leads to its importance in improving the overall business success and the success of its projects. Enterprise Architecture EA does not only explain the flow of information to show how the technological elements work together; it rather justifies the usage of resources within the IT projects and justifies the IT expenditure the organization is embarking on (Morganwalp & Sage 2004). In case such architecture does not exist, organizations could face serious ad hoc management practices which could lead to poor performance and unsustainable environment. Thus, a good and effective IT governance structure combined with a properly designed IT architecture breeds sustainable business environment (Armour et al 1999).

Pearlson & Saunders (2004) suggested the IS strategy triangle as shown in Figure 2-4. They explain that there exists a strong relationship between information strategy - controlled by IT governance, business strategy and the organizational strategy. They claim that those three apexes of the triangle should always be in balance, and any slight change in any of them should be countered with a change in the other two remaining strategies/apexes.

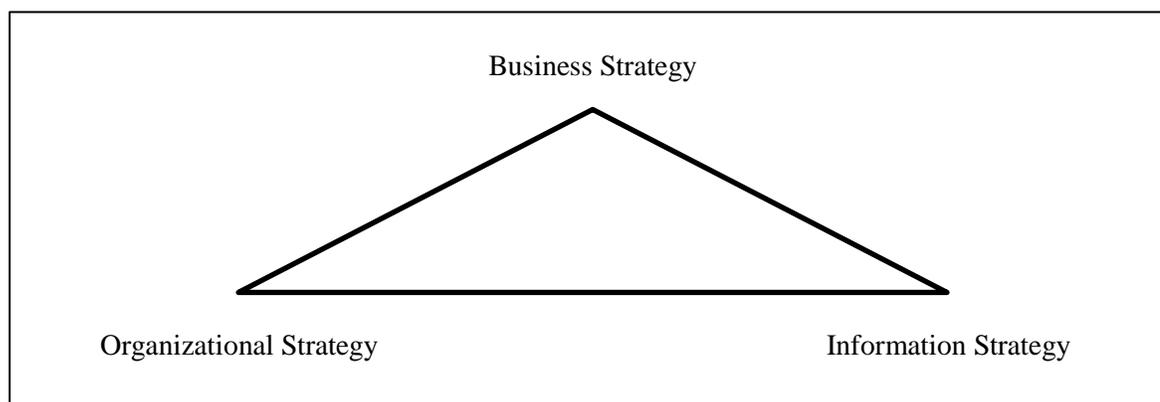


Figure 2-4: IS strategy Triangle, Pearlson & Sauders (2004)

Pearlson & Saunders (2004) IS triangle benefits the organization with its assurance that the organization has all its strategies in alignment with each other. It ensures consistency of the business rules, policies and regulations within all the organizational systems and operations, and facilitates any changes, and thus breeds a more of a controlled flexibility.

It increases the responsiveness of the system, enhances its efficiency and moves the organization towards professionalism.

The above literature implies a positive and strong relationship between organizational strategy and the IT governance structure. Mintzberg (1990) on the other hand, and as mentioned in Section 2.7, reports a strong relationship between the organizational structure and its strategy; which implies a relation of the same type between both the IT governance and the organizational structure.

Since project success and the organizational structure have proven to be correlated as explained in Section 2.10; it can be implied that the IT governance - as a result - can too affect the success of those projects and the business as a whole; this relationship is depicted in Figure 2-5.

The relationship between organizational structure and the IT governance has also been discussed and highlighted by Weill & Ross (2004). They claimed that the IT governance “transcends the organizational structure and can be more stable”. The reason as explained by them goes back to the centralization and decentralization concept within the matrix organizational structure which introduces more reporting relationships that confuses the project team (Banner & Gagne 1995).

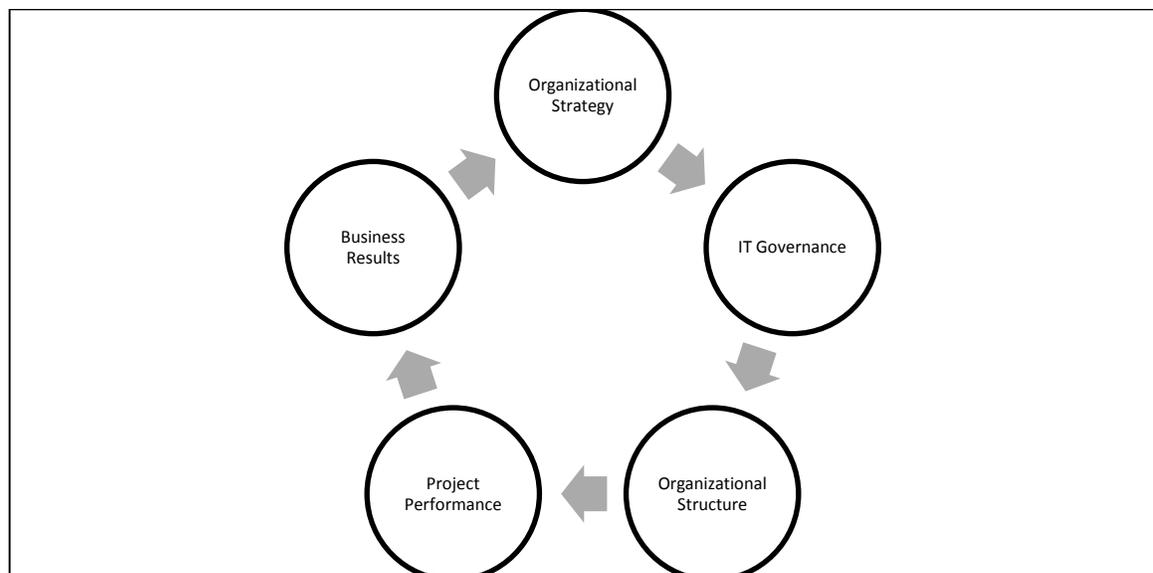


Figure 2-5: Organizational structure relationship with the IT governance

Weill & Ross (2004) measure the performance of IT governance in organizations by observing the delivery of four of the organization's objectives that are related to the usage of IT in the business. They have recognized the efficiency of IT governance: (1) when it comes to the cost of using IT applications within the business, and the importance of such efficiency to the company, (2) when it comes to asset utilization, and its importance to the company, (3) when it accounts for the long term growth of the organization and the importance of such efficiency to the business, and finally (4) when it is needed to improve on business flexibility.

Weill & Woodham (2002) elaborated on the IT governance domain and added that such a domain consists of five major decision areas: (1) *IT principles*; which mainly encompasses decisions related to funding associated with IT investments and the desirable roles of IT within the business, (2) *IT architecture*, which answer questions related to the type of relationship between core business processes and standardization of activities, (3) *IT infrastructure*, which determines what IT infrastructure should an organization host, and which should be outsourced, (4) *business application needs*, which looks at the requirements of the market and match it with the internal business processes, and (5) *IT investment and prioritization*, which deals with the distribution of IT projects within portfolios.

Weill & Ross (2004) expands on Weill & Woodham (2002) IT governance domains by tallying in the governance mechanism, which looks at the decision level taken at each of the above discussed domains. As an example, a CEO or other C level decision making mechanism for most of the above domains renders the organization's approach to IT as centralized. However, decisions taken at lower level employees and small groups renders it decentralized with its IT approach.

Weill & Ross (2004) further differentiate between both the centralized and decentralized approaches to IT governance as shown in Figure 2-6. While the centralized approach focuses more on measuring Return On Investments ROI and Return On Equity ROE, the decentralized approach considers the overall revenue growth as a measure of success.

Such approaches and measures of success can well be linked to portfolio management efficiency, and hence the best type of approach can be researched, tested and a link could be established. However, and due to the time scale and other limitations of this study; this research will only consider the IT governance performance as a construct and will measure its effect on portfolio efficiency as an independent dimension along with the above discussed organizational structures. The results of this research can then be used as basic data to investigate more into the preferred approach to IT governance and its combined effect with the organizational structure and IT governance performance on the portfolio management efficiency.

	Performance*		
	Profit	Asset Utilization	Growth
Strategic Driver	Profitability via enterprise-wide integration and focus on core competencies.	Efficient operation by encouraging sharing and reuse	Encourage BU innovation with few mandated processes
Key Metrics	ROI/ROE and business process costs	ROA and unit IT cost	Revenue growth
Key IT Governance Mechanisms	<ul style="list-style-type: none"> ▪ Enterprise-wide management mechanisms (e.g., executive committee) ▪ Architecture process ▪ Capital approval ▪ Tracking of business value of IT 	<ul style="list-style-type: none"> ▪ Business/IT relationship manager ▪ Process teams with IT members ▪ SLA & chargeback ▪ IT leadership decision making body 	<ul style="list-style-type: none"> ▪ Budget approval and risk management ▪ Local accountability ▪ Portals or other information/services sources
IT Infrastructure	Layers of centrally mandated shared services	Shared services centrally coordinated	Local customized capability with few required shared services
Key IT Principles	Low business costs through standardized business processes	Low IT unit costs; reuse of standard models or services	Local innovation with communities of practice; optional shared services
Governance	More centralized E.g., Monarchies & Federal	Blended E.g., Federal & Duopolies	More decentralized E.g., Feudal arrangements; risk management emphasis

*Based on analysis of firms with statistically significantly higher three year industry adjusted performance: Profit (ROI/ROE), Asset Utilization (ROA), Growth (Revenue Growth)
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Figure 2-6: Centralized/decentralized IT governance approaches, Weil & Ross (2004)

2.12 Portfolio Effectiveness and the Organizational Structure

Drawing from the literature on the growing importance of portfolio management, along with the attempt by organizations to achieve the best portfolio investment efficiency, this brings us to the intention of this research; which is to test the correlation between project portfolio management effectiveness, as represented by business units of the private sector, and two of the most important products of strategy, which are the organizational structure and the IT governance.

Figure 2-7 provides a graphical representation for the relationships and conclusions that have been discussed in the literature review. As can be seen in Figure 2-7, the organizational strategy, which is a product of the market and the desire to grow, produces the organizational structure - some other factors affect the creation of such structure as discussed in Section 2.7, but drawing from Mintzberg (1990), this research will focus on the strategy side of it only. The organizational strategy, after the application of the required processes and procedures as shown in Figure 2-2, produces portfolios, programs and projects. The strategy also guides the production of the IT governance structure of the company as shown in Figure 2-5. Among all the above mentioned terminologies - i.e. projects and project success, project portfolio and project portfolio effectiveness, organizational structure and IT governance - which all have been covered in the respective literature; relationships have been created, tested and established (Lechler & Dvir 2010; Gray et al 1990; Gobeli & Larson 1985) and they are represented as bold arrows in Figure 2-7. Drawing from those already tested relationships; this research intends to fill in the gap in the literature and tests the type and magnitude of correlation as represented by those dotted arrows.

Drawing from the literature at Sections 2.9 and 2.10 regarding the correlation between the multidimensional approach for defining organizational structure and the project success - and since the same literature has proven that the unidimensional approach in defining the structure remains unreliable for correlation analysis - the same relationship could be hypothesized and taken to the project portfolio level. This hypothesis is supported by Lechler & Dvir (2010) measures of project success used in their literature. They used the same economic success factors to measure project success as mentioned in

Shenhar et al (2001) & Meskendahl (2010) in Section 2.5 as measures for the effectiveness of portfolio management.

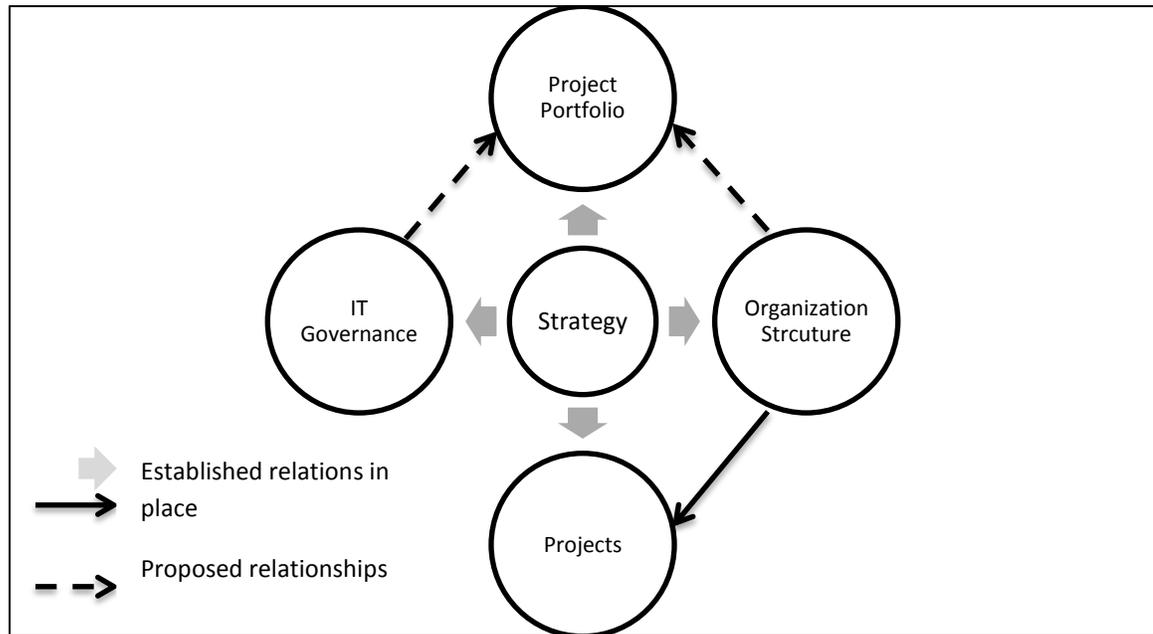


Figure 2-7: Graphical representation for the research proposed relationships

Therefore, and drawing from the cluster analysis as discussed in Lechler & Dvir (2010) and covered in Section 2.9, the *first hypothesis* is:

H1: Portfolio management effectiveness is positively correlated with organizational structures that use top management supervision for all projects and portfolios via a committee, such as a steering committee, regardless of the amount of personnel or functional authority given to the project managers.

Drawing from the above hypothesis, and referring to the same literature of Lechler & Dvir (2010), an alternative of the first hypothesis could be implied as well, which is as represented in the *second hypothesis* as follows:

H2: Portfolio management effectiveness is positively correlated with organizational structures that provide high personal and functional responsibility and authority to their project managers regardless of the amount of supervision received from an assigned steering committee.

And the *third hypothesis* as follows:

H3: Organizational structure, represented in cluster 1 form of structure, with low amount of supervision received from a steering committee and low functional and personnel project manager responsibility and authority, is expected to exhibit poor portfolio performance.

Those above hypotheses are represented in the diagram as shown in Figure 2-8.

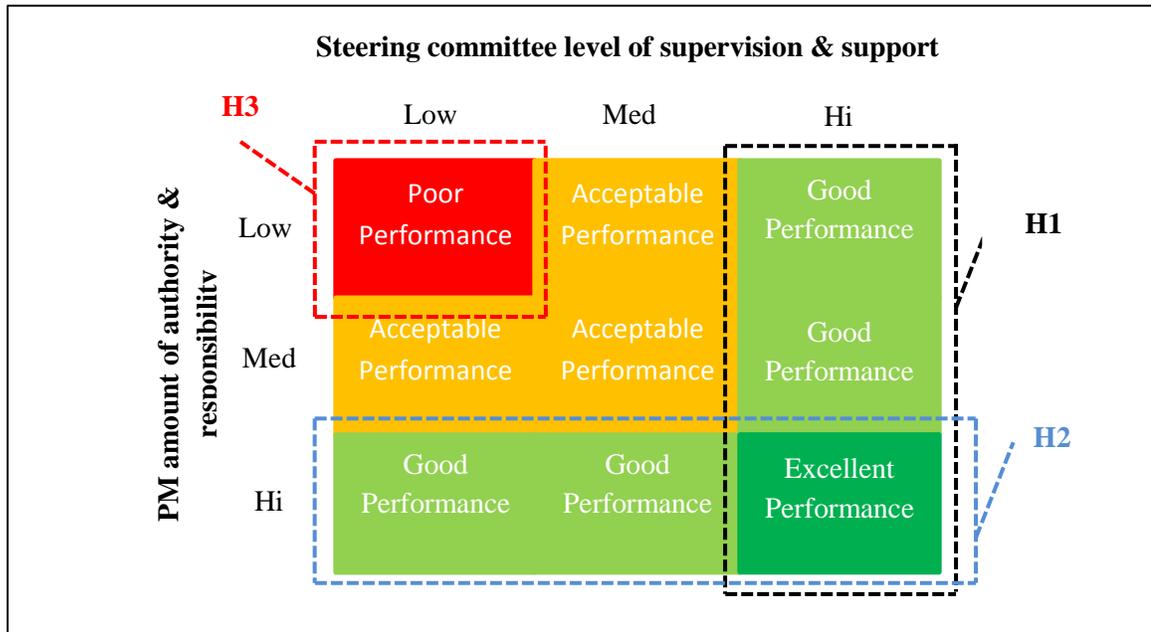


Figure 2-8: PPM performance in relation to the organizational structure

IT governance performance on the other hand is used in this research as an extra dimension to measure portfolio effectiveness in partnership with the organizational structure. Drawing from the literature in Section 2.11 and Weill & Ross (2004) model to measure IT governance performance, along with the literature in Section 2.2 where Reyck et al (2005) emphasized on having prioritization tools and softwares for better portfolio management; the *fourth hypothesis* discusses such relationship as follows:

H4: IT governance performance is positively correlated with the portfolio performance and therefore, it could be tuned into the type of organizational structure to better understand the actual factors constituting an effective structure.

Chapter 3 Methodology

3.1 Introduction

A deductive quantitative approach was used in this research to test the hypotheses as developed in Chapter 2. The selection of this approach is supported by Ketchen et al's (1993) research findings which conclude that phenomena that are related to organizational performance would achieve better results when hypothesized and tested under the umbrella of a deductive approach. Therefore, and since measuring portfolio effectiveness in correlation with organizational structure is related to organizational behavior and performance, this research then qualifies for Ketchen et al's proven approach.

This chapter clarifies the methods by which this study has tested the developed hypotheses with. Section 3.2 proposes the conceptual framework which is based on the work presented in Chapter 2, it displays a graphical representation for those units/constructs and relations that were proposed to be tested - i.e. portfolio effectiveness - along with the affecting independent variables, i.e. organizational structure and IT governance performance.

Sections 3.3 and 3.4 propose the research framework and the units of analysis stipulating the sampling procedure and the type of units that will be tested. They also touch on the designed questionnaire and the process of dispensing the questionnaire and the selection participants.

This study assumes that all organizational samples have developed a form of a portfolio structure, regardless of their understanding of the terminology and science behind project portfolio management. The reason behind this assumption is justified by Archer & Ghasemzadeh (2007) when they described business units that fall under wider organizations as project portfolios. Those business units are usually established as a way to grow the business geographically, or to provide diversity in their service offerings. In other instances organizations may have plenty of other reasons to start those business units other than growth and diversity, those reasons are not covered in this study.

Section 3.5 discusses the measurements that have been used to test the units of analysis and the proposed relationships. A detailed description of the variables is also provided.

3.2 Conceptual Framework

The conceptual framework of this research has been adopted from those researchers as mentioned in Chapter 2. Their proposed frameworks were used in order to ensure that the research results are aligned with established knowledge and parameters.

The first set of constructs consists of the organizational structure variables; they were adopted from the multidimensional approach as discussed in details in Lechler & Dvir (2010) and presented in Section 2.9. The organizational structure, as hypothesized in Chapter 2 Section 2.12, influences the efficiency of portfolio management that is carried out within those tested organizations. The second construct, which is the portfolio effectiveness, is measured using those dimensions that have been created, gathered and adopted by Meskendahl (2010), Muller et al (2008) and Shenhar et al (2001). The third construct - the IT governance performance as proposed in Hypothesis 4 and discussed in Muller et al (2008) - is measured and its correlation with the developed relations is tested as well. Weill & Ross's (2004) model of measuring the IT governance performance has been adopted in this research. All those discussed relationships are depicted in the graphical representation as shown in Figure 3-1.

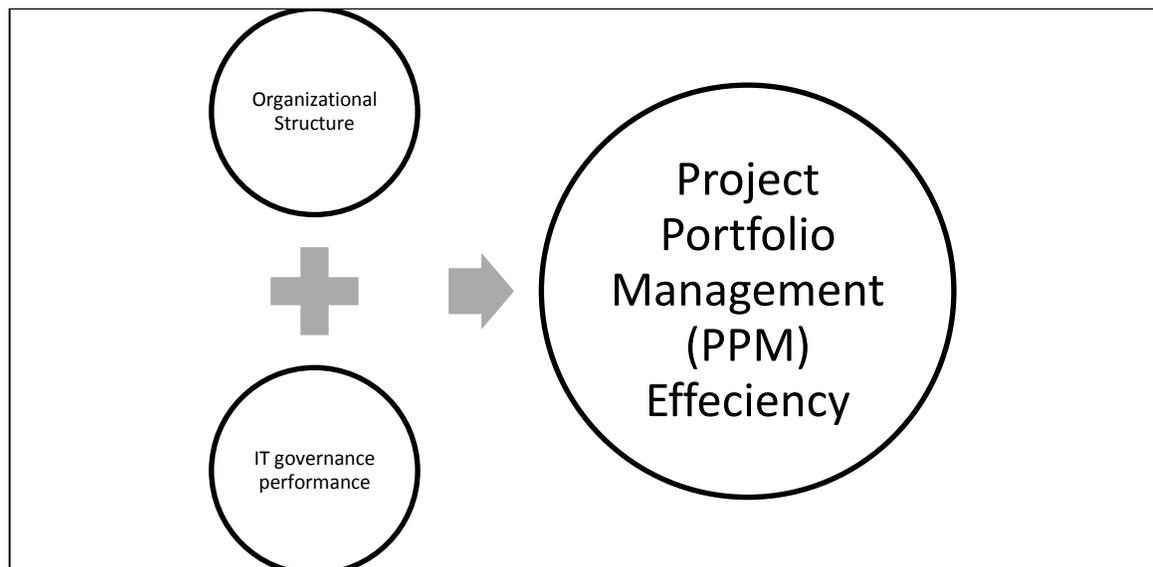


Figure 3-1: Graphical representation of the conceptual framework

Figure 3-1 provides a high level representation for the conceptual framework only. Thus below are those high-level constructs broken into their lower level constituents for the reader to understand the intention of the researcher. A more detailed conceptual framework, which details all the adopted models from Lechler & Dvir (2010), Meskendahl (2010), Muller et al (2008), Shenhar et al (2001) and Weill & Ross (2004), is represented at Figure 3-2 below for information.

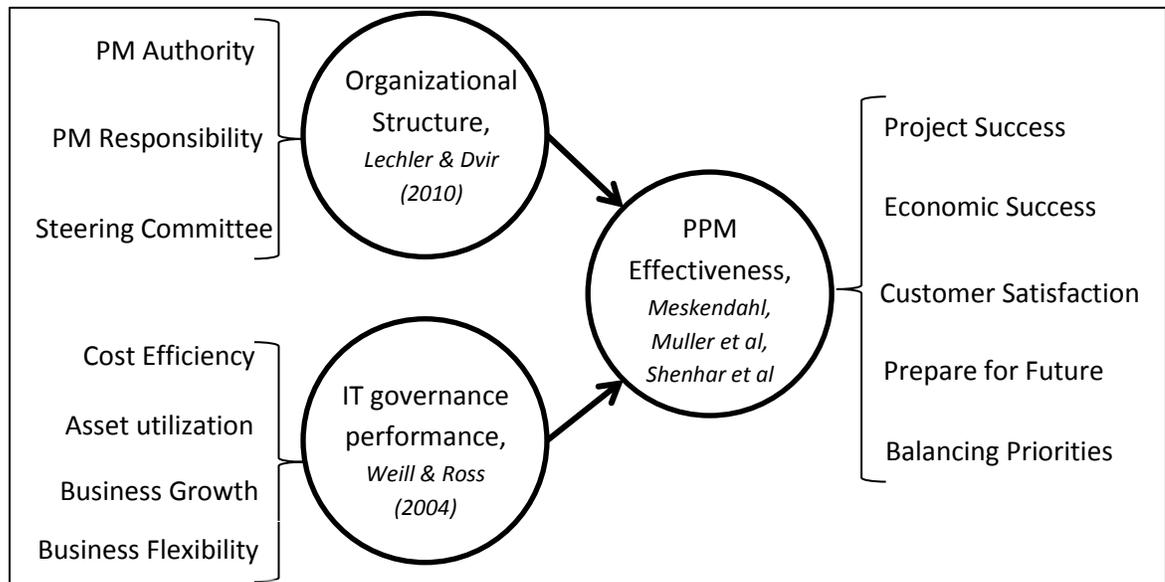


Figure 3-2: Detailed conceptual framework

A more detailed description of each of the constituent variables as shown in Figure 3-2 is provided in the following section.

Some of the dimensions/ variables that are related to PPM effectiveness may seem missing from the conceptual framework, such as the *strategic* alignment of projects within the portfolio or the benefits as measured and realized from the portfolio. Those dimensions have not been missed, rather, they have been imbedded in the description of those presented ones and the questionnaire had them covered - refer to the Appendix for a copy of the used questionnaire. As for the benefits measurement part of the portfolio; then it is as explained in Chapter 2. Those benefits were covered under the *economic success* for this research's population framework covers the effectiveness of PPM concerning projects that are external to the business - refer to Section 3.3 for more details, i.e. managed by the business on behalf of external clients for a fee.

3.3 Population Framework

The population framework for this research has been referred to in previous sections - Section 2.10 and Section 3.2 - and will be presented in more details here. The population framework includes projectized organizations working within the private sector, and their external projects are considered in the analysis only (i.e. projects external to the business and sponsored by clients/ managed on behalf of clients for a fee). Hence, the results of this research cannot be compared against organizations that are carrying out R&D projects or other internal projects that are intended to fix internal organizational processes.

The reason behind not including the organization's internal project portfolios in this research - i.e. projects & portfolios sponsored internally such as R&D's and IT - is that different processes are required to create a portfolio for those internally sponsored projects. These include processes such as *ideation* for example (Heising 2012) which was not covered in this research due to different requirements, management characteristics and other limitations (Meskendahl 2010).

Similarly, the reason behind not including the public sector portfolios in this research is that most of the projects concerning the public sector may have different measures of success other than those of the private sector; those measures were not covered in the relevant Section 2.4. Thus, portfolio effectiveness measurements as discussed in Section 2.5 may be different and may not be applicable to the public sector. Such measures of effectiveness would be better if covered under a separate research with no overlaps with those of the private sector.

Moreover, the unit of analysis for this research - as referred to in earlier sections and in the following Section 3.4 - is the business unit. A business unit represents a wider organization's portfolio (Archer & Ghasemzadeh 2007), and it operates differently than a government's portfolio. The unit of analysis for a public sector's portfolio may not be a business unit. The public sector, such as governments and municipalities, have their portfolios set up in key programs and strategic projects with a vision that usually coincides with the longer vision and mission of the government and the country as a

whole - e.g. take an example of a municipality embarking on a portfolio of projects with the purpose of alleviating poverty by enhancing the infrastructure of poor villages - in this particular example, measures of project success would slightly differ than those as discussed in Section 2.4. Similarly, the portfolio effectiveness indicators may also differ; *economic success* and *ROI* for instance as discussed in Section 2.5 may not seem as important as compared to the noble purpose behind this specific portfolio. Some other indicators of effectiveness should be used, such as devising measurable KPI's and CSF for those publicly initiated portfolios.

Comparing a private sector portfolio with a public sector one may result in different measures of success and efficiency indicators, especially when considering: economic success, project success, strategic alignment and customer/ end user satisfaction. A more sophisticated method with a combination of case studies and ethnographical approach may be the best approach to test the proposed hypotheses within the public sector.

3.4 Units of Analysis, Questionnaire and Ethical Considerations

The units of analysis in this research are portfolios consisting of projects that are sponsored externally; those portfolios are being run within the context of larger organizations in the private sector as a form of business units. This research uses Archer & Ghasemzadeh's (2007) definition of a portfolio in such a case and hence used business units of wider organizations as a representation of portfolios. Those business units have the exact similar framework of a portfolio selection process as explained in Archer & Ghasemzadeh (1999), which is a selection framework that is based on processes of: pre-screening projects within the pipeline of the portfolio (or business unit), analyzing projects, screening projects, selection and adjustment.

A questionnaire was developed which covers all the variables as mentioned in Section 3.2 the Conceptual Framework, more details of those variables are provided at the Measurements Section 3.5. This research targets those business units which trade in consultancy service offerings - i.e. consultancy firms, and more specifically with the Engineering Consultancy Industry and IT. However, the particularity of this research under such a specification does not deny its generalizability to other categories of businesses dealing with different types of service offerings, provided that those businesses follow the previously mentioned conditions as stipulated in the population framework - i.e. managing externally sponsored projects within the private sector.

The designed questionnaire was distributed to 12 business units representing portfolios as explained earlier. The geographical location of those portfolios covers the region of the Middle East. The questionnaires were specifically distributed to portfolios in the following countries: *three* business units in Jordan, *one* business unit in Bahrain, *one* business unit in Lebanon, *six* business units in the UAE, *one* business unit in Qatar. Each one of those business units is characterized with having large number of projects - mainly engineering type of projects. Each of those business units operate in a different way, while each one of them has its own approach to organizational structure, approach to project and business (portfolio) management, different understanding and approaches to governance and different understanding of the role of IT in supporting the business and its governance.

The number of projects covered in each one of those business units varies between 20 to 100. The number of the participants whom the questionnaire was sent to is 120 with a response rate of 59%. The participants were selected from the senior staff of each of those business units with each of them carrying sufficient job tenure within the same organization, a variance of 5% of this rule has been allowed with only 6 participants who had joined their company recently and participated in this questionnaire - check Table 4-3 in Chapter 4. The reason behind this specification is to be able as much as possible to reduce any chance of receiving incorrect answers or mutilated facts. This initial level of control represented by the above proposed filtration has increased the level of confidence the results of this research presents. This confidence is gained by ensuring that the selected participants have the required true knowledge of their employer's processes, projects and portfolio effectiveness, organizational structure and approach to IT governance with no made up stories.

The questionnaire was distributed to the respective participants using the World Wide Web to facilitate collecting information from organizations all over the Middle East. The questionnaire was initially distributed through a network of professionals, who met the required criteria of job tenure and years of experience, and they have been requested to pass it to colleagues who met the same criteria, and hence a controlled snowball effect assisted in growing the population of this study in a controlled environment. The first three questions from the questionnaire also acted as a filter to remove those who do not meet the required criteria and hence adding one more level of control to improve on the confidence the results of this study holds.

The data was collected professionally ensuring that an ethical theme was built around the research process; firstly the participants who participated did it voluntary and they participated under their own will. Secondly the participants were assured about the confidentiality and the anonymity of their and their employer's identity. Finally all questions were politically and commercially safe; no questions were asked which could be perceived as triggering or causing any harm or risk for the participants or their employer in the future.

3.5 Measurements

The questionnaire used in this research included 34 items which are portfolio specific; the intention of these items is to measure the variables as discussed in previous sections. Those variables are summarized and shown in Figure 3-2; two to four items were used to describe each one of those variables with the exception of the IT governance performance - eight items were used to describe it (Weill & Ross 2004). Out of the 34 items, 9 items were devised to measure the type of the organizational structure those tested business units operate under, these structural forms have been adopted from Lechler & Dvir (2010) research outcomes and they are based on three main variables - i.e. PM authority, PM responsibility and steering committee level of involvement. Furthermore, out of the 34 items, eight items were used to measure one variable only which is the IT governance performance based on Weill & Ross's (2004) model. The rest of the items were devised as inspired by the literature, and a small portion only were taken directly from a research carried out by Reyck et al (2005) with the permission of the authors.

Lechler & Dvir distinguished between the functional and the personal authority, the latest is the authority over employees' remuneration and status. They also distinguished between functional and project responsibility. In this research it is assumed that the higher the position the project manager holds within the organization, the higher authority or responsibility they will get over personal, project and functional matter.

Each one of those items was assessed based on a five point Likert scale ranging from a level 1 "Strongly Agree" to a level 5 "Strongly Disagree". The original questionnaire as discussed above was developed in the English language. All the above discussed constructs and variables that consist of several items were tested for reliability and validity using the Cronbach's alpha and proved to be reliable to represent the relevant constructs - with the exception of the *economic success* variable - with slight modifications only as explained in Chapter 4. Chapter 4 provides details for the statistical methods used to analysis the data that have been received from those 12 portfolios/business units: a bivariate correlation analysis along with a linear regression analysis were used to explore the type of correlation between the constructs and the level of impact they have on the effectiveness of the portfolios under study.

Following the conceptual framework as presented in Section 3.2, and the above discussion; three variables have been used to measure the organizational structure construct, five variables to measure the portfolio/ business unit PPM effectiveness and a model consisting of eight items was used to measure the IT governance performance, as follows¹:

- 1) *Organizational structure variables*: the three variables measuring this construct measures: The project manager Authority, which is the authority given to the project manager for taking the appropriate decision concerning the project technical matter, appraising the team members and altering project goals if necessary. The project manager responsibility covers his responsibilities towards the outcomes of the project, his knowledge regarding the technical aspects dealt with in the projects that are managed under his supervision and the ranking he/she holds within the functional/technical department. A steering committee level of involvement is measured based on the level of supervision and support it provides to the project and the project manager.

- 2) *IT governance performance*: this construct is measured directly using eight items as discussed in the model by Weill & Ross (2004) and as shown in Figure 3-3. The IT governance performance for business units and enterprises is assessed by evaluating the effectiveness of the IT governance based on the achievement of four objectives and their importance as shown in the respective Figure 3-3. Those four objectives have been included in the questionnaire as eight items that measure both the *influence* and the *importance* of each of those objectives. A high value of this governance performance counts when it goes above 70%. Weill & Ross (2004, p.2) concludes that “[a]chieving high governance performance [means] that the enterprise’s IT governance [is] successful in influencing the desired measures of success” and in pushing the business to achieving higher Return On Assets ROA’s and Return On Equity ROE.

¹ A set of the questionnaire items is found in the Appendix

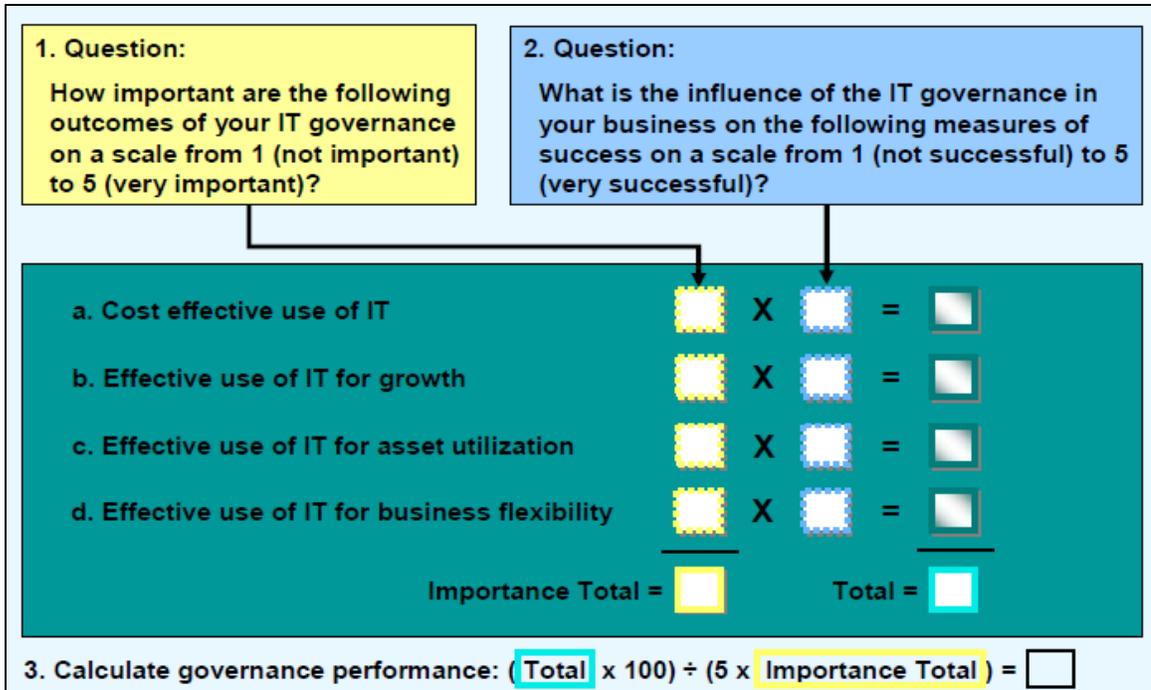


Figure 3-3: How to assess your governance IT performance, Weill & Ross (2004)

3) *Portfolio management effectiveness variables*: Meskendahl (2010), Muller et al (2008) and Shenhar et al (2001) suggested several aspects and variables which identify portfolio effectiveness. In this research the following five variables have been concluded to be the most influential due to their inclusion in other relevant studies such as Lechler & Dvir (2010) and Reyck et al (2005): the average project success, economical success, customer satisfaction, preparing for the future and balancing priorities:

Project success variable is used in this instance to measure the overall frequency of having successful projects within the business unit. Short term success factors as explained in Section 2.4 are used to measure this variable. Other long term related success criteria are included in other variables constituting the same construct.

Economic success variable consists of the two dimensions commercial performance and market performance. Commercial success refers to the traditional measures of financial performance such as profit, annual turnover, and

ROI. And the market performance reflects the achievement of the set market goals and achieving the required market share. It has been clearly identified by Shenhar et al (2001) that there have never been an established standard to measure those variables. Therefore, this study has proposed and used items that measure number of employees as an indication of annual turnover, volume of projects and direct questions related to market shares.

Customer satisfaction measures the average degree of satisfaction the clients have towards the general delivery process and the results of most of the projects offered by the business unit/ portfolio.

Preparing for the future variable measures the longer term benefits of executing projects within the business unit. Such as increasing the market share, developing new skills and capabilities within the team members, and increasing the ability to react to external market threats and changes.

Balancing priorities measures the efficiency of portfolio management in retaining and managing resources, providing efficient inter project management, reducing inter and intra project conflicts and ensuring that all projects are aligned to the overall business strategy.

Chapter 4 Research Results

4.1 Introduction

This chapter takes on the methodology that was discussed in Chapter 2 and applies it to the answers that were received from the pertinent respondents, and then presents the outcomes of the research in order to verify the research's proposed hypotheses.

The chapter starts with presenting the descriptive statistics in Section 4.2 where it statistically describes the data that were received from the respondents. The Section conveys to the reader a quick brief about the respondents' age, experience, industry and their level in the organization where they work for. Section 4.3 and 4.4 prepare and test those collected data for the next phase of analysis which is the inferential statistics.

Section 4.3 tests the reliability and internal consistency of the research variables, and the items used to measure those variables with, as a bid to increase the confidence the research results makes. Section 4.4 tests the proximity of the collected data to a normal distribution, such test is an imperative statistical test for determining the type of coefficients to be used in the rest of the inferential statistical analysis.

Section 4.5 conducts and presents the outcome of a bivariate correlation analysis that was conducted on the reliable research variables only, the intention of the section is to prove/disprove the set of proposed hypothesis depicted in Section 2.12. Section 4.6 presents the outcome of a linear regression analysis and hence presents a sensitivity analysis for the relations that were established in this chapter.

Finally, Section 4.7 summarizes the outcomes of the analysis and then it proposes a model that can be used as a quick guidance to determine the extent of those factors/variables when improving the effectiveness of a project portfolio.

4.2 Descriptive Statistics

Out of the 12 business units and approximately 120 professionals that have been approached, 71 (59%) respondents completed the survey questionnaire, and only one respondent did not meet the require criteria and expressed a lack of understanding of the designed questionnaire. Table 4-1 provides the percentages of those respondents as grouped by age; it is observed from this table how the survey touched on various age groups with a bit of clustering around the group of thirties. This later table along with Table 4-2 and Table 4-4, which demonstrate the respondents' level in the organization and their years of experience respectively, provide the research with a level of confidence expressed by the level of seniority of the staff involved in this research.

Table 4-2 shows that 45% of the respondents came from senior level technical staff, and above 40% came from management and senior management staff. Table 4-4 on the other hand presents the respondents' general years of experience, and it can be seen that almost 80% of the respondents have above 11 years of experience under their belt.

Table 4-3 presents the number of respondents against their years of tenure working in the same organization. It can be seen how almost all of the respondents have stayed in their current tenure for over than 1 year. And approximately 25% of them stayed in their tenure for over than 11 years. The more the years of tenure those respondents have, the more confidence the research gets in terms of respondents understanding the processes and procedures of their own workplace; such understanding is required to answers the questionnaire correctly with no mutilation of the facts.

Table 4-5 examines the industry those respondents came from, and thus confirms the population framework of this research is as discussed in Section 3.3. It can be noted that 66% of the respondents came from the engineering industry; they cover consultancy, engineering, IT, construction and other services. The criteria of these organizations that operate from such industrial background match the criteria required for this research, and thus all respondents within those categories have passed to the next level of inferential analysis.

Table 4-1: Results analysis - age group

Age groups	Response Percent	Response Count
21-29	7%	5
30-39	47.9%	34
40-49	31%	22
50-59	11.3%	8
60 or older	2.8%	2

Table 4-2: Results analysis - level in the organization

Level in the organization	Response Percent	Response Count
Entry level	1.4%	1
Technical Staff	11.3%	8
Senior Technical Staff	45.1%	32
Management Staff	25.4%	18
Senior Management Staff	16.9%	12
Others		3

Table 4-3: Results analysis - tenure in the same company

Years of tenure	Response Percent	Response Count
Less than 1 year	8.5%	6
Between 1 to 5 years	39.4%	28
Between 6 to 10 years	28.2%	20
Between 11 to 15 years	16.9%	12
Above 16 years	7.0%	5

Table 4-4: Results analysis - respondents experience

Years of experience	Response Percent	Response Count
0-5 years	5.6%	4
6-10 years	16.9%	12
11-15 years	28.2%	20
16-20 years	22.5%	16
Above 21 years	26.8%	19

Table 4-5: Results analysis - research industry, based on multi choice answers

Business Industry	Response Percent	Response Count
Services	4.6%	4
Engineering	66.2%	46
Construction	16.9%	11
Information Technology (IT)	7.7%	5
Consultancy	70.8%	52
Environmental Services	29.2%	21

4.3 Scales Reliability

Those variables that have been discussed in Chapter 3 have been administered using a range of 2 to 4 item questions except for the steering committee level involvement and the IT governance performance. The Steering committee level of involvement was administered using one item following Lechler & Dvir (2010), as it has been assumed there are no other items that could express the level of involvement other than a simple question requesting so. As for the IT governance performance; a model that was developed by Weil & Ross (2004) has been used to measure it.

The items which were used to measure the rest of the variables have been calibrated to achieve an appropriately high value of Cornbach alpha allowing a good and reliable representation of those variables with strong internal consistency as shown in Table 4-6. The PM authority, PM responsibility, project success, client satisfaction, preparing for the future and balancing priority variables show a strong internal reliability and consistency measure based on Cornbach alpha coefficients of 0.72, 0.76, 0.83, 0.79, 0.81 and 0.78 respectively as shown in Table 4-6. Therefore, and as per Pavot et al (1991), those variables are reliable and can be taken forward to the next level of analysis.

Table 4-6: Scale reliability - Cornbach alpha

Variables	Initial items	Final items	Cornbach Alpha	Mean X	STD
PM Authority	4	4	0.72	2.41	0.74
PM Responsibility	4	2	0.76	2.51	0.86
Steering Committee	1	1	NA	2.69	1.13
IT Governance Performance	8	8	NA	2.23	0.72
Project Success	3	3	0.83	2.83	0.82
Economic success*	4	2	0.37	2.16	1.56
Client Satisfaction	2	2	0.79	2.01	0.46
Preparing for the future	4	4	0.81	2.00	0.71
Balancing Priorities	4	4	0.78	3.18	0.73
PPM effectiveness*	5	4	NA	2.53	0.45

* *Economic success item have proved to be not reliable enough with a very low value of Cornbach alpha, therefore it was not considered when measuring the key variable PPM effectiveness.*

The economic success variable provided a Cronbach alpha which is less than 0.5 and even after altering the items and deleting the most non-reliable ones, the maximum value that could have achieved was only 0.37 based on two items. Therefore, the items used to measure the economic success variable did not achieve a good internal consistency, and hence this variable was completely disregarded from the rest of the analysis.

The reason that the economic success variable did not achieve a good internal consistency could be attributed to the method of measurement used to measure this variable. It has been envisaged in the previous chapter that measuring the economic success could be tricky, and that a single question item asking for the business unit's annual turnover for comparison reasons may be confusing and difficult to answer by the respondents. Therefore, question items which are related to the number of employees, number of projects and market share were included as well, but regrettably, those items did not achieve at least an acceptable internal consistency. The reason behind that could be attributed to the confidentiality of some of the requested information or the non-availability of some of the information during the time of answering the survey. It could be concluded at this stage that other means of measuring the economic success of portfolios should be devised in future similar studies; such methods should be supported by organizations' and respondents' willingness to provide honest answers in this particular field.

The PPM effectiveness scale was measured taking the average of only those reliable measures of: Project Success, Client Satisfaction, Preparing for the Future and Balancing Priorities disregarding the Economic Success for reasons as discussed above. In any particular portfolio or business unit, some of those variables may achieve high values while others may achieve lower values at the same time, and thus diluting the efficiency and effectiveness of the portfolio. A Cronbach alpha value therefore is not applicable in this case; the reliability of the PPM effectiveness scale is inherited from the high internal consistency levels as proven for its four constituent variables deeming the PPM effectiveness scale as reliable and good to pass for the next level of inferential analysis.

4.4 Check for Normality

Since all the variables have passed the initial reliability testing using the Cornbach alpha except for the *economic success*; the research takes the passed variables to the next level of analysis - the bivariate correlation analysis and the regression analysis. One more test remains necessary for determining the type of coefficient to be used in those later analyses; which is the normality tendency of the variables. The normality of those variables determines the type of coefficients to be used in the bivariate analysis, whether it is the Pearson coefficient or the Spearman's Rho. Field (2009) associates a normally distributed set of data with the Pearson coefficient, whereas a Spearman Rho qualifies for a non-normal distribution.

Table 4-7 provides an analysis of normality for the passed variables only - having had excluded the economic success variable from the upcoming analysis already. The Kurtosis and Skewness measures determine the proximity of the data to a normally distributed bell curve, the closer those measures to zero the closer the distribution of the collected data to a normally distributed bell curve. By examining those measures in the said table, it can be concluded that none of those variables have a true normal distribution without having the distribution curve either slightly skewed to the left or the right (as indicated by the negative or positive sign of the skewness measure respectively), or either having a too narrow of a normal shape or a flat one as could be seen from the signs as indicated by the Kurtosis measure.

The Kolmogorov-Smirnov level of significance provides another indication for normality. Considering the note below the previously presented table, it can be seen that it is only the: *PM authority*, *IT governance performance*, *preparing for the future*, *balancing priorities* and *the PPM effectiveness* could pass as normally distributed variables with a significance level $p > 0.05$. However, the variables: *PM responsibility*, *steering committee level of involvement*, *project success* and *client satisfaction* do not qualify for normally distributed data curves.

Table 4-7: Test for normality

	Kolmogorov- Smirnov Statistic	Kolmogorov- Smirnov Sig.*	Kurtosis	Skewness
PM Authority	0.113	0.076*	-0.766	-0.197
PM Responsibility	0.241	0	-0.88	0.143
Steering Committee	0.21	0	-1.003	0.116
IT Governance Performance	0.086	.200*	0.759	0.294
Project Success	0.149	0.004	-0.911	0.053
Client Satisfaction	0.366	0	1.494	-0.323
Preparing for the Future	0.1	.200*	-0.526	-0.045
Balancing Priorities	0.11	0.095*	-0.837	-0.272
PPM Effectiveness	0.078	.200*	-0.804	0.013

*. Values above 0.05 indicate normality.

Since there is a mismatch in normality between approximately half of the variables, a better coefficient to be used in this case would be the Spearman's Rho. The Spearman's Rho coefficient is used as the basis assumption as to conduct the bivariate correlation analysis and the regression analysis as discussed in the following section.

This section and the previous sections acted as the test tube in which all the variables have been tested and then verified to either pass or not pass to the next level of analysis. Regretfully only one variable was disqualified due to lack of reliability and internal consistency. The following sections carry out the actual testing for the proposed hypotheses, using the passed variables only, these variables are tested and presented using the correlation analysis followed by a regression analysis.

4.5 Correlation Analysis

Following the previous sections, a correlation analysis using a 1-tailed Spearman's Rho was conducted on the previously discussed variables with the exception of the *economic success* variable due to its exclusion subsequent the reliability analysis. Table 4-8 provides the correlation analysis for the variables constituting the organizational structural forms and the IT governance performance along with the constituents of the PPM effectiveness as discussed previously.

Table 4-9 provides the same analysis but with the PPM effectiveness variable itself to verify the proposed hypotheses.

Organizational variables Versus PPM variables:

As it can be seen from Table 4-8; the *project manager's authority* was found to be positively correlated with high significance with the portfolio's rate of *project success* (+0.298) - first constituent of the PPM effectiveness - supporting Lechler & Dvir's (2010) research outcomes. The *PM's authority* has been found to be also positively correlated with the variables that represent *preparing for the future* (+0.248) and *balancing priorities* (+0.238). Although such correlations have been found to be weak, but they hold high significance with $p < 0.01$. Hence, it can be concluded that the more the project manager is entertained with authority within his workplace, the more the chances that the projects he/she manages are going to be successful. Similarly, the more authority given to the project manager, the less problems the organization may face in terms of balancing resources within their project portfolios/ business units, and the more prepared to win and execute future projects they will be.

The *project manager's responsibility* variable was not found to be correlated in any way with all the constituents of PPM effectiveness except for the *client satisfaction* (+0.231) - again this finding supports Lechler & Dvir's (2010) findings when they reported a significant correlation for the same variable with a value of (+0.21) for the German sample and (+0.33) for the US sample, Lechler & Dvir (2010, p. 203). Reason could be

attributed to clients lending their trust to project managers with more of a technical background and technical responsibility towards the project outcome.

A weak but highly significant positive correlation was found between the *steering committee level of involvement* and the *client satisfaction* (+ 0.255 only), extended to higher positive correlation towards *preparing for the future* (+ 0.387) - such as winning more work from the same client, other clients and training the staff to undertake future projects. This tells us how clients wish to see more involvement from the top management. Such involvement tells the client how they are being taken care of. Even if the steering committee involvement was internal, it gives the project manager and the team more confidence into managing the client's projects transferring indirectly the management wish to see happier clients. Such involvement, whether it was internal or external, would invariably enhance the chances of winning more projects and preparing the team to manage future projects.

Table 4-8: Spearman correlation analysis with PPM components

Variables Correlation		PM Authority	PM Responsibility	St. Committee Involvement	IT Governance performance	Project Success	Client Satisfaction	Preparing for the Future	Balancing Priorities
Org. St. Variables	PM Authority	1							
	PM Responsibility	0.045	1						
	St. Committee Involvement	.306**	.238*	1					
	IT Governance Performance	-0.082	-.247*	-.647**	1				
PPM Eff. Variables	Project Success	.298*	0.037	0.12	0.081	1			
	Client Satisfaction	0.131	.231*	.255*	0	.515**	1		
	Preparing for the Future	.248*	0.166	.387**	-.281*	.345**	.517**	1	
	Balancing Priorities	.238*	-0.016	0.075	-0.029	.295*	0.106	-0.016	1

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed).

The three organization structural variables - authority, responsibility and committee - were all found to be positively correlated in a way or another with all the constituents of PPM effectiveness - i.e. project success, client satisfaction, preparing for the future and balancing priorities. Those established positive and highly significant correlations prove the three hypotheses as proposed in Section 2.12 and represented in Figure 2-7.

Organizational variables Versus PPM effectiveness:

Table 4-9 represents the correlation analysis that was conducted between those discussed independent variables and the dependent variable of PPM effectiveness. The table shows that there is a highly significant, but weak to moderate correlation, between the *PM authority* and the *PPM effectiveness* (+0.349). The correlation between the *PM responsibility* and *PPM effectiveness* on the other hand is positively significant as well but weak (+0.227), which is the case for the correlation with the steering committee involvement as well (+0.266). No correlation was found at all between the IT governance performance and the PPM effectiveness and hence no statistical proof was found to support hypothesis No. 4.

Table 4-9: Spearman correlation analysis with PPM effectiveness

Variables Correlation		PM Authority	PM Responsibility	Steering Committee	IT Governance performance	PPM Effectiveness
Org. Variables	PM Authority	1				
	PM Responsibility	0.045	1			
	St. Committee Involvement	.306**	.238*	1		
	IT Governance Performance	-0.082	-.247*	-.647**	1	
	PPM Effectiveness	.349**	.227*	.266*	-0.092	1

** Correlation is significant at the 0.01 level (1-tailed).

* Correlation is significant at the 0.05 level (1-tailed).

IT governance:

Table 4-8 shows that there was no correlation in whatsoever form between IT governance and the constituents of the PPM effectiveness. The only correlation that could have been established is a negative and weak one between the *IT governance performance* and *preparing for the future*. This unexpected negative correlation tells us that more governance and control exercised by the organization may be perceived as a form of rigidity and hence inflexibility in the work place. As a reminder, the governance that is being discussed - referring to Weil & Ross (2004) model - covers the importance and influence the organization gives to the IT infrastructure in terms of reducing cost, controlling resources and growing. The IT infrastructure that has been used in the questionnaire items covers the infrastructure that is used to control spending and financials, such as the ERP and any other form of a cost control/ staff utilization software tool.

Therefore, the *IT governance performance* variable with its relation to the *PPM effectiveness* constituent variables was not successful in proving its pertinent hypothesized theory.

On the other hand there was found to be a strong and highly significant negative correlation between the *IT governance performance* and the *steering committee level of involvement* (-0.657). This surprising outcome tells us that the high performance the IT governance is for an organization, the less need for its top management to be involved in managing projects. The top management may assume that they can control project inputs and outcomes via using the IT infrastructural base they have when it is strong and efficient. But, when this infrastructure is weak, the top management may consider interfering in the course of the ongoing projects.

Since the *steering committee involvement* variable was proven to be positively correlated with the *preparing for the future* variable (+0.387), the negative correlation with the *IT governance performance* variable (-0.266) was expected.

Other correlations:

Some other correlations could be picked up from Table 4-8, which are as follows:

- Clients are satisfied when their projects are successful - as can be seen from the highly significant positive and moderate correlation found between those two variables (+0.515);
- Clients are satisfied when they see how the managing business units prepare themselves for the future - as can be seen from the highly significant positive and moderate correlation found between the two variables (+0.517);
- In general, clients are satisfied when they see an organization's business unit that knows how to manage its portfolio of projects;
- When priorities are balanced, a better chance of having successful projects should be expected;
- When an organization spends time on its resources to prepare them for the future, the probability of this spent time to pay off is enhanced and a better chance of having successful projects is improved.

4.6 Regression Analysis

Having had conducted a correlation analysis amongst the previously defined set of variables - and since it has been found that most of the variables are weakly to moderately correlated with each other - a regression analysis was conducted to advise on the sensitivity of those independent variables to find out which one has the most impact on the dependent variable of *PPM effectiveness*.

A minimum sample size of $N > 50 + 8m$ (m is the number of independent variables) is required for a good and reliable analysis of regression, (Tabachnick & Fidell 1996, p.72). In the case of this study, while we have three independent variables (excluding the IT governance due to its non-correlation with the model); $N = (50 + 8 * 3 = 71) < 74$ – this slight marginal difference could be accepted.

Table 4-10 is one of the linear regression analysis outputs, and it shows that the developed model (i.e. the model of correlation between the organizational variables and PPM effectiveness) describes only 10-15% of the changes that happens in the PPM effectiveness variable. Hence, that tells us that there are other variables that have not been researched and covered in this study which could as well influence the *PPM effectiveness* and its dimensions, those variables could be other than organizational related and may be region related. This research does not cover the investigation of those other variables and will leave their investigation for other future research.

Table 4-10: Value of adjusted R-squared and Durbin Watson

R Square	Adjusted R Square	Std. Er. of the Estimate	Durbin-Watson
0.15	0.10	0.42	2.02

Table 4-11 presents the ANOVA analysis and it proves that the null hypothesis of multiple R in the population equals to zero is not rejected with $p < 0.05$. Table 4-12, apart from the Beta analysis, it provides the collinearity analysis as to make sure that those variables that are tested do not coincide (i.e. hold the same meaning). And since $VIF < 10$ and $Tolerance > 0.1$; no collinearity issue exists (Pallant 2007).

Table 4-11: ANOVA

Model		Sum of Squares	Df	Mean	F	Sig.
				Square		
1	Regression	1.541	3	.514	2.894	.044a
	Residual	9.048	51	.177		
	Total	10.588	54			

a. Predictors: (Constant), Committee, Authority, Responsibility

b. Dependent Variable: PPM Effectiveness

Table 4-12: Beta coefficient, collinearity and singularity tests

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	T	Sig.	Tolerance	VIF
(Constant)	1.811	0.255		7.107	0.000		
Authority	0.162	0.082	0.268	1.989	0.050	0.923	1.083
Responsibility	0.066	0.070	0.127	0.941	0.351	0.922	1.085
Committee	0.057	0.056	0.142	1.016	0.315	0.859	1.165

a. Dependent Variable: PPM effectiveness

As presented in Table 4-10, 10% to 15% of the PPM effectiveness was proven to be explained with the variation of the values of the previously discussed variables. Table 4-12 however delves into the details of those variables that explain this variation and picks out the most influential one by inspecting the significance of its Beta value. It can be noticed that the Beta value of the *Project Manager Authority* is the highest one amongst the three independent variables, and this value is significant with $p = 0.05$. This outcome implies then that it is the authority of the project manager that has the most of the influence in determining the *PPM effectiveness* among all the studied and previously discussed variables. This result is as well substantiated from observing the values of correlation as presented in

Table 4-9 with a value of correlation of (+0.349) between the *PM authority* and *PPM effectiveness* - the highest amongst all. This result tells us how much important is giving the project manager the required authority to control the project, plus the personal status of the project team members, for improving the effectiveness of the business as a whole and the effectiveness and success of its various project portfolios.

4.7 Summary and Model

This chapter has analyzed the previously discussed variables post the collection of 71 responses. The reliability of those variables have been tested using the Cornbach alpha reliability test and it was proven that all the variables were reliable when tested using the suggested item questionnaire except for one - the economic success of portfolios, which has been removed from the analysis.

A bivariate correlation analysis followed by a linear regression analysis was conducted on the collected responses. The results of those analyses supported the previously proposed hypotheses except for hypothesis No. 4 which relates the IT governance performance with PPM effectiveness. It turned out that there was not statistical prove that supports that the *IT governance performance* is correlated in any form with the *PPM effectiveness*.

Hypotheses 1 to 3 have proved their statistical validity with more emphasis on the *PM authority* towards the success of the portfolio (in the proposed hypotheses it was assumed that all variables hold the same weight). Those hypotheses with the new variables weightings are summarized in the below model as shown in Figure 4-1.

		Steering Committee level of Involvement			
		Low	Med	Hi	
Project Manager Authority	Low	Poor Performance	Acceptable Performance	Good Performance	Low/Med
	Med	Acceptable Performance	Good Performance	Excellent Performance	Low/Med
	Hi	Acceptable Performance	Good Performance	Extreme Performance	Med/High
					Project Manager Responsibility

Figure 4-1: PPM effectiveness model

Chapter 5 **Research Conclusions**

5.1 Introduction

This chapter presents the research results in a summarized format. It provides the conclusions and recommendations for future considerations by those organizations that could be interested in enhancing their business units' efficiency or by scholars and researchers who wish to consider the outcome of this study in their own research.

Section 5.2 provides a high level summary of this study combined with the research conclusions as learned from the results of the analysis that was carried out.

Section 5.3 reports the limitations that this study does not offer. Section 5.4 lists down the recommendations that could benefit interested organizations, or could be used as inputs for similar future research. Section 5.5 suggested areas for future research following the structure of the *research limitations* section.

5.2 Conclusions

This study makes several contributions to the general understanding of a project portfolio. It advises on the methodology of how to harness such understanding in order to achieve business efficiency using an effective project portfolio management. Four main areas were discussed in this research and thus could be considered as contributions to the conceptual understanding of the portfolio science, their management and structure.

Firstly, the research contributes with a collection for definitions of a portfolio and emphasizes on the representation of a portfolio as a business unit that has several external projects to manage. It differentiates between a public and a private portfolio though basing the difference on the different KPI's and measures of success that are used to determine the effectiveness of those portfolios in different sectorial situations. The research touches on the benefits management and benefits realization and concludes that a private sector portfolio may look more into some benefits that are related to the satisfaction of external clients, financial benefits and some other market related benefits. The public sector portfolio on the other hand may look at some different set of measures that are related to the satisfaction of the public or some other GDP improvements or country infrastructure enhancements which were not covered in this study. The research concludes that the best measures of success for a portfolio in the private sector are: the average success of projects within the portfolio, the economic success of the portfolio, external client satisfaction, preparing for the future and the ability to balance projects priorities within the portfolio.

The second contribution this research makes is related to one of the measures that portfolio management looks at - the project success. The research defines the success of projects; it differentiates between the long term and short term success factors, and links this success with the various known organizational structural forms. The research takes on the multidimensional approach to define the organizational structure, as defined and used by Lechler & Dvir (2010), and reiterates on its established linkage with the project success while questioning the reliability of a unidimensional approach with its equivocal results.

The third contribution comes with a special research that was carried out to investigate the IT governance structure and performance and how such governance is linked to the portfolio and its effectiveness. The reason this area was researched is attributed to the established link between portfolio selection and the software tools used to manage this selection (Levine 2005). An IT governance performance model was researched and discussed based on a model which was developed by Weil & Ross (2004). Further to that, different types of centralization/ decentralization of IT governance were discussed.

The fourth contribution took place post a quantitative analysis that was carried out to test the hypotheses proposed in Section 2.12; those hypotheses were based on the above discussed three research contributions. The results implied a significant positive correlation between the PPM effectiveness and the multidimensional organizational attributes (i.e. PM authority, PM responsibility and Steering Committee involvement), but found no correlation between the IT governance and the PPM effectiveness. A regression analysis showed that it is the *PM authority* that has more of the influence on the success of a portfolio followed by the steering committee level of involvement and the PM's technical responsibility.

The IT governance structure expressed a surprisingly significant negative correlation with one of the constituents of PPM measures of success - *preparing for the future*. The research concludes that such negative correlation could be attributed to the rigidity a governance structure offers which may breed non-flexibility as to the ability to prepare for the future.

Previous research tested and established relationships with the success of projects only. This research takes on a wider approach and tests the effectiveness and success of project portfolios. Those relationships that were established in this research influence only 10%-15% of the variance in the effectiveness and success of project portfolios. Hence, this opens the door for future research to fill in the balance 85%-90% gap in defining the *PPM effectiveness*. Suggestions for other variables/ relationships that could affect the effectiveness of a project portfolio are: market growth, organizational strategy, contract types, procurement strategy, centralization/ decentralization of the IT governance structure and the focus on intrinsic rewards (Petro & Bajracharya 2012).

5.3 Research Limitations

This research raises as many queries as it answers, and hence provides a promising point for further discussions and analyses for the concept of a project portfolio and its management. The limitations provided by this study open up the door for future research targeting the efficiency and effectiveness of portfolio management.

This study has considered portfolios and their effectiveness in organizations pertaining to private sector only for reasons related to different measurements of portfolio success in both of the sectors. This type of limitation provokes an initial set of thoughts that could be used to develop future studies concerning similar areas. Another limitation this study holds is the consideration of external projects only for those portfolios under study (i.e. projects sponsored by external clients), and hence limiting the study to a population framework that is confined with the private business units only. The study limits its population framework to industries pertaining to engineering and consultancy. Although the outcome of it could be generalized to other similar industries, but the prudence in generalizing this data to other industries is considered by itself as another limitation.

This research never considered the business strategy in defining or testing the success of portfolios. Some organizations may have the intention of starting a business unit in some region for the purpose of having a sole presence in that region for various reasons which have not been discussed in this study.

The non-reliability of the *economic success* variable, as discussed in Section 4.3, is considered by itself a limitation were the PPM effectiveness measures were forced to be limited in this case to four variables instead of the originally researched five.

Confining the organizational structural attributes to three attributes only (i.e. PM authority, PM responsibility and the steering committee involvement) is considered as another limitation. There could be other structural factors that could have been considered in this study which could belong to the organizational structural attributes; such as process related attributes, or other attributes pertinent to the internal policies and procedures of the organization.

5.4 Recommendations

The aim of this study is to explore those factors that are required to enhance the efficiency of business units in the private sector. This study exposes one of the very important and significantly influential organizational factors that should be considered during any such improvement process any organization is endeavoring - i.e. which is the authority that is provided to the project manager, such as the authority towards personal issues and status of the project team member.

Organizations in the private sector mostly have their portfolios lumped in business units directed by a Business Unit Director BUD who acts as the portfolio manager. The BUD may not have enough power to decide on the degree of the authority that should be given to the business units' project managers, such decision is a process and policy related that is cascaded down from corporate. The corporate governance will determine the degree of authority that should be given to the project manager and states the extent of the PM's assigned technical responsibility.

On the contrary of the above, the involvement of a steering committee into the ongoing project does not require a special type of power, the BUD can high level supervise his/her business unit projects representing the top management. The BUD can as well form a steering committee to his/her own satisfaction and involve it in all project decisions.

The higher the governance as cascaded down to the business unit from the organization - especially the IT governance - the more negatively the degree of involvement of the steering committee as formed by the BUD will be affected, it could as well affect the future projects and preparing the business unit to tackle any future issues. Such area should be looked at carefully by the BUD or the portfolio manager.

In light of the above recommendation, it can be seen how the major decisions and implementation of improvements mostly lay within the hands of the organization itself and not the business unit. However, the business unit can always provide its support via forming a steering committee as this has been proved to be positively correlated with the effectiveness and efficiency of the business unit's management for its projects.

5.5 Areas for Future Research

This research opens up the door for future research around the same subject; future research can be directed to fill in the gaps as found in the literature. The research limitations provided in Section 5.3 can act as a guideline to direct the future research appropriately. The following areas could be considered for future research:

- Measuring the effectiveness of project portfolios in the public sector;
- Finding proper methodologies to measure the economic success for portfolios in the private sector;
- Exploring more attributes concerning the organization and its structure and link it to the effectiveness of portfolios in the private as well as the public sector;
- Considering the centralization/ decentralization decision making process in the IT governance and how this affects the efficiency of the operating organization;
- Exploring the effectiveness of project portfolios for projects that are internally sponsored by the organization, such as process improvement projects;
- Exploring the effect of strategy formulation and implantation on the effectiveness of portfolio management;
- Exploring the effect of communication within the business unit on the effectiveness of its management;
- Exploring the effect of employees job satisfaction and the intrinsic rewards on the success of portfolios.

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Appendix

Items as used in the questionnaire

Organizational Structure

a) *Project Manager Authority*

- 1- *A Project Manager in your business unit has an exclusive authority to make all the necessary decisions to achieve the goals of the projects.*
- 2- *A Project Manager in your business unit has a significant influence on deciding the type of rewards (such as bonus and promotion) given to the project team.*
- 3- *A Project Manager in your business unit has an exclusive authority over the project team regarding technical matter.*
- 4- *A Project Manager in your business unit has a significant influence and input when assessing the project team's performance.*

b) *Project Manager Responsibility*

- 1- *A Project Manager in your business unit usually carries out technical activities during the course of any project.*
- 2- *A Project Manager in your business unit has a high ranking in the technical department other than the project management department.*
- 3- *A Project Manager in your business unit is fully responsible for his assigned projects - removed*
- 4- *When a project goes wrong in your organization, the project manager gets more of the blame than the technical staff who worked on the project - removed*

c) *Steering Committee Level of Involvement*

- 1- *The top management of your business unit interferes in the details of any ongoing projects.*

IT Governance Performance (Weill & Ross 2004)

Business IT infrastructure tools are those IT tools that assist the business with its day to day ongoing operations, such as: ERP system, IT Financial support system such as Oracle or any other system, the use of emails and any other communication tools, the use of websites to support projects and the business, ETC.

- 1- *What is the level of importance your business unit gives to:*
 - a. *Achieving cost efficiency through the usage of IT infrastructure.*
 - b. *Grow through the usage of IT infrastructure tools.*
 - c. *Effective resource utilization via using proper IT infrastructure tools.*
 - d. *Achieve business flexibility through the usage of IT infrastructure tools.*

- 2- *To what level does the IT infrastructure in your business influence the following objectives/ goals:*
 - a. *Achieving cost efficiency.*
 - b. *Growth.*
 - c. *Effective resource utilization.*
 - d. *Achieving business flexibility.*

PPM Effectiveness

a) *Project success*

- 1- *Projects within your business unit are completed on time.*
- 2- *Projects within your business unit are completed on budget with no overruns and losses.*
- 3- *Project management within your business unit prevent any scope creep from happening.*

b) *Economic success - removed*

- 1- *How many employees do you have in your work place? (please do NOT report the number of employees within your whole organization if you were a branch only).*
- 2- *How much is your business unit's market share in comparison to the competitors who are operating in the same country in percentage?*
- 3- *What is your annual turnover in thousands Dollars (USD)?*
- 4- *How many projects are being carried out under your business unit/office? (please do NOT report the number of projects within your whole organization if you were a branch only)*

c) *Customer satisfaction*

- 1- *Your clients are satisfied with the delivery process of their projects.*
- 2- *Your clients are satisfied with the results of their projects.*

d) *Prepare for the future*

To what extent does your business unit/ office give importance to:

- 1- *Increasing their market share.*
- 2- *Winning projects from previous clients (increase client's loyalty).*
- 3- *Increase skills and competencies of employees by providing frequent training or on job training.*
- 4- *Increase the employees' capabilities to adapt to market changes and fluctuations.*

e) *Balancing priorities*

To what extent is your organization affected by the following problems? (Reyck et al 2005)

- 1- *Too many projects.*
- 2- *Lack of coordination between projects.*
- 3- *Lack of alignment of projects to strategy.*
- 4- *Resource constraints (i.e. conflicts between resources used on different projects).*