

Improving asset management in the public sector in the Kingdom of Saudi Arabia

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Abstract

Since the early explosive growth of Saudi Arabia in 1973, a rapid, comprehensive and ambitious urbanisation movement has taken place, changing the country's face from the medieval to its modern shape. In many cases, this growth has been translated into physical assets, which leads to immense pressure on physical assets condition. To date, no study has given clear a view of asset management practices across the Saudi public sector. In addition, no improvement plan has been developed regarding asset management practices across the whole of the public sector of Saudi Arabia.

Therefore, the aim of the study is to assess current asset management practices across the Saudi public sector and, then, provides recommended actions based on the assessment outcomes. This aim is achieved by three main objectives: first, to explore leading asset management standards and guidelines and their recent development trends; second, to explore current characteristics of asset management practices in Saudi public sector with the purpose of developing an understanding of the gap between developed countries and Saudi public sector; and third, to explore factors influencing systematic asset management practices and provide recommendations.

Inductive and deductive methodological approaches are adopted and employed. Findings from the research reveal that asset management practices in the Saudi public sector present five major issues: the need for an independent entity for asset management practices, the fact that physical assets are not managed strategically, weak asset management practices, weak organisational policy and professional standards, and reliance on experience. To tackle these issues, a systematisation of asset management practices in SPS is recommended. Systematisation thinking was originally derived from the international standards and guidelines that belong to several developed countries. The outcome of the study is believed to be context free because the basic principles of systematisation thinking rely on existing theories in process, strategic planning/reasoning, portfolio and programme management.

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CHAPTER 1

INTRODUCTION

This chapter attempts to bring together the essence and foundation of the study. The chapter starts by presenting a brief background on the location of physical assets within organisations and also by setting out the main aim of the asset management concept. The second part of the chapter discusses the context of the Saudi public sector, and how this context motivated the researcher to initiate the research. Later, the research problem, aim and objectives of the study are brought together in order to set the scene for the work of the study as a whole. This chapter ends with a brief overview of the contribution, whether in knowledge or context, a brief discussion of the research methodology and an outline of the content of the subsequent chapters.

1.1 Background of the research

1.1.1 Physical assets

Physical assets exist in many aspects of life, and include buildings, offices, cars etc. All physical assets are derived from the scarce and insufficient natural resources which are used to cover all of society's needs and desires. The shortage of natural resources enforces a search for the ideal methods to manage physical assets. In addition, expenditure on physical assets is the second highest spending after payroll. Accordingly, the obvious target to cut costs after payroll is physical assets. However, the long term strategic benefits of physical assets are not well quantified (Lloyd, 2003).

Physical assets pass through four phases in their life cycle; creation, establishment, exploitation and disposal. Frolov et al. (2009, p.87) state that *these four stages can be thought of as the value chain of an asset, and all must be optimised to deliver a better return on asset investment*. Thus, Asset Management (AM) has emerged to tackle deficiencies in this area; this development is timely and stems from the recurrent demand of organizations around the world for a whole-life cost approach to managing physical assets. This situation provides a vital position for AM that stems from the

demand for new ways of thinking (Lloyd, 2010). Woodhouse (2001) claims that AM is set of processes, tools, performance measures and common understanding upon which various discrete elements are brought together.

While AM has drawn attention to achieving and fulfilling asset objectives through a holistic and comprehensive system of management practices and activities, various definitions have been developed to capture this intention. To illustrate this, Tables 1a and b below present various AM definitions extracted from well-known and leading associations and organizations dedicated to developing AM practices and activities within the public and private sectors.

Table 1.1a. Definitions presented by multiple asset management associations and organizations.

Definition	Title of the document and source
“Physical asset management is “...systematic and coordinated activities and practices through which an organization optimally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life cycles for the purpose of achieving its organizational strategic plan”	PAS 55 (BSI, 2008a, p.2).
“Asset management is a strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their lifecycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision making based upon quality information and well defined objectives”	U.S. Federal Highway Administration (FHWA, 2007, p.4)
“Assets management is a methodology to efficiently and equitably allocate resources amongst valid and competing goals and objectives”	American Public Works Association Asset Management Task Force (Danylo and Lemer, 1998, p. 2)
“A systematic process of maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, and providing tools to facilitate a more organized and flexible approach to making the decisions necessary to achieve the public’s expectations”	Organization for Economic Cooperation and Development (OECD, 2001, p. 8)
“Asset management may be defined as a comprehensive and structured approach to the long-term management of assets as tools for the efficient and effective delivery of community benefits. The emphasis is on the assets being a means to an end, not an end in themselves”	Australian Highway Authority (Austroads, 2001, p. 4)

Table 1.1b. Continuation of definitions presented by multiple asset management associations and organizations.

Definition	Title of the document and source
“Transportation Asset Management (TAM) is a strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their lifecycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision making based upon quality information and well-defined objectives”	The subcommittee of Transportation Asset Management (TAM) belonging to AASHTO, the American Association of State Highway and Transportation Officials.
“the process of organising, planning, designing and controlling the acquisition, care, refurbishment, and disposal of infrastructure and engineering assets to support the delivery of services. It is a systematic, structured process covering the whole life of physical assets”	Integrated Strategic Asset Management (AAMCoG, 2011, p. 4)

Based on these definitions, AM brings about benefits to organizations through achieving the organizational strategic plan, allowing better decision making, providing sound investment data, giving an organized and flexible approach to making the decisions necessary to achieve the public’s expectations, providing tools for the efficient and effective delivery of community benefits, and supporting the delivery of services.

Basically, these definitions claim that a systematic, coordinated, methodological and comprehensive process for asset management practices could lead to optimum usage of physical assets, which would in turn benefit organizations. The benefit is achieved by managing various aspects of physical assets’ life cycle; creation, operation, maintenance and disposal. Considering the existence of several terminologies to describe the AM concept, the systematic asset management practices (SAMP) is the adopted concept.

Accordingly, the role of the study is to reveal the nature and meaning of AM practices and SAMP in turn. This action is carried out by investigating the underlying principles of the leading international AM standards and guidelines. The subsection which follows is devoted to a brief discussion of Saudi Arabia in general and physical assets in the Saudi context.

1.1.2 Saudi public sector (SPS)

Although Arab lands existed from far back in history, Saudi Arabia as it is known currently was not created until September 1932. Saudi Arabia is the biggest country in

the Gulf region and one of the largest in the Middle East. Saudi Arabia, as shown in Figure 1.1, stretches over 1,500 km from North to South and 1,000 km from East to West (Filor, 1988). The total area of Saudi Arabia is 1,962,582 square kilometres, with a coastline of 2,640 kilometres on two sea-lanes; the Red Sea and Arabic Gulf (Cordesman, 2009).

The public sector in Saudi Arabia is part of a political fabric in which the organisations and activities of government are set. Hague and Harrop (2007, p.4) define government as *institutions responsible for making collective decisions for society. More narrowly, government refers to the top political level within such institutions.* Meanwhile, Dew (2003, p.7) states that:

Administratively the Kingdom of Saudi Arabia (KSA) is a monarchy supported by a political system based firmly in the traditions of Islam, comprising a council of Ministers and 13 regional administrations, each headed by a governor

The council of Ministers was established in 1953 by King Abdul Aziz, the founder of the KSA. The total number of ministries of the KSA is 24, and their headquarters are located in the capital of the country, Riyadh (SAMIRAD, 2010).

Dew (2003, p.7) reports that those ministries and the Council of Ministers are *responsible for drafting and overseeing the implementation of all internal, external, financial, economic, educational and defense policies.* Hague and Harrop (2010) also state that public ministries, as in Saudi Arabia, are central and vital elements in the public sector, because they represent the coercive power of the public sector over the population in implementing policies.

The main revenue of Saudi Arabia comes from exporting oil, which accounts for 90 % of its export earnings (MOF, 2009). Despite the first oil shipment taking place in 1939, the KSA did not experience considerable development until the 1970s when a marked rise in oil prices was felt (Dew, 2003). Thereafter, decisions in the KSA about development were taken on the basis of conducting a series of five-year developmental plans. By the end of the Sixth Developmental Plan (covering the years 1995-2000) Dew (2003, p.24) states that *despite wild fluctuations in oil prices and events such as the Gulf War, the government had succeeded in creating the basic infrastructure needed to*

support a modern, rapidly developing economy. During this period a rapid, comprehensive and ambitious urbanisation movement began, relying on a single resource; oil.

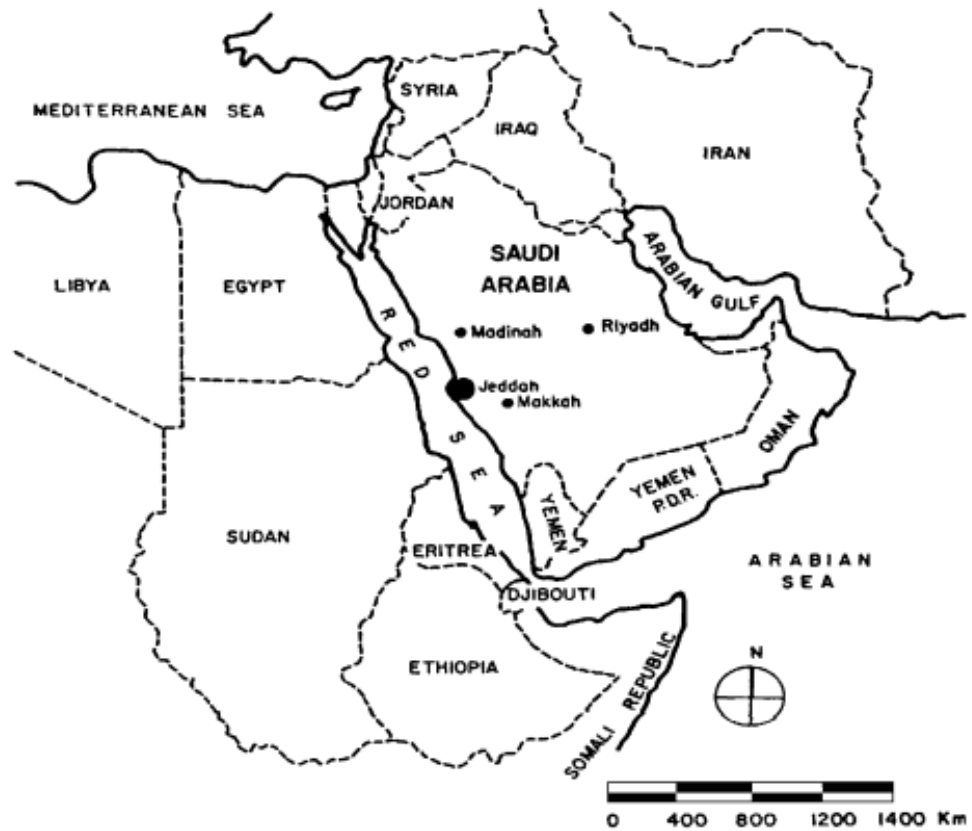


Figure 1.1. Geographical setting of Saudi Arabia. Source: Anon.

This early explosive growth was oriented to change the country's face from medieval to modern. The growth was concentrated on developing new cities and certain old cities such as Makkah, Riyadh, Jeddah, Madinah, Dharan and Taif. The new cities were created and located to serve the new petrochemical industry that had been created at different locations; Jubail on the Gulf sea, and at Yanbu on the Red sea (Al-Hathloul and Edadan, 1992; Montgomery, 1986).

During the history of Saudi Arabia, three subsequent rises in capital expenditure have taken place, as demonstrated by the Saudi Arabian Monetary Agency's (SAMA, 2014) publication of the annual government current and capital expenditure report covering a period from 1969 to 2012, as shown in Figure 1.2. Capital expenditure has undergone three major fluctuations in the whole period. The first period ranges from 1973 to the

end of the peak point at 1981, and the total capital expenditure at this year reached 171bn Saudi Rial (SR) (45.6bn US\$).

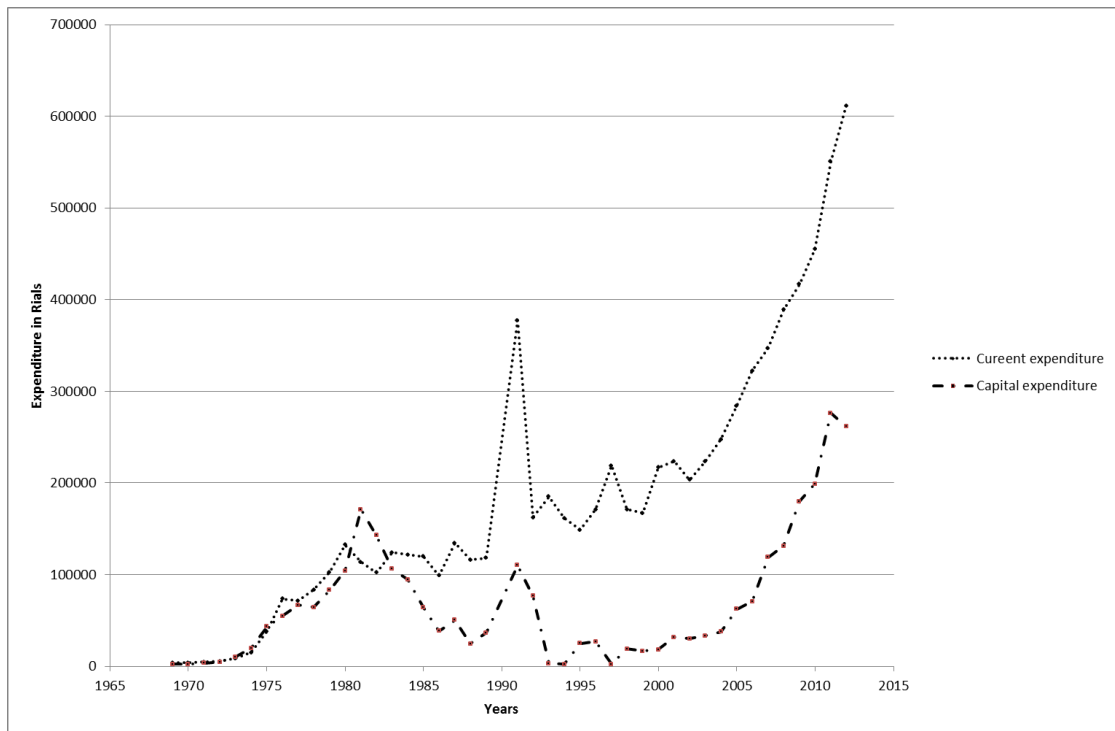


Figure 1.2. The annual expenditure of the Saudi government. Source: SAMA, 2014, no pagination.

The second period started in 1989 and its peak was in 1991, and reached 110bn SR (29.33bn US\$). The third period started gradually from 2001 and continues to the present, with the capital expenditure reaching an unprecedented value of 276bn SR (73.6 billion dollars), (SAMA, 2014). In 2010 alone, Saudi government contracts reached 562bn SR (150bn US\$) for infrastructure projects, nearly two-third of which were non-oil related (Connor, 2010).

In addition, the Saudi government, in August 2010, approved a five-year infrastructure plan of approximately 1443bn SR (385bn US\$) for the next five years, covering several public sector areas including transportation, energy and utilities, education, healthcare, and commercial, residential, industrial and tourist development (Connor, 2010). The allocated budget is the largest stimulus package among the G20 member countries relative to GDP. The cornerstone of the transformation of the Saudi economy is to develop and improve infrastructure at every level, and ensure that new infrastructure is

added to accommodate the rapid changes in the Saudi economy and society (Connor, 2010). For instance, the total length of road networks reached at the year of 2012 was 58,000 km (Alhazmi, 2012). In this sense, the SPS witnesses massive increase in physical assets that places pressure on all of the physical asset life cycle; creation, establishment, exploitation and disposal. Therefore, the need for AM is evident.

1.2 Research problem

Although the SPS has experienced unprecedented expansion in the magnitude of its physical assets since the 1970s, the asset management characteristics of the SPS are totally ignored by researchers. A very few studies have partially or indirectly uncovered asset management characteristics of the SPS. For instance, Almohawis and Al-sultan (1994, p.213) mention that *the survey showed a strong indication of a lack of systematic engineering methods or formal procedure to set construction contract duration*. In addition to the lack of knowledge regarding the current asset management characteristics of the SPS there is no initiative that can be identified regarding improving asset management practices in the SPS. However, a detailed and full review of published studies on SPS is presented in Chapter 2. Therefore, the research effort in this thesis is to uncover the AM characteristics of the SPS and tackle deficiencies by suggesting recommended actions. The following paragraph focuses on the aim of the study and how the objectives achieve the aim.

1.3 Aim and Objectives

The aim of the study is to assessing current asset management practices across the Saudi public sector and, then, provides recommended actions based on the assessment outcomes.

This aim is satisfied by achieving the following three main objectives:

Objective A: To explore leading AM standards and guidelines and their recent development trends. The objective attempts to answer the following questions:

A1. What are the variations between the leading AM standards and guidelines?

A2. What does systematic mean to leading AM standards and guidelines?

A3. What existing theories in process, strategic, portfolio and programme management thinking would provide an avenue to explain AM practices in leading AM standards and guidelines?

A4. How do these theories constitute the underlying principles of the developed conceptual framework (systematic asset management practices, SAMP) to explain AM practices in leading AM standards and guidelines?

A5. What is the gap between theory and AM practices?

A6. What is the relation between the empirical findings and the developed conceptual framework for the underlying principles of the systematic AM practices (SAMP)?

These questions are addressed in Chapters 2, 3 and 5.

Objective B: To explore current characteristics of AM practices in Saudi public sector with the purpose of developing an understanding of the gap between the developed countries and Saudi public sector. This objective attempts to answer the following questions:

B1. What are the characteristics of individual AM practices in SPS?

B2. What is the current state of AM practices in terms of organisational policy, professional standards and experience?

B3. Are AM practices in SPS systematic? If not, what stages are missing?

These questions have been answered in Chapter 5.

Objective C: To explore factors influencing systematic asset management practices (SAMP). This objective attempts to answer the following question:

C1. What are the factors influencing the systematic asset management practices (SAMP)?

This question is addressed in Chapter 5.

1.4 Outline of the research methodology

To achieve the study's aim, an inductive and deductive logic of knowledge development are adopted. The inductive approach focused on developing the basic framework of AM practices (the SAMP framework) by interrogating management literature as well as textual thematic analysis carried out regarding international AM standards and guidelines. The deductive logic focused on confirming and testing the developed and proposed conceptual framework, as well as accomplishing the remaining objectives. Following this approach (deductive logic) facilitated the usage of a repertoire of diverse tools and techniques existing in deductive logic of knowledge development in both qualitative and quantitative research. In terms of qualitative research, the study used various techniques found in pattern matching approaches, while for quantitative research, the central tendency as a method of analysis was followed. Finally, combining these diverse logics of knowledge development on the basis of a pragmatic philosophical foundation has considerably benefited the study.

1.5 Contribution

In achieving the aim of the study,, several hurdles are found which needed to be resolved in order to achieve the aim. Accordingly, solutions to overcome those hurdles resulted in several contributions, some of which are related to knowledge, while others relate to society. This division is based on Blaikie's (2003) classification:

- The first contribution falls into the category of societal contribution. The study developed recommended actions to systematise AM practices in the Saudi public sector. These actions should help policy makers to reform current AM practices of SPS on the basis of knowledge about the current situation of AM practices in SPS and systematic characteristics of AM practices in theory and international experience.
- The second contribution falls within knowledge contribution. The systematic AM practices (the SAMP framework) is developed for understanding AM practices. This framework features various aspects:

- First, the developed conceptual framework (SAMP) assists practitioners and academics to understand and explain the meaning of systematic AM practices in international AM standards and guidelines.
- Second, new practices which had been partially reflected in various AM standards and guidelines are introduced and advocated such as programme formulation.
- Third, a new concept (single and multiple strategic issues) is brought into the field in order to explain reality and improve our understanding.
- The third contribution falls within knowledge contribution. A model for factors influencing the behavior of systematic asset management practices (SAMP) has been introduced and shown explicitly.
- The fourth contribution falls into the category of knowledge contribution. This study is the first of its kind that attempts to uncover current AM characteristics of the whole SPS besides comparing these characteristics against international AM standards and guidelines.

1.6 Research scope and limitations

The overarching aim of the study is to assessing current asset management practices across the Saudi public sector and, then, provides recommended actions based on the assessment outcomes.. Therefore, the scope of the research is formed by the management practices for the physical assets of the public sector. However, there are various assumptions and limitations which need to be articulated:

- The developed model for factors influencing factors on systematic asset management practices (SAMP) are derived from the context of the SPS. Therefore, factors reflect the SPS context.
- The Saudi government is composed of two different groups of organisations: agencies and ministries. The research focuses on ministries only.

1.7 Organisation of the thesis

The structural logic of the thesis is built on the aim of the study. This aim is broken down into several objectives, and each objective may encompass several chapters or in

some cases the objective can be encapsulated within a single chapter. Therefore, this section explains how each chapter participates in the study's objectives in order to accomplish the overall aim.

Chapter 2 focuses on two themes. The first theme is part of, and also consistent with, the study's aim, and is to investigate available published material which describes the current managerial practices related to physical assets. The second involves discussing and presenting existing leading international physical asset management standards and guidelines with the purpose of understanding what 'systematic' means within international AM standards and guidelines.

Chapter 3 was brought into the scope of the study after it was concluded that systematic asset management practices (SAMP) of the international physical AM standards and guidelines are not similar and need to be articulated and grasped by using existing knowledge in process, strategy, portfolio, and programme management thinking. Therefore, Chapter 3 focuses on building a conceptual SAMP framework in order to allow the study to find commonality between the international AM approaches upon which dissimilarities and similarities can be understood and later systematic asset management practices (SAMP) can be revealed.

Chapter 4 explores research methodology approaches with the purpose of identifying the most suitable research strategies, design and methods in order to achieve the study's aim. Thus, this chapter attempts to articulate the reasons for choosing the selected research method and the steps required for the research.

Chapter 5 is devoted to analysis and discussion of the empirical findings. The results presented range from the confirmation of underlying principles of the conceptual SAMP model to the societal and knowledge related contributions.

Chapter 6 shows how AM practices in the SPS can be developed and improved. Therefore, this chapter presents and combines all the previous chapters' discussions and findings in the form of an executive summary intended for the Saudi Government. A framework for the current issues in the SPS is provided and the final part of the chapter is devoted to recommended actions.

Chapter 7 is the conclusion chapter for the whole thesis. This chapter is divided into three main parts: review of the aim and objectives, conclusions regarding the study's contribution, and finally, further required research.

CHAPTER 2

ASSET MANAGEMENT PRACTICES

This chapter is divided according to four themes. Firstly, a background on physical assets in terms of assets life cycle and benefits is presented. The second part is devoted to presenting the current studies on physical assets in the SPS. The third part explores leading international AM standards and guidelines in order to reveal meaning of systematic and find the most suitable model for measuring systematic asset management practices (SAMP) in the SPS. The chapter ends with a critical appraisal of existing international AM standards and guidelines. This appraisal ends with suggesting the next action.

2.1 Background

Asset is a wide-ranging term, PAS 55 (BSI, 2008a), for instance, mentions five different types of assets: financial, intangible, information, human and physical assets. The physical assets, as claimed by the PAS 55, are considered central to organisations where physical assets have ongoing interaction with other assets (BSI, 2008a).

Amadi-Echendu (2006), and Amadi-Echendu et al. (2007) classify physical assets into two main groups. The first is tangible physical assets that encompass; equipment, machinery, furniture, computer hardware, vehicles, property, land, buildings, infrastructure, heritage and mineral resources. The second group of physical assets are intangible: software, trademarks, license and patent and capitalised development costs. Thus, Amadi-Echendu (2006) is apparently showing how wide this term is, and consequently that it can be used for various and diverse kinds of physical assets.

However, some sets of asset management standards and guidelines such as the Federal Highway Agency (FHWA) uses the term for specific types of physical assets; pavements, structures, tunnels and hardware (FHWA, 1999, 2007). Within Amadi-Echendu's classification, our interest is limited to tangible physical assets. The following argument is devoted to the life cycle of the tangible physical assets.

2.1.1 Physical asset life cycle

Physical assets go through various stages in their lifespan irrespective of the category of asset. Blanchard and Fabrycky (2006) propose a life cycle for physical assets that contains two phases, with each phase broken down into several stages, as shown in Figure 2.1. The first phase is the acquisition phase, in which several stages are connected to each other in a linear way: conceptual design; preliminary design; detailed design and development; and the production and/or construction stage. The second phase is the utilisation phase, which encompasses two stages: utilisation and support, and retirement and disposal.

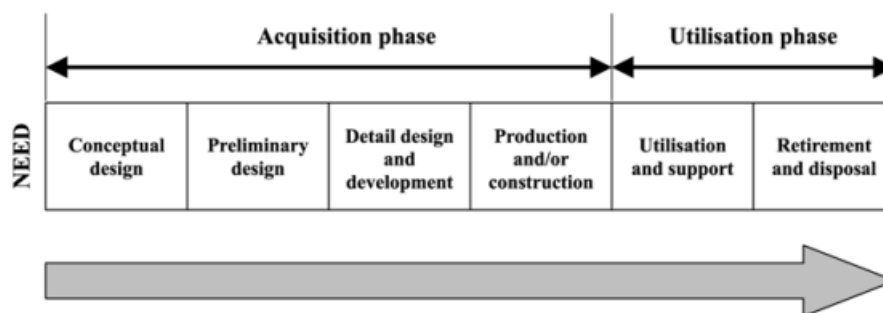


Figure 2.1. Life cycle phases of process asset systems. Source: Blanchard and Fabrycky, 2006.

Other authors and organisations such as the PAS 55 perceives the physical asset life cycle in terms of four phases: create/acquire, utilize, maintain and renew/dispose of (BSI, 2008a). Other organisations such as the Royal Institution of Chartered Surveyors (RICS, 2012) in their guidelines propose a physical asset life cycle composed of three generic phases: creation, performance and disposal. In contrast, the Australian Asset Management Collaborative Group (AAMCoG, 2011) depicts the physical asset life cycle as acquisition, operations, maintenance and disposal.

Meanwhile, Amadi-Echendu (2006) proposes physical asset life cycle stages that are more generic and typical: creating, establishing, exploiting and finally divesting a physical asset. Amadi-Echendu (2006, no pagination) elaborates that:

During the create stage, the business case, financial, technological, and exploitation ideas are initiated and formalised. The established stage involves detailed definitions, acquisition, installation and verification that

the asset can deliver to expectations. The exploit stage is when the asset actually delivers the expected outcomes especially in terms of economic benefits. The divest stage involves termination of current use and concurrent development of alternative uses for the asset or its derivatives

Apart from Blanchard and Fabrycky's (2006) physical asset life cycle, the last four proposed physical asset life cycles are similar and can be reorganised within the four-stage life cycle of Amadi-Echendu (2006) as shown in figure 2.2. Frolov et al. (2009, p.87) state that *these four stages can be thought of as the value chain of an asset, and all must be optimised to deliver a better return on asset investment.*

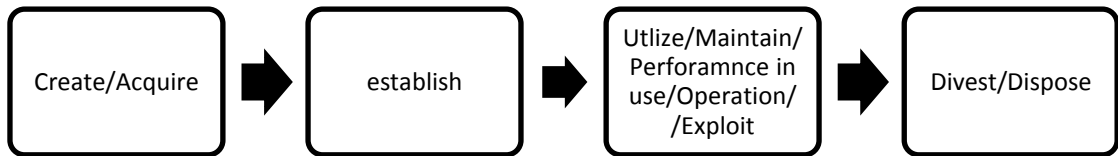


Figure 2.2. The four generic stages of the physical asset life cycle. Source: Amadi-Echendu, 2006, no pagination.

To sum up, the four physical asset life cycle stages are the target of the international asset management standards and guidelines however, with variant emphases on these stages. Therefore, this chapter explores, later, the international AM standards and guidelines with the intention to probe into how each approach deals with these four distinct stages besides revealing the systematic consideration of these standards and guidelines.

2.2 Limitation of current AM studies in SPS

Despite the huge investments from the government of the country to develop infrastructure and other types of physical assets, attention to developing managerial practices was nearly absent. In addition, academic studies were also rare. However, the following attempts to capture what is written about AM in Saudi Arabia.

One of the few studies in this area was conducted by Daghistani (1991), whereby the researcher assessed the planning structure of the Ministry of Municipal and Rural Affairs. Daghistani (1991) indicated several attributes of planning activities at the ministry of municipalities among which long, medium and short term planning activities are developed. However, he also found various shortcomings. One of these

shortcomings is the shortage of experienced staff for planning formulation. The next is insufficient communication between ministries has been carried out especially in case of developmental plans. Therefore, Daghistani (1991) demanded that explicit and delegated authority to certain department is necessary for successful developmental plans.

However, there are various issues in Daghistani's (1991) study. First, the study has not shown what does planning formulation mean. Second, the study also was very limited in its scope, where the focus was only on one city in Saudi Arabia, Jeddah. Third, the study also focused on one branch of one ministry in the SPS. Therefore, the study does not only explain what the current AM practices in the SPS but also ignored variation between ministries.

Later, Almohawis and Al-sultan (1994) explored how the public sector in Saudi Arabia develops construction contract durations. This study was conducted by administering a survey across the public agencies. The researchers found that the public agencies rely on three entities in developing their contract duration; top management, engineering departments and external consultants. In addition, all these agencies have no systematic approach, procedures or formal approach to developing contract durations.

Assaf et al. (1995) investigated the effect of 35 faulty construction works on building maintenance. The defects were grouped into six categories; construction inspection, civil construction, contractor administration, construction materials, construction equipment and construction drawings. The Assaf et al. (1995) conducted their survey on three groups; owners, contractors and architect/engineers. Their intention was to rank the six groups based on their importance. The study found that contractors and architects/engineers are most similar in their ranking of the importance of defects, while owners have a different stance. The most important factor for contractors and architects/engineers is the construction inspection with least importance on construction materials and equipment. On the other hand, the most important group for owners was contractor administration and the least important group was construction equipment. Assaf et al. (1995) pointed out that most of these problems should be taken into consideration before the implementation phase of the intended plan which in turn reduce life cycle cost of the buildings.

Al-Musallami and Assaf (1996) investigated public sector satisfaction regarding services received from architectural and engineering consultants. A fairly moderate relationship between the two groups is found. However, an improvement actions were suggested, especially in case of the cost effectiveness of the design and change orders originating from design errors. In addition, communication between both parties can be improved by increasing the number of meetings.

Al-Hammad et al. (1996a) explored eight types of public maintenance contracts; fixed price, cost plus a percentage fee, cost plus a fixed fee, cost plus fixed fee with a guaranteed maximum, unit price, term, schedule and purchased labour contracts. The findings were that the fixed price, term and purchased labour contracts were the top used contracts while unit price and cost plus a percentage fee were the second choice. The remaining contracts were found inappropriate for the public sector.

After two decades of rapid growth in Saudi Arabia, Al-Hammad et al. (1996b) explored problems facing the maintenance industry in both public and private sectors. The study identified 24 factors related to maintenance problems. The factors were distributed across six major categories; technical problems, management and administrative problems, financial problems, spare parts and tool problems, human related problems and lack of institutions and training facilities. The study showed that the most important problems were financial, while management and administrative problems came at the lowest rank. However, the study were not clear about what types of financial problems were referred to, and whether these were from miscalculation of cash flow before public sector tender projects.

Al-Hammad et al. (1996b) concluded the following two points. First, due to the lack of paying enough attention to the maintainability of new assets, several problems are found in maintaining assets in the future. Therefore, the study recommended the public sector to take into consideration practices related to maintenance in the planning practices stage, and also the researchers urge the public sector to take into consideration others practices in the planning practices stages. Next, the need for operation and maintenance manual for the public sector is vital for successful maintenance practices.

Al-Khalil and Al-Ghafly (1999) investigated 60 causes of delay in public utility, water and sewage projects. The sample explored three entities; contractors, consultants and owners. The study found that the most important causes of delay were; cash flow problems and financial difficulties of contractors, difficulties in obtaining permits, and the requirement to select the lowest bidder without regard to prequalification. In addition, the contractor blamed owner administration as one of the most important cause of delay, due to the following; delay in the settlement of claims, slow decision making, delay in making progress payments and excessive bureaucracy. According to Al-Khalil and Al-Ghafly (1999) the study conclude that the need for taking into consideration these causes upfront in the process of physical assets development practices is evident.

Alhazmi and McCaffer (2000) developed a project procurement system selection model to assist people working in the construction industry to find the most suitable procurement system for their projects. The study conducted a survey in the Saudi public sector to find the most suitable procurement for their projects. The researcher found design and built procurement system to be the most suitable approach for the public sector.

Bubshait (2001) studied factors behind the deterioration of road performance quality in Saudi Arabia. The factors were ranked according to their severity and later classified into three major categories; managerial, design and specifications and construction factors. Apparently, departments of physical asset management in the SPS are responsible for most of these factors.

Bubshait and Al-Juwairah (2002) studied factors affecting construction costs in Saudi Arabia and then ranked these factors according to their severity to contractors, consultants/engineers and owners. The most severe factors that lead to high construction cost are; material cost, incorrect planning, previous experience of the contract, contract management, and poor financial control on site. Apparently, these scattered factors belong to different areas of managerial practices of AM practices.

Al-Arjani (2002) studied the orientation of contractors toward operation and maintenance of public contracts. The study found that contractor numbers in biomedical, water and waste water projects are greater than for contractors working in

building and electromechanical maintenance and operation projects. In addition, the study also found that in the previous decade, the increase in public expenditure on maintenance and operation projects was more than on new projects.

Assaf and Al-Hejji (2006) investigated 73 causes of construction projects delay. The sample consisted of 23 contractors, 19 consultants and 15 owners. The researchers do not articulate whether the participating owners are public or private. The study finds that the average time overrun is between 10 % and 30 %. In addition, the greatest cause of delay is awarding contracts to the lowest bidder, as reported by both owners and consultants. However, contractors blamed projects' owners as the main cause of delay. Moreover, only one common cause was found between all the study participants; change orders by the owner during construction.

Al-Kharashi and Skitmore (2009) investigated causes of delays in public construction projects. The study classified the causes of delays into seven main categories; client related, contractor related, consultant related, materials related, labour related, contract related and, finally, contractual relationship related causes.

Bageis and Fortune (2009) investigated how bid/no bid decisions are influenced by different characteristics of contractors. The collected sample was 91 contractors with the purpose to achieve the aim of the study Bageis and Fortune (2009) found that one of the main factors to influence contractors' decisions is client type. Further, this result is important when considering that the public sector was the main client of 77% of the contractors. In addition, 44 out of 87 factors that influence bidding decisions are related to public sector management practices.

Assaf et al. (2010) found six main categories affecting outsourcing of maintenance services at Saudi universities; strategic, economic, management, technological, functional characteristics and quality. Although Assaf et al. (2010) did not use statistical analysis to show the significance of their findings, the most important factor for outsourcing was to obtain better quality.

To sum up, previous research has found various shortcomings and deficiencies at different phases of the physical asset life cycle stages. However, most of the research conducted was regarding either certain practices such as procurement or generic

deficiencies such as the need for planning formulation practices. In addition, most researchers indirectly indicate the need for better management in the SPS. For instance, the SPS lacks planning formulation practices (Daghistani, 1991), shows a lack of method, procedures and formal approach (Almohawis and Al-sultan, 1994), road performance quality is deteriorating (Bubshait, 2001), and increases in construction costs occur due partially to incorrect planning (Bubshait and Al-Juwairah, 2002). These research studies indirectly indicate deficiencies in SPS management because they, one way or another, affect different parts of the physical asset life cycle stages. However, the following questions about the current AM practices of the SPS need to be addressed in order to fill the current knowledge gap and draw a complete picture of the current AM practices in the SPS. These questions are:

- What are the current SPS AM practices against the leading international AM practices? This question implies the need first to uncover the characteristics of the current leading international AM practices in order to specify what characteristics are looking for.
- What are the variations of the AM practices between the SPS ministries?
- What is the proposed action plan to improve the current AM practices situation in the SPS?

Based on these enquiries, the following argument is devoted to discuss the leading international AM standards and guidelines.

2.3 Asset management standards and guidelines

Management of the physical asset life cycle certainly began a long time ago, and nowadays the term is used to refer to professional management practices dedicated to managing physical assets (Woodhouse, 2001). For instance, fairly superficial survey of uses for the term “Asset Management” reveals some fundamental differences in interpretation and usage. Here are three distinct yet common current uses of the term as claimed by Woodhouse (2006; 2003):

- The financial sector has long used the phrase to describe the management of a stock or investment portfolio – trying to find the best mix of capital security/growth and interest rates/yield.

- Equipment maintainers and software vendors have also adopted the name in an attempt to gain greater credibility and ‘voice’ for their activities. As ‘maintenance’ has for so long been treated as a necessary evil and low on the budgeting priority list, perhaps calling it ‘Asset Management’ instead will raise awareness on the corporate agenda. ‘Asset Management’ becomes, therefore, a more sellable way of saying ‘better and more business-focussed maintenance’.
- Many infrastructure or plant owners and operators have adopted ‘Asset Management’ to describe their core role in life: both caring for, and making best sustained use of, the physical plant, infrastructure and associated facilities. In addition, many scholars emphasize the pivotal role of physical assets even when physical assets have no core role in their business. Foster and Dye (2005) for instance state that one of the CEO’s business responsibilities is to secure the core businesses of organisations through securing systems, facilities, infrastructure and process. In addition, Drion et al. (2012) and Too and Too (2010) claim that there is emergent evidence that physical assets are becoming central to the organisation’s core business processes.

The last two bullet points have shown the domain of AM practices from a fairly superficial survey of usage of ‘Asset Management’. In addition, it is apparent from the previous chronological development of the term that AM is increasingly drawing attention and becoming broader in its application. The term as used by Woodhouse (2001) was for a specific stage of the physical asset life cycle, but later the term came to include various cycles such as creation and acquisition (Drion et al., 2012; Too and Too, 2010). Therefore, AM as a term becomes not limited to certain stage of the physical asset life cycle, but, instead the term in the meantime covers all the stages of the physical assets life cycle. The following discussion of the international asset management standards and guidelines support this claim. However, prior to discuss the international AM standards and guidelines an overview on the AM drivers is provided in the following subheading.

2.3.1 AM drivers

There is a widespread feeling of the need for asset management standards and guidelines, due to various reasons. The following bullet points are the drivers that found scattered on various literatures and AM standards and guidelines:

- Increasing system demand for maintenance, reconstruction, performance and management (FHWA, 1999, 2007; RICS, 2012)
- Recognition of the financial payoff for better real asset management, (Kaganova et al., 2006; RICS, 2012)
- Personnel constraints (FHWA, 1999, 2007)
- Increased budget demand (FHWA, 1999, 2007)
- Accountability to the public sector (FHWA, 1999, 2007; APCC, 2001; Kaganova et al., 2006; RICS, 2012)
- Entry of real estate professionals into public property management (Kaganova et al., 2006)
- Build, preserve, and operate facilities more cost effectively with improved performance (APCC, 2001; NCHRP, 2002; Audit NZ, 2010; AAMCoG, 2011; RICS, 2012)
- Best value for the public spent (OECD, 2001; NCHRP, 2002, AAMCoG, 2011)
- Enhance the credibility and accountability of the transportation agency (NCHRP, 2002)
- Better communication at internal and external levels of the organisation (OECD, 2001; APCC, 2001; Audit NZ, 2010; AAMCoG, 2011; RICS, 2012)
- Asset inventory, condition and level of use (OECD, 2001)
- Tools for managing assets (OECD, 2001)

Based on the previously mentioned drivers of AM, whether in terms of benefits or outcomes, a large global scale movement has started toward the formal management of physical assets. The governments of Australia, New Zealand, the United kingdom, France and the United States were the first movers into this domain. These countries designed and implemented significant reforms in the management of assets, whether property or infrastructures (Remenyte-Prescott and Andrews, 2013; Kaganova et al., 2006). For instance, France has been working to formalize their practices since 2001. In

addition, the General Accounting Office in the United States announced in 2003 the establishment of federal property management. This movement found a huge echo around the world. Therefore, other countries such as China, Indonesia, Morocco, Chile, Kuwait and others started to identify problems and consider the suitability of setting up a formal and organised system (Kaganova et al., 2006). However, at the time of writing, Saudi Arabia is still outside this movement.

Accordingly, the intention to find an appropriate AM framework in order to investigate the current AM practices in the SPS and revealing the meaning of systematic asset management practices (SAMP) is dictated by the following justifications. Firstly, the following discussion focuses on leading AM standards and guidelines that belongs to the first movers, due to their cumulative experience. Secondly, based on the aim of the study to investigate most of the SPS ministries, the decision is to include in the review all kinds of AM approaches targeting either specific or various types of physical assets. Therefore, the remaining part of the chapter is devoted to studying the systematic elements underlying various international AM standards and guidelines in order to uncover what systematic AM practices (SAMP) mean besides investigating their plausible use to uncover the variations between ministries in SPS.

2.3.2 Asset Management Primer of the U.S. Department of Transportation

The Asset Management Primer did not exist until the Office of AM at the Federal Highway Administration (FHWA) was created in 1998. The reasons for introducing the primer were as follows (FHWA, 1999):

- System demand; when the interstate highway system was completed early in the 1990s, the need for maintenance, management and reconstruction of existing infrastructure emerged
- Personnel constraints due to downsizing and incapability of the transportation agencies to attract and retain professional staff
- Increased budget demands
- Accountability to the public

All these factors motivated the FHWA to develop an AM approach that constitutes the key functions of AM practices. However, since that time, two reports published by the

FHWA (2007; 1999) describe the current decision-making approach of the U.S. states to AM practices within highway agencies and the latter proposes a new AM model. The FHWA (1999) described the U.S. states' asset management practices as independent and unique to each state, yet the approaches share three common functions.

First, each state has a long-term decision making plan upon which state policies and objectives are guiding their practices. The second common area is based on this long-term plan, whereby each state produces the short-term needs of projects and programmes. The third common area of functions is the existence of mechanisms for evaluating and selecting projects and programmes. However, when the FHWA (2007) developed a generic model for managing physical assets, The FHWA (2007, p.4) defined transportation asset management as:

A strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their lifecycle, it focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision making based upon quality information and well defined objectives

Accordingly, the FHWA developed a model comprising seven stages, as shown in Figure 2.3. The first stage is concerned with goals and policies, in which asset managers need to understand the organisation's mission and policies. The second stage is related to the asset; inventory, value, functions and services provided. The third stage focuses on the asset's condition and performance in terms of past, current and predicted future condition.

The fourth stage is for developing alternative options to preserve, maintain, or improve assets. The parallel stage with this is used as an input to the fourth stage in which managers should pay attention to available resources and budget constraints. In addition, the stage attempts to find the optimum combination of options.

The fifth stage is to evaluate the consequences of not maintaining assets and how this intended decision is communicated to end users in terms of asset performance. The sixth stage is to investigate the impact of the decisions taken, and at the same time discern how to change their implementation when indicated. The last stage is devoted to finding ways to avoid public disturbance and inconvenience. In addition, the last stage

is coupled to the first stage for monitoring physical assets' performance against predetermined objectives.

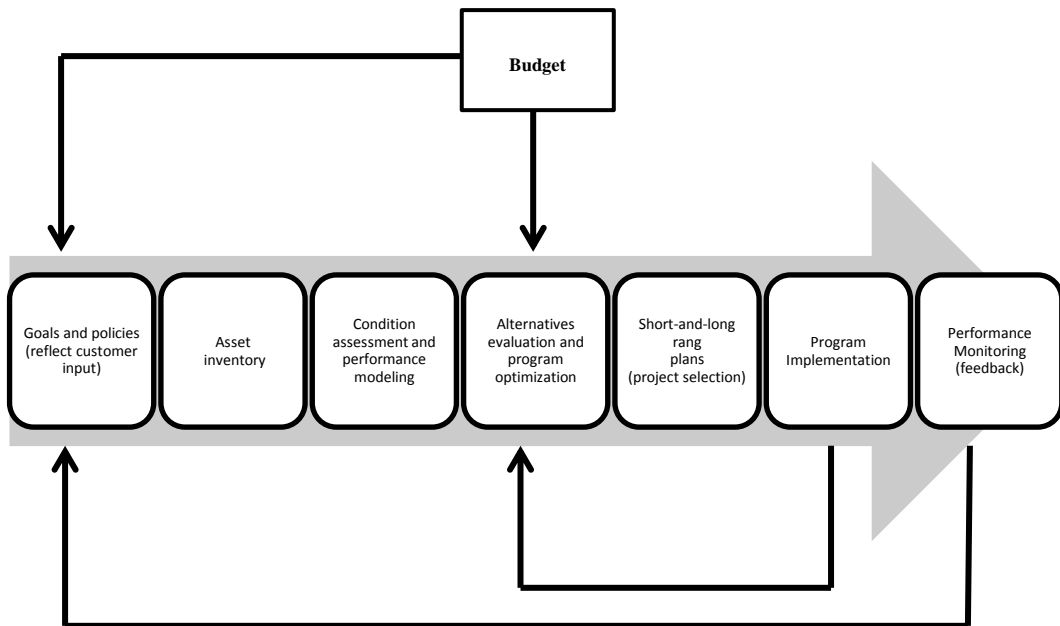


Figure 2.3. A generic asset management system. Source: FHWA, 1999, p.19.

Based on the key stages of the FHWA model (2007; 1999), four comments are deduced. First, performance indicators of physical assets are central to the model. To clarify, the performance stage is built on the idea of managing physical assets by monitoring predetermined performance indicators related to several aspects of the physical asset life cycle, such as the deterioration of physical assets. In addition, asset managers at the performance stage should also predict and consider different scenarios for the future (FHWA, 1999). However, the model does not provide exact performance indicators to asset managers, instead the relevant performance indicators are left to agencies to develop. This type of discretion could possibly put pressure on asset managers in terms of developing suitable and proper performance indicators for utilizing, maintaining and operating physical assets.

The second comment is the simplicity of the FHWA model, where all the required practices fall within few stages depicted in a single process. Despite the simplicity of the model, the FHWA (2007) still claims that to have included various aspects of managerial and engineering practice. In addition, the model is held to be advanced and

to have satisfied the requirements of the business process and decision-making criteria (FHWA, 2007).

Third, AM practices in the FHWA's model are not differentiated in terms of the required practices for the various stages of the physical asset life cycle. To clarify, the model considers AM practices related to maintenance or upgrading of transportation assets to be similar, and notes no differences between them.

The final comment is related to the interpretation of SAMP. According to the FHWA model, the developed model enables asset managers to carry out asset management practices by conducting sequential stages. In addition, asset managers need to repeatedly carry out certain activities in developing the required actions. Therefore, SAMP means that practice is repeatedly undertaken in a process form.

2.3.3 Organization for Economic Cooperation and Development (OECD)

The OECD is an organisation working around the world to promote policies related to the improvement of economic and social well-being. Part of their interest is to develop the transportation management systems and road sectors. Therefore, the organisation allocated a specific committee and held a forum for this purpose. This initiative resulted in developing an AM system *to embrace all the process, tools, data and policies necessary to achieve the goal of effectively managing the asset* (OECD, 2001, p.17).

The OECD (2001, p.8) defines asset management as:

A systematic process of maintaining, upgrading and operating assets, combining engineering principles with business practice and economic rationale, and providing tools to facilitate a more organised and flexible approach to making the decisions necessary to achieve the public's expectations

The AM model developed by the OECD encompasses the following stages; goals (and policies and budget), asset data, performance modelling, analysis options, programme optimisation, project selection/prioritisation and implementation programme as shown in Figure 2.4. All these activities encompass other elements, tools and activities (OECD, 2001).

However, the proposed model works more on a generic level than as a detailed guideline for AM practitioners. For instance, despite the fact that performance indicators are required by the guideline, it does not articulate exact indicators to asset managers. Therefore, the model comes in the form of a simple process similar to the proposed model from the Asset Management Primer of the U.S. Transportation Department.

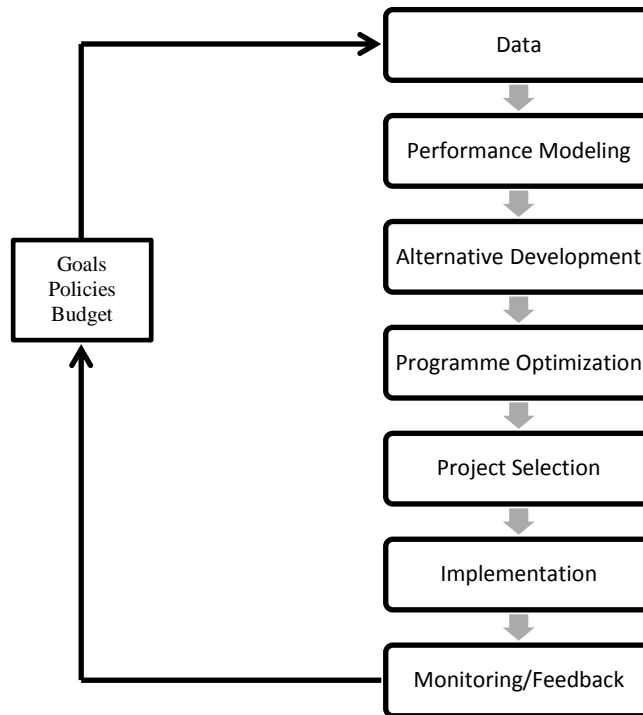


Figure 2.4. The integrated asset management system. Source: OECD, 2001, p.13.

In addition, the model attempts to capture the maintaining, upgrading and operating of physical assets in one single stage (performance modelling). At this stage, asset managers need to apply diverse techniques and tools for monitoring the linkage between the service and physical asset life cycle changes:

- Deficiencies/needs – gap analysis, network analysis
- Future condition – deterioration models, remaining life
- Levels of service
- Valuation – financial and economic value, capitalisation methods
- Volume/use forecast – vehicle operating and user cost models

Although similarity between the OECD and the Asset Management Primer of the U.S. department was very clear, the following difference is noticed. The OECD model allocated a separate stage in the process for the project selection practice, while the Asset Management Primer of the U.S. (the previous guidelines) included the same practice (the project selection practice) within the programme optimisation stage in the process of AM. This type of different arrangements of the stages of the AM process, especially in case of two similar asset management practices that serves the same physical assets, could raise a question about the underlying principles of different arrangements. Therefore, absence of an explanation tool upon which judgement on when and why certain stage or practice in the AM process can be modified or changed is apparent. However, the following argument concludes the findings.

Based on the previous discussion, the following two notes can be inferred regarding the meaning of SAMP. First, SAMP means that there are certain practices and activities connected to each other in a process form. Secondly, SAMP means that asset managers repeatedly carry out certain activities and practices in developing the required physical assets. These two comments confirm what was found in the previous framework, developed by the FHWA.

2.3.4 Integrated Strategic Asset Management (ISAM) and Total Asset Management (TAM)

The Australian government set up the Australian Asset Management Collaborative Group (AAMCoG, 2011) due to a feeling of the need for integrating and aligning all built assets for the whole country in one direction. The AAMCoG (2011, p.4) defines asset management as:

The process of organising, planning, designing and controlling the acquisition, care, refurbishment, and disposal of infrastructure and engineering assets to support the delivery of services. It is a systematic, structured process covering the whole life of physical assets

It is clear from this definition that the framework developed by the AAMCoG intends to cover all of the physical asset life cycle stages. Therefore, according to this required mission, the AAMCoG (2011) developed an integrated strategic AM (ISAM) framework for relating asset management practices to the general direction of the

government. In addition, the AAMCoG (2011, p.11) characterises the ISAM framework as *the increasingly complex and interconnected processes which government and its agencies need to take into account when delivering services.*

The ISAM resulted from the collaborative work of several organisations: the Australian Procurement and Construction Council Inc. (APCC), the Australian Asset Management Collaborative Group (AAMCoG) and the Cooperative Research Centre for Infrastructure and Engineering Asset Management (CIEAM). The ISAM framework provides asset managers with generic principles for asset management practices and leaves the detailed asset management practices to the governments of the Australian states and territories to develop their particular approach (APCC, 2001).

Figure 2.5 below presents the main elements of the framework. These elements are; environmental factors, community needs and expectations, whole-of-government policy framework, organisational strategic management, organisational management and knowledge management. All these elements should be taken into consideration when asset managers develop their asset plan. For instance, the AAMCoG (2011, p.9) guidelines, in case of the environmental factors, state that *the environment affects assets, their functions and their safety. Climate change now needs to be considered in asset management risk identification and planning.*

The detailed activities of the AM practices that support the service delivery planning of organisations are linked to the ISAM framework by submitting tactical and operational plans. While these detailed activities are left to the states and territories (APCC, 2001), providing discretion in their AM practice approach, the states and territories need to submit their strategic plan according to the following classified plans; acquisition, operation, maintenance and disposal. It is clear from the classification of the required strategic plans that physical asset life cycle stages dictate the type of required documents. Up to this point, the ISAM framework does not provide sufficient information about the required practices to develop the four strategic plans. Therefore, the need to approach one of the state or territory guidelines is clear in order to understand what practices of AM are required and how these practices are organised. One of the bodies which have developed an AM approach is the New South Wales Government.

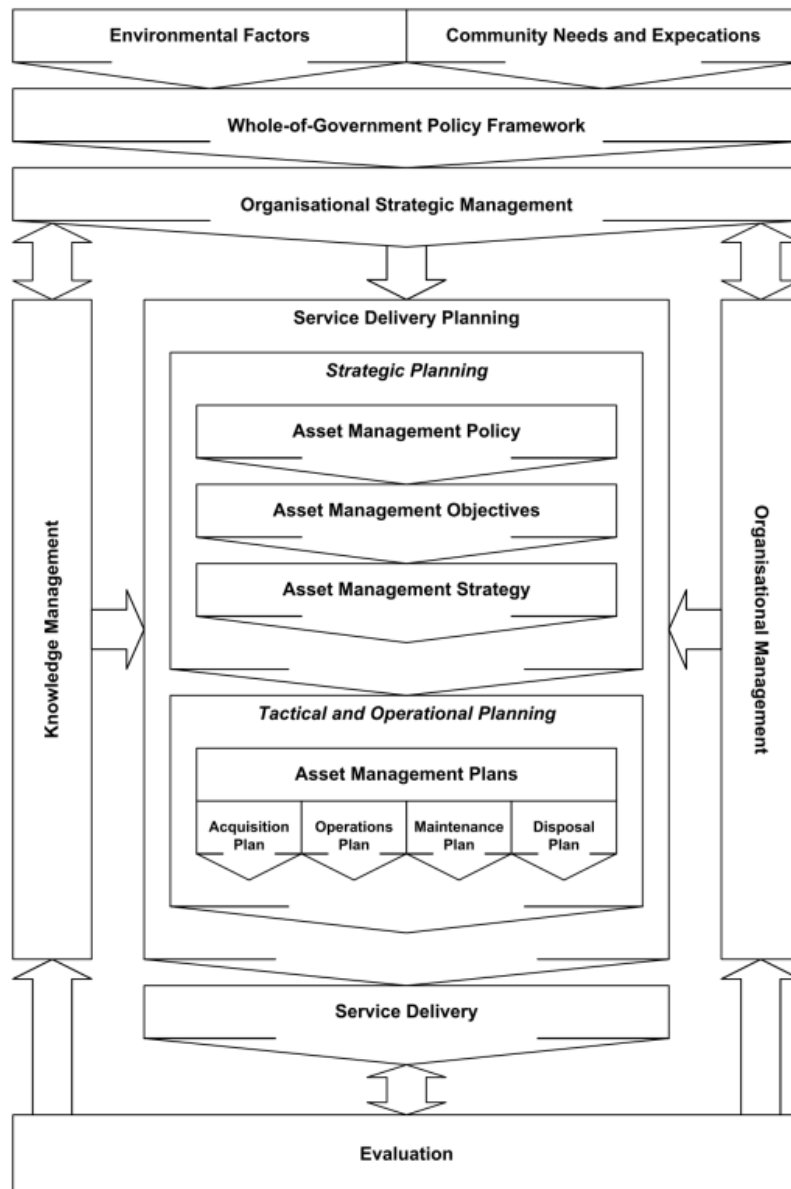


Figure 2.5. Integrated Strategic Asset Management (ISAM). Source: AAMCoG, 2011, p.8.

The New South Wales Government developed the Total Asset Management (TAM) guidelines to achieve better planning and management of physical assets (NSW, 2001a). The TAM guidelines comprise five packages; asset strategy (NSW, 2006a), office accommodation strategy (NSW, 2006b), capital investment strategic plan (NSW, 2006c), asset maintenance strategic plan (NSW, 2006d) and asset disposal strategic plan (NSW, 2006e). Each package is designed to imitate process form practices where each stage dictates to some extent specific practice. Some stages are broken down into

several other stages, consequently forming a hierarchal process. The remaining discussion is devoted to articulating four of the TAM guidelines' characteristics.

First, the asset strategy package is considered the hub of the other asset planning packages; the capital investment, asset maintenance and disposal strategic planning packages. To clarify, the asset strategy package should lead to the *best asset-action for successful service delivery* (NSW, 2006a, p.16), and then, the remaining planning packages detail what is required in terms of capital, maintenance and disposal planning (NSW, 2006a). Therefore, overlap and interaction between asset strategy and the remaining planning packages are highly likely. Unfortunately, the existence of interactions between packages' processes could raise complexity in the guidelines. For instance, the asset strategy package consists of four main stages; service requirements, asset portfolio, risk and risk management and asset performance measurement, as shown in figure 2.6. The asset portfolio in turn is broken down into several stages and one of those stages is the asset utilisation stage. This stage could lead to either the asset disposal package process or capital investment package process. This type of alternative selection of different processes is not clearly identified in the TAM guidelines.

The second characteristic is related to the existence of a hierarchical process of practices. Fortunately, this hierarchical linkage of the processes assists asset managers to connect the strategic and operational levels of the asset management practices because the multiple levels of practices facilitates the linkage between the high level abstraction of strategic management practices and the lower level operation of physical assets.

Third, the TAM guidelines provide asset managers with many factors that affect the physical asset life cycle. For instance, asset managers are required and also guided to investigate the impact of environmental events on physical assets (NSW, 2006a). This type of guidance helps asset managers to identify which factors are influencing physical assets, and in turn need to be investigated. In addition, these requirements facilitate the linkage between the physical asset management practices with the other required practices imposed by the government such as the environmental factors stated earlier in the ISAM guidelines.

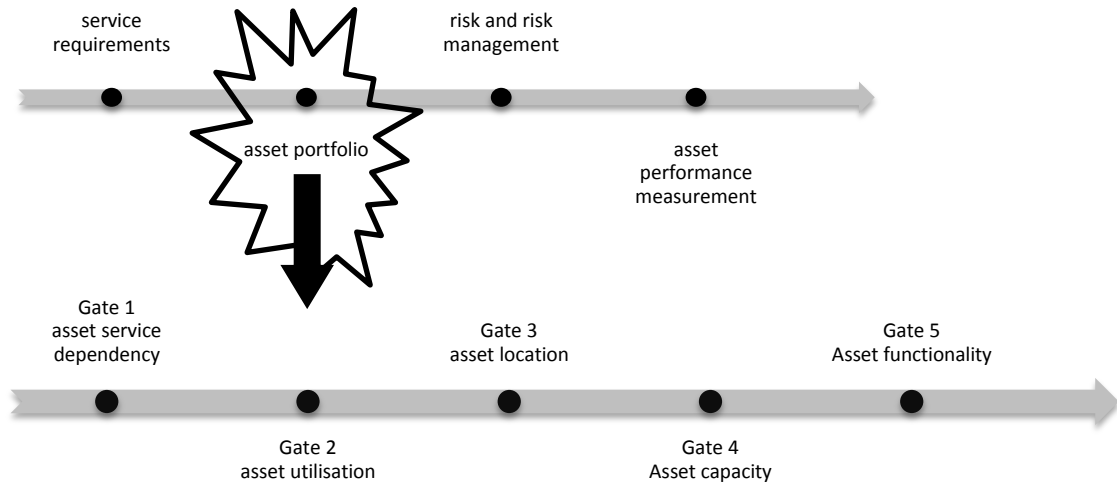


Figure 2.6. Asset Strategic Planning. Source: NSW, 2006a, p.8.

Fourth, although the TAM guidelines present AM practices in a process form, in fact the practices cannot be carried out in a sequential form for the following reason. One of the asset strategy practices, for instance, is the asset portfolio stage, as shown in figure 2.6 above. This stage is followed by the risk management stage. According to the TAM guidelines (NSW, 2006a), the output of the asset portfolio stage is not an input to the risk management process because risk management has a separate process of decision making and does not receive any information from the asset portfolio stage. This evidence supports the view that the TAM guideline is highly likely to be organised in multiple process practices, it rather seems that the TAM guideline is composed of several horizontal and vertical processes.

Based on the preceding four comments, some differences are found between the earlier two guidelines (the Asset Management Primer of the U.S. transportation departments and the OECD) and the TAM guidelines in the following three points. First, the TAM guidelines are composed of multiple horizontal and vertical processes. Second, there are other central practices that are not part of the performance indicators stage, such as the asset portfolio stage in the TAM guidelines, which raises the likelihood of the existence of other types of practices which need to be considered but are not part of the performance indicators. Finally, the TAM guidelines do not imply practices directly linked to the asset life cycle; instead, the TAM guideline has included various aspects

such as knowledge management and organisational management which broad the concept of asset management (AAMCoG, 2011).

Based on the previous discussion, the following two notes can be inferred regarding the meaning of SAMP. First, SAMP means that there are certain practices and activities connected to each other in a process form. Secondly, SAMP mean that asset managers repeatedly carry out certain activities and practices in developing the required physical assets. These two comments confirm what was found in the previous frameworks.

2.3.5 International Infrastructure Management Manual (IIMM)

The International Infrastructure Management Manual (IIMM) is produced by collaboration across the global public works industry. The contributing countries for producing this manual are: the United Kingdom, the United States, South Africa, New Zealand and Australia. The IIMM (2006, p.1.5) states that:

The Manual outlines a formal systematic process for infrastructure asset management

The IIMM's statement of the systematic process for AM includes activities that are outside the typical physical asset life cycle, such as liabilities after disposing of physical assets. However, the manual, generally speaking, targets the typical life cycle of physical assets as clearly identified in the following statement:

The time interval that commences with the identification of the need for an asset and terminates with the decommissioning of the asset or any liabilities thereafter (IIMM, 2006, p.1.10).

In addition, the Manual targets varied assets. These assets are: transportation networks, energy supply systems, parks and recreation facilities, water utilities, flood protection and land drainage systems, solid waste facilities, manufacturing and process plants and telecommunication networks. It is apparent from the diversity of physical assets that this manual is not limited to a certain type of physical assets.

The approach to the IIMM's manual is facilitated by the road map for preparing an AM plan, as shown in figure 2.7. The framework describes required AM practices; corporate planning, review/collate asset information, establish levels of service, lifecycle management strategies, financial forecasts, improvement plan and the remaining

practices as presented in the framework. The following argument is dedicated to those practices.

In the corporate planning stage the following sixth points are needed. First, asset managers are required to clearly define corporate mission and making sure AM improvement programmes are consistent with it. Secondly, AM plan should be compatible with the organisation's risk management framework. Thirdly, AM plan should establish a linkage between the AM outcomes and the achievement of the agreed strategic outputs. Fourth, AM practices' complexity differ according to the organisation's corporate needs. Fifth, employees should be committed to the AM plan.

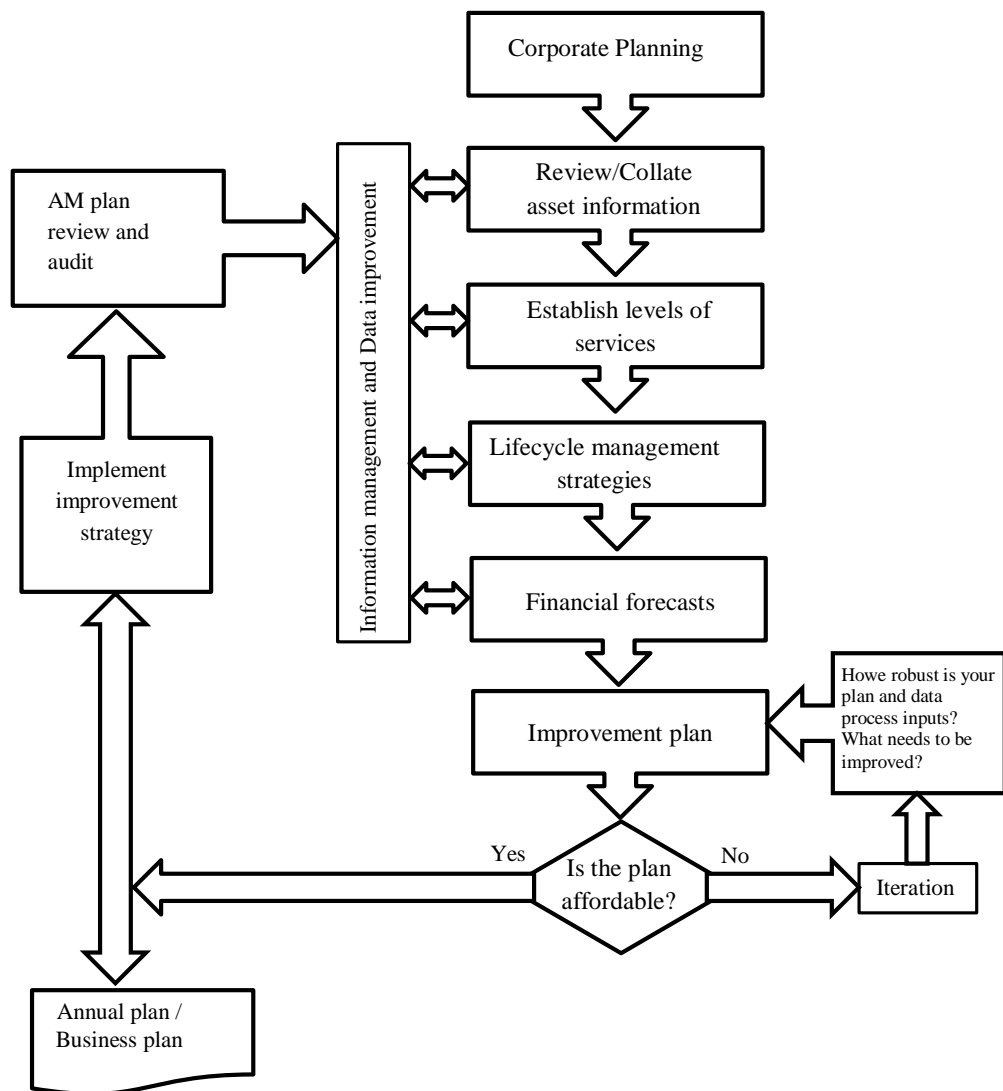


Figure 2.7. The road map for preparing an Asset Management plan using the IIMM manual. Source: IIAM, 2006, p.1.10.

Sixth, the asset owner should determine the core activities of the AM and which activities can be contracted out. In addition, the organisation needs to identify what its core assets.

In review/collate asset information stage, asset managers should have good understanding to what data are available and the most cost-effective way to obtain it. In addition, obtaining data should be planned thoroughly in prior. These data should be structured and numbered. Moreover, asset managers are required to collect information on the state and performance of assets. The performance implies prediction of the remaining asset life. The last required practice in this stage is to conduct asset valuation.

In establish levels of service stage; linking corporate, AM and operational objectives are needed. In addition, asset managers need to conduct certain steps to establish the level of service; understanding the customers, developing levels of service, reporting performance, consulting with customers, and communicate the outcomes. The manual at this stage does not show whether the developed performance indicators are related to existing or non-existing assets. Therefore, it is assumed that the developed performance indicators at this stage are related to various phases of the physical asset life cycle.

In life cycle management strategies stage, asset managers are required to presenting lifecycle strategies. These strategies are; asset planning, asset creation/acquisition, financial management, asset operations and maintenance and asset condition, performance monitoring, and AM review and continuous improvement. In financial forecasts stage, asset managers are required to evaluate the asset lifecycle costs, valuing assets and financial forecasts. Finally, the remaining stages of the road map, in figure 2.7, can be understood by their terminology.

Based on this review and the preceding brief explanation of the process of the IIMM's guidelines, four comments are deduced. First, the possibility of multiple parallel processes of practices is highly likely to occur. For instance, asset managers could start by predicting population demand on the organisation's services and following this, arrive at a solution, without even passing through the assessing failure modes and risks practices existing in the lifecycle management strategies stage.

Second, the IIMM's guidelines are different from previous guidelines in terms of not only providing asset managers with the factors that influence the physical asset life cycle but also leads asset managers to develop the required factors. For instance, at the 'identify level of service' stage, the guideline provides asset managers with the required process and action in order to develop the expected service level. However, this feature in the guideline does not influence the current search for appropriate model to use.

Third, although performance indicators are central to the model, these are not the only source for actions, due to the existence of risk management methodology and demand prediction. This diversity may make the guidelines more advanced than other models because, as seen earlier, some models rely on performance indicators alone, such as in the case of the Asset Management Primer of the U.S. transportation department. Lastly, the IIMM manual central focal point is to develop cost-effective AM plan. This intention is totally obvious in the manual because a dedicated stage for the intention was included, the financial forecasts stage.

Based on the previous exploration of the IIMM (2006) guidelines, the following can be inferred about the meaning of SAMP. Although process form characteristics are discerned in the guidelines, considerable attention is focused on certain practices required from asset managers, asset valuation. However, this does mean other practices are not needed "frequently", instead, all practices are needed to be conducted "frequently". In addition, the guideline allows for parallel processes of asset management practices. However, these parallel processes asset management practices converge into shared practices such as the evaluation stage of the proposed solution.

2.3.6 Property Asset Management in the USA

In 2004, the president of the United States published Executive Order 133327 (EO) related to the strategic management of United States assets. The following paragraphs are extracted from the EO to serve the current purpose, in understanding how the regulations and policies emerged in the USA in order to enhance AM practices:

By the authority vested in me as President by the Constitution and the laws of the United States of America, including part 121(a) of title 40, United States Code, and in order to promote the efficient and economical use of Federal real property resources in accordance with their value as national

assets and in the best interests of the Nation". The EO emphasised the responsibility of executive branch departments and agencies to recognise the importance of real property resources through increased management attention, the establishment of clear goals and objectives, improved policies and levels of accountability, and other appropriate action

The EO established the Senior Real Property Officer (SRPO) in each departments and agencies for administering, developing and implementing an agency asset management planning process that meets the form, content, and other requirements established by the Federal Real Property Council

The EO established the Federal Real Property Council (FRPC) within the Office of Management and Budget (OMB) for administrative purposes, to develop guidance for, and facilitate the success of, each agency's asset management plan. In addition, the EO commands The Council to work with the Administrator of General Services (GSA) to establish appropriate performance measures to determine the effectiveness of Federal real property management. Moreover, the GSA shall provide policy oversight and guidance for executive agencies for Federal real property management

Apparently, the executive order aims to increase the utilization of real property in an efficient and economical manner by allocating responsibility within the OMB. The OMB (2006, p.3) published a Federal Real Property Asset Management Initiative framework in order *to ensure that property inventories are maintained at the right size, cost, and condition to support agency missions and objectives*, as shown in Figure 2.8. The incorporated real property includes land, buildings and structures (U.S. GSA, 2009). Basically, the FRPC framework is divided into two levels. The upper level is the required goal (building the right inventory size) upon which each agency needs to develop a three-year plan and after this update the plan annually. In addition, asset managers have to identify what has been with specific real property that supports their individual asset management plans.

The lower level of the framework is dedicated to developing complete and accurate required information (GAO, 2007). Therefore, the role of the asset management plan (AMP) at the lower level is to systematize agency procedures and actions related to AM. In addition, the AMP provides a three-year plan in which alignment of physical assets with the whole organisation's mission can be attained. The developed required

assets are prioritized in order to achieve the organisation's mission. However, the FRPC (2004, p.4) requires asset managers to include with the AM plan the following:

- *Integrated guiding Principles; support agency missions and strategic goals, use public and commercial benchmarks and best practices, employ life-cycle cost-benefit analysis, promote full and appropriate utilization, dispose of unneeded assets, provide appropriate levels of investment, accurately inventory and describe all assets, employ balanced performance measures, advance customer satisfaction and provide for safe, secure and healthy workplaces,*
- *Agency-specific owner's objectives,*
- *Periodic evaluation of all assets,*
- *Prioritized operations and maintenance and capital plans,*
- *Identified resource requirements to support plans,*
- *Building block asset business plans in agency portfolio context,*
- *Continuous monitoring and feedback mechanism,*
- *Consideration of socio-economic-environmental responsibilities,*
- *Adequate human capital support of asset management organisation, finally*
- *Common government-wide terminology” The next required item of information in the FRPC framework is the legislative authority segment. At this stage, the asset managers are required to address the barriers and process inefficiencies that agencies encounter when disposing of, transferring, constructing, or renovating assets in the modern real estate market*

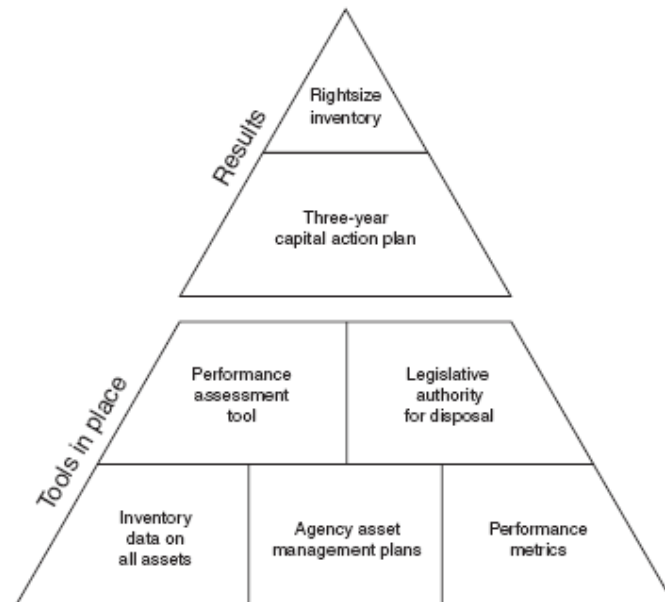


Figure 2.8. Real Property Initiative Frameworks. Source: OMB, 2006.

The last stage is the performance metrics and assessment tool, devoted to providing, measuring and evaluating assets' performance. In addition, with the performance assessment tool, asset managers are equipped with an analytical formula to help federal agencies to identify the following asset characteristics: non-mission dependent, underutilized, costly to operate, in poor condition for possible disposal or rehabilitation. However, agencies are not limited to the four performance indicators provided, instead, asset managers can develop their own indicators in addition to these (FRPC, 2004). The following mandatory performance indicators have been extracted from the FRPC (2009, p.9-11) guideline:

- *Utilization: it is a ratio of the current utilization over intended design*
- *Facility condition Index: a general measure of the constructed asset's condition at a specific point in time. It is calculated as the ratio of deferred maintenance needed to current replacement value; the higher CI the better condition of constructed asset.*
- *mission dependency: the value an asset brings to the performance of the mission as determined by the governing agency:*
 - *Mission Critical: without constructed asset or parcel of land, mission is compromised.*
 - *Mission dependent, not critical: does not fit into mission critical or not mission dependent categories.*
 - *Not mission dependent: mission unaffected.*
 - *Not rated: used for specific departments.*
- *Annual operating costs: consist of the following*
 - *Recurring maintenance and repair costs.*
 - *Utilities (includes plant operation and purchase of energy).*
 - *Cleaning and/or janitorial costs (includes pest control, refuse collection, and disposal to include recycling operations).*
 - *Roads/grounds expenses (includes grounds maintenance, landscaping, and snow and ice removal from roads, piers, and airfields)*

Based on the previous exploration of the FRPC's framework (OMB, 2006), the following five comments about systematic asset management practice are deduced. First, similar to the first two guidelines, the asset management primer of the U.S. and

the OECD, the FRPC's framework relies on only the performance indicators to capture three of the physical assets' life cycle stages; creation, utilization and disposal. Second, although AM practices are not neatly organised in a process form but still the process is working in the high level of abstraction. Third, the Federal Real Property Council requires asset managers to repeatedly carry out certain practices in developing the required actions. Fourth, the framework includes activities not directly linked to the physical asset's life cycle, such as inventory data on all assets. Finally, the framework provides the agencies with clear goal for their management practices, right size inventory. This type of management was not found in all the previous guidelines. Generally, the framework is simple in the process and the number of practices.

2.3.7 Property Asset Management in the UK

The Royal Institute of Chartered Surveyors (RICS, 2012) updated their first published framework for property asset management, which was presented in 2008. The RICS framework, as stated by the institute, is relevant to the UK public sector and private organisations as well. In addition, the guideline is intended for widespread audiences across the public sector, which covers business managers, property and construction professionals, consultants and politicians. Moreover, the RICS (2012, p.9) claims that:

The purpose from the guideline is to provide direction and assistance to those involved with public sector property asset management and provide insight to those on the fringes to explain what is involved and the benefits which will accrue in terms of reduced operating costs, better quality accommodation, more productive staff and satisfied customers

One of the RICS's framework objectives is to articulate the relationship between property asset management and the whole business process, as shown in Figure 2.9. However, the property asset management responsibilities, as shown in Figure below, are limited to the following stages; service delivery strategy, asset planning, asset delivery and delivery review of assets. The four stages are the highest level of abstraction of the asset management practices, and are related to each other in a process form.

Within the service delivery strategy, the guidelines require property asset managers to connect and establish asset policy with the organisation's planned services. Therefore, property asset managers need to understand the organisation's policies and mission. In

addition, property asset managers involved in the service delivery strategy are required to determine the overall approach to how property and accommodation meet the organisation's needs.

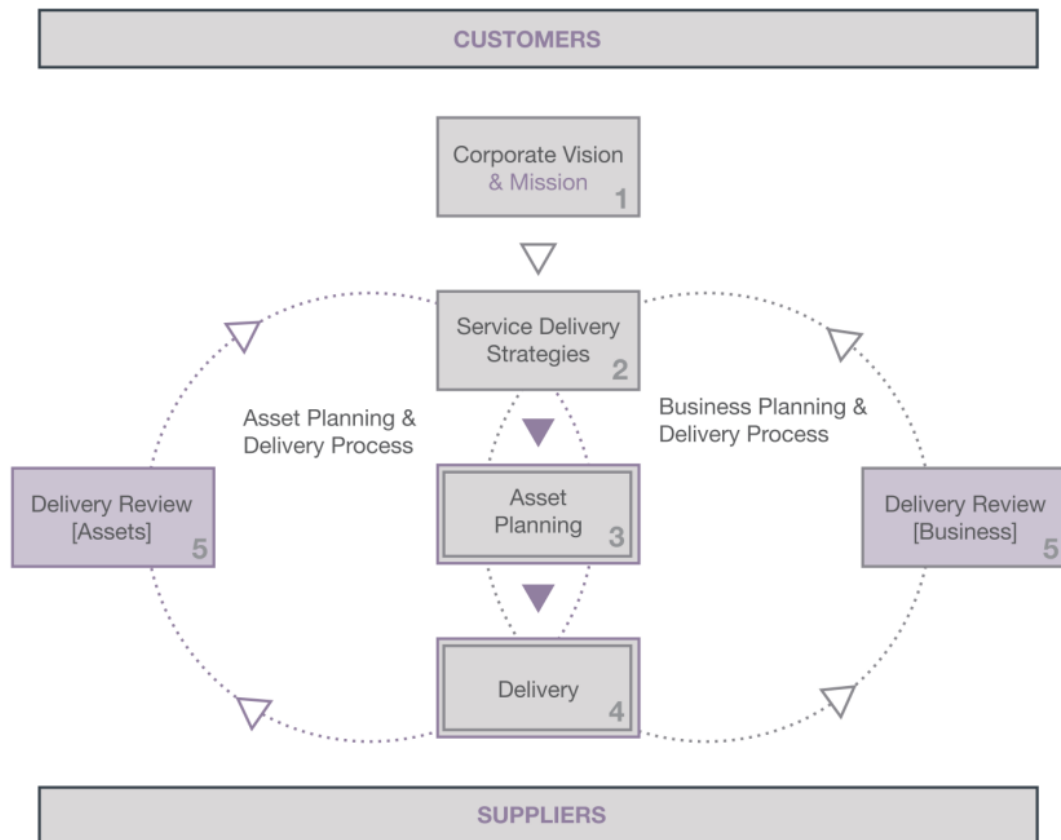


Figure 2.9. The basic business process for effective property asset management. Source: RICS, 2012, p.14.

Moreover, part of the practices within the service delivery strategy is to assist property managers to grasp the corporate policy and objectives that emanate from the corporate vision and mission. The RICS (2012, p.23) claims that establishing an efficient property policy will benefit organisations in the following ways:

- *An efficient allocation of property assets across the organisation*
- *A better integration of service delivery from single multi-purpose locations across the organisation*
- *Introducing innovative online non-property asset dependent service delivery*
- *Increasingly sustainable delivery strategies*

- *Providing a basis for investigating cross-organisation and/or across a number of organisations, engineered property asset vehicles; and*
- *Lower operating costs and efficient use of capital*

The second main stage of the property asset management guideline is the asset strategy and planning activities stage, in which property asset managers should take consideration of and collate information from various sources in order to understand the property context and its effect and outcomes on property assets and the organisation, as shown in Figure 2.10. However, property asset managers are likely to be unable to cover all the influencing sources, and therefore the need to select the most significant and sensitive sources is clear (RICS, 2012). The asset strategy stage is not simply for obtaining information about the impact of various factors on assets and organisation, instead, the property asset managers at this stage are required to appraise and plan testing, evaluate affordability and audit the required portfolio.



Figure 2.10. Asset strategy considerations. Source: RICS, 2012.

After the strategy from the second stage is produced and evaluated, the third main element of the RICS's property asset management framework is the asset delivery stage, in which property asset managers should focus on the *resources for delivery, delivery planning, delivery management, benefits realisation and risk* (RICS, 2012, p.36). These activities are displayed in Figure 2.11. However, the RICS (2012) mentions that the asset delivery stage can be modified or repeated based on the situation which property managers face in reality. The main purpose of the delivery stage is to assist property asset managers to plan how to implement the required strategy.

The fourth and last element of the RICS's property asset management framework is to review the delivered properties and business. The main purpose of the review stage is to review the intended improvements or returns promised in the business cases. The RICS (2012, p.41) claims that there are four key areas requiring review:

- *the property asset management processes*
- *The performance of the property assets in property terms*
- *The performance of the property assets in business terms*
- *Customer experience feedback*

Based on the previous presentation and the RICS guideline revision, five comments can be drawn. The first is that, although the RICS guideline is organised in a process form and especially at the highest level of abstraction, at the lower level the RICS guidelines process is unclear. To clarify this point, the following evidence is provided. At the asset planning stage, the RICS guidelines (2012) provide property asset managers with several factors that have an impact on property. These factors are not organised, and in fact property managers do not have to investigate all of them, but instead property managers are required to select the most important factors. In addition, there are other requirements which are not been mentioned as process activities, such as the evaluation of the selected options to develop the required action.

Second, the RICS guidelines (2012), in the first impression, contradict the repetition characteristics of SAMP found in the previous guidelines. To clarify, the following evidence is given. At the delivery stage, property managers do not have to follow all the stated stages, and property managers have the right to modify, add to or cancel some of the guideline stages. Interestingly, this type of discretion might contradict some of the characteristics of SAMP, but in essence it does not. This characteristic has added another interpretation to the meaning of SAMP. Property managers are required to repeatedly check the validity of practices in order to be systematic. Therefore, the meaning of SAMP can be understood as the following: asset managers are required to visit the practice and check its applicability.

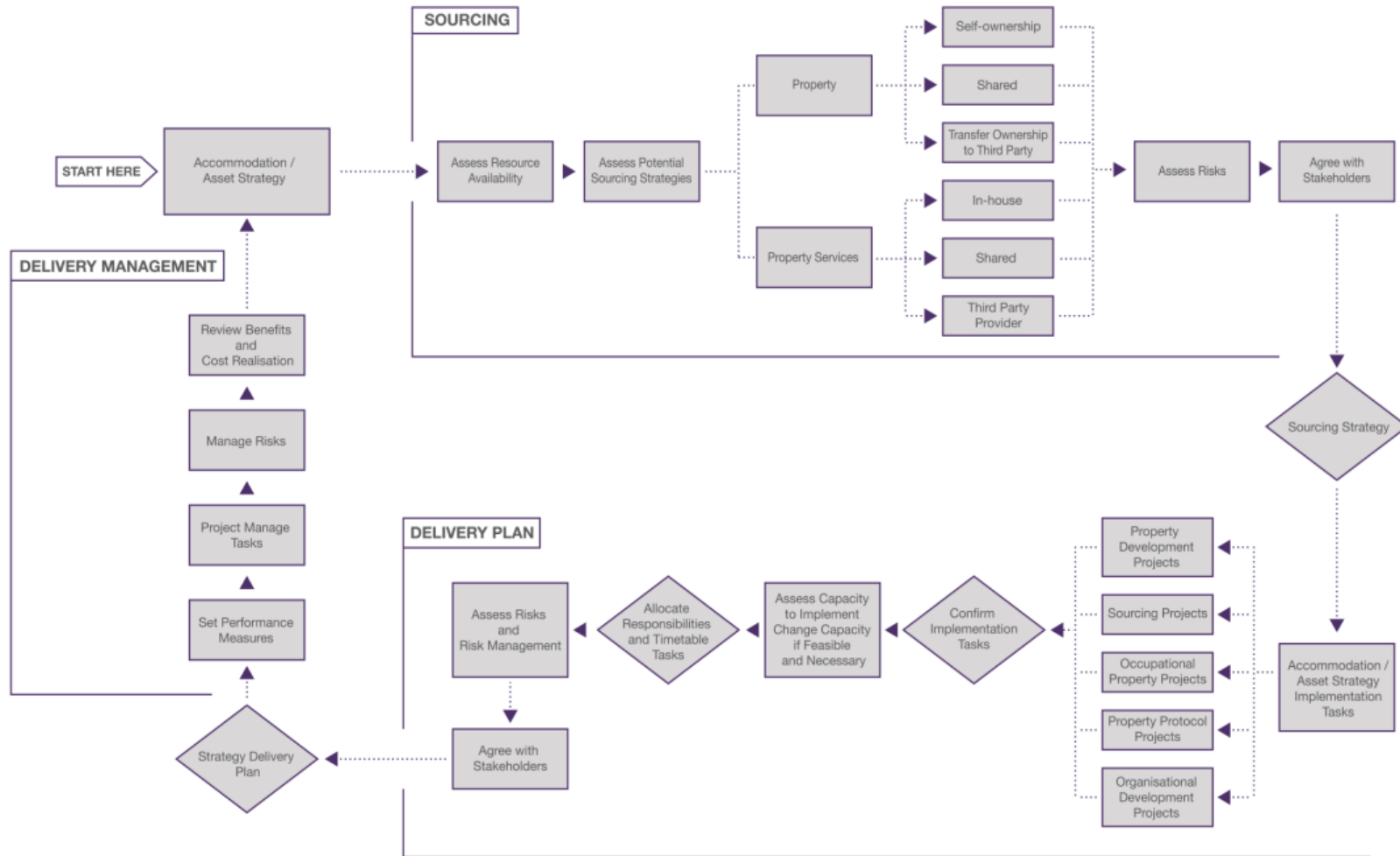


Figure 2.11. Property asset strategy delivery process. Source: RICS, 2012.

Third, the RICS guidelines (2012) cover practices beyond the typical AM practices of the previous guidelines. For instance, the RICS guidelines provide asset managers with detailed practices of AM that focus on how to source the assets which are needed. In addition, the RICS guidelines focus on delivery management plan practices.

Fourth, at the stage of reviewing the delivered properties and services, the RICS guidelines (2012) require property managers to monitor several aspects of property performance. This practice was not mentioned at the second stage, the asset strategy and planning activities stage. The guideline requires property managers to monitor property performance but without mentioning this practice in the asset strategy. However, in the previous Figure 2.9 the guidelines linked both stages diagrammatically.

Finally, the RICS guidelines do not only cover the direct processes that capture the physical asset life cycle. Instead, the guidelines include other indirect factors that may influence AM practices; leadership and change management, organisation culture, data and information management.

To sum up, considering those processes directly related to the physical asset life cycle, the RICS guidelines (2012) require property managers to undertake certain practices in order to be systematic. Moreover, these practices take place in a sequential manner or a process form, especially in the high level abstraction.

2.3.8 Publicly available specification 55 (PAS 55)

After increasing industry demand for AM practice standards, the British Standards Institute responded by producing the first standards for physical AM in 2004 and updated the standard in 2008 (BSI, 2008a). The PAS 55, the name of the standard as known in the industry, was developed to define what AM practices are needed with no emphasis on how these practices can be developed (Edwards, 2010). In addition, the guideline was developed for organisations that consider physical assets as critical or key factors for their success such as utility networks, power stations, railway or road systems, oil and gas installations, manufacturing and process plants, buildings and airports (BSI, 2008a). However, our intention in this chapter is to investigate the required AM practices. Thus, the PAS 55 (BSI, 2008a, v) defines AM as:

Systematic and coordinated activities and practices through which an organization optimally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life cycles for the purpose of achieving its organizational strategic plan

In order to achieve what is stated in the definition, the PAS 55 (BSI, 2008a and b) developed an AM system that comprised eight components as shown in Figure 2.12. The first is related to the AM policy, in which the guideline motivates top management and asset managers to pay attention to the organisation's policy, and then to develop an asset policy that is consistent with the organisation's policy.

The second stage is the AM strategy, in which the guideline lists several requirements that need to be included in the AM practices; performance, risk management, paying attention to stakeholders' requirements, evaluation of developed actions, criteria for prioritization of objectives and plans, and finally making sure the developed plans are aligned with the organisation's strategy.

In the third stage, the guideline requires asset managers to develop objectives that are linked to the asset management strategy. In some cases, objectives can be translated into performance targets such as functionality and capacity. In the fourth stage, asset managers should translate the asset strategy and objective into plans that dictate how physical assets are:

- Created, acquired or used to enhance other physical assets,
- Utilized,
- Maintained,
- Decommissioned or disposed of.

Although asset managers are required to deal with various physical asset life cycles in the AM, they are also required within this stage to evaluate the impact of the strategic decisions on the organisation and many other practices.

The fifth and sixth stages of the guidelines require asset managers to provide several plans for various issues such as training, awareness and competence of employees in addition to the future physical asset delivery. In the performance assessment and improvement stage, the asset managers need to monitor and check the implementation of the asset management plan and objectives in addition to monitoring the performance

of existing assets. The seventh stage concerns establishing, implementing and maintaining process and procedure for the implementation of AM plans. The last stage is the management review stage in which top management are required to evaluate the appropriateness of the AM system to ensure its suitability, adequacy and effectiveness.

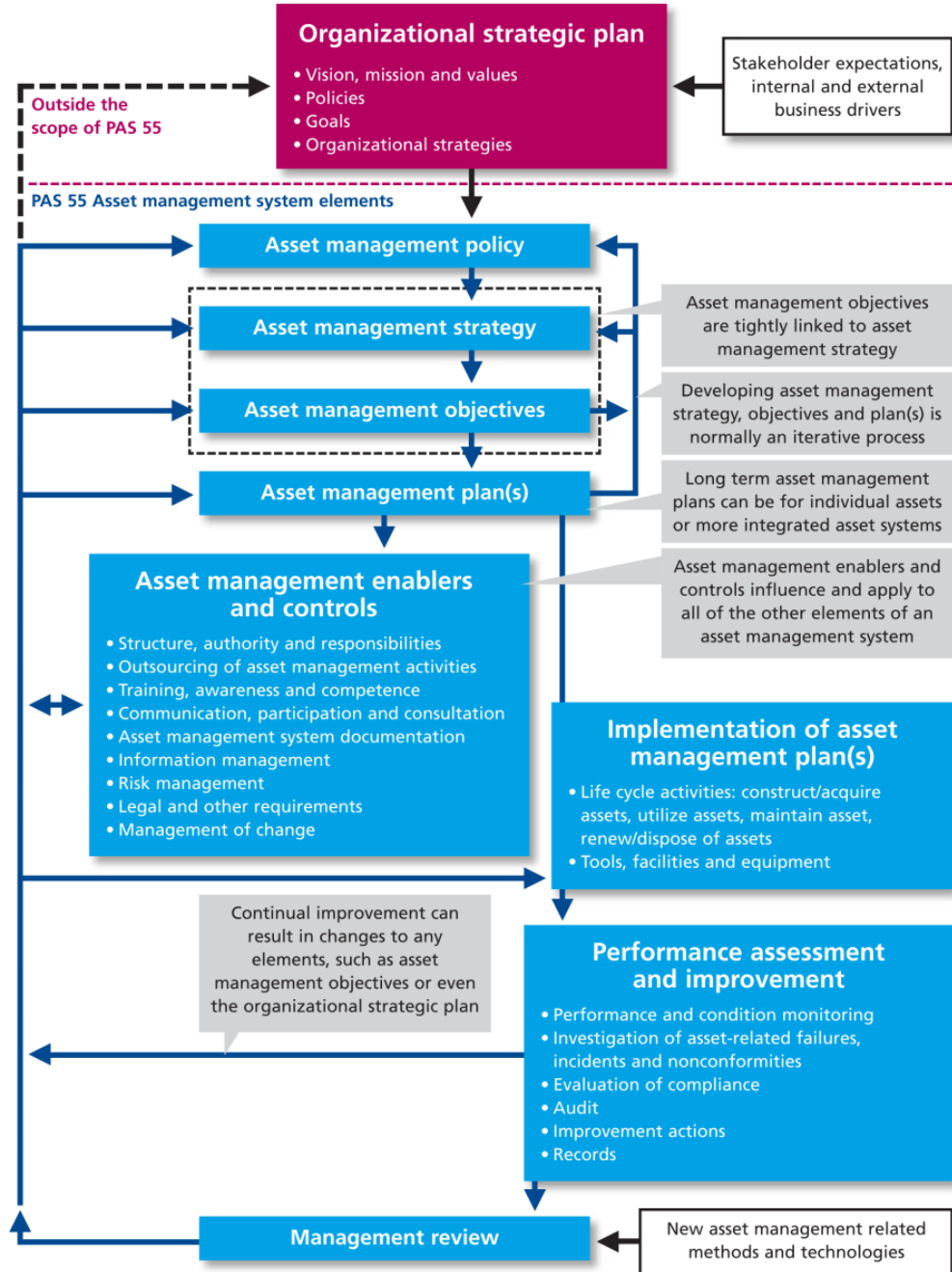


Figure 2.12. PAS 55 asset management system. Source: BSI, 2008b, xii

Based on this review and brief description of existing practices within PAS 55, five observations can be made. First, although the standard is similar to the previous guidelines discussed, the standard has taken into consideration feedback arrangements that link various stages together. Second, the PAS 55 has devoted a separate stage articulating the objectives of AM strategy. This type of practice is not stated in any other guideline.

Third, in the AM strategy stage, the guideline requires asset managers to have performance indicators for physical assets while the following stage is to develop objective. This request contradicts the implicit assumption of performance indicators, because performance indicators have already implied the objectives at the time of considering these indicators (Bryson, 2004). Fourth, the PAS 55 requires organisations to audit AM practices in order to improve these practices (Tim and Roxburgh, 2011). Fifth, not all practices are directly linked to the physical asset life cycle, such as training, awareness and competence of employees.

To sum up, considering those processes directly related to the physical asset life cycle, the PAS 55 (BSI, 2008a) standard require asset managers to undertake certain practices in order to be systematic. Moreover, these practices take place in a sequential manner or a process form.

2.3.9 Issues around asset management practices

This exploration of seven international AM standards and guidelines was intended to provide an understanding of the attributes of systematic asset management practices (SAMP) and potentially lead to the adoption of one of these approaches to investigate the extent to which the asset management practices in the SPS are systematic. As a result, two distinct attributes of SAMP were found from reviewing the international AM standards and guidelines.

The first attribute is that all of the reviewed asset management approaches have certain practices which must be “**frequently**” visited by asset managers, especially at the higher level of the process of practices. Although a considerable number of practices at this high level are similar, there are other practices which are unique to certain approaches, such as the sourcing activities of the RICS (2012) guidelines.

The second attribute is the nature of the relationships between the different AM practices. The simplest form of relationship is a single process form in which asset managers are required to follow certain generic requirements of each stage until all stages are accomplished. A more complicated form of relationship is presented in the way in which different groups of practices are linked to each other in a process form. Therefore, multiple horizontal or vertical processes of activities can be found. In some cases, these processes converge into certain groups of activities, while they diverge in others.

Based on these attributes and considering the centrality of the term ‘**systematic**’, it is vital here to define the term “systematic asset management practices” (SAMP) because the remaining discussion relies on this definition:

(SAMP) Systematic asset management practices are certain practices which are dedicated to capturing the life-cycle of physical assets. These practices are connected with each other in a process form.

It was hoped that one of the international AM practices could be used to investigate the extent to which AM practices in the SPS are systematic. Unfortunately however, a number of obstacles, described below, prevented the study from achieving this intention:

- Although AM approaches provided by various organisations are to some extent similar, there are also considerable differences in the way they are organised, even when these approaches are developed for the same type of physical asset. For example, in the RICS (2012) guidelines, sourcing takes up a considerable space in the process, while it is nearly absent in the TAM guidelines. Another example can be found in transportation AM approaches. While the FHWA’s guidelines do not include an alternative options stage, the OECD guidelines include this as an essential stage. Accordingly, without rigorous evidence to support the choice of what to include and where, it becomes hard to judge the importance of the inclusion and exclusion of certain stages of practice. Therefore, the intention in this thesis is to develop criteria upon which justification of inclusion and exclusion of certain stages is beneficial. Whetten (1989) states that judgement on inclusion or exclusion of certain factors in any

intended theory should pass the comprehensiveness and parsimony criteria. Although Whetten's (1989) suggestion is intended for theory building, it is accepted as suitable for use here.

- The reviewed AM practices are not always presented in a single process. For instance, although the prevalent style of relating various practices together is to depict them in a sequential form (process), the TAM guidelines use multiple levels of processes. Therefore, this type of confusion invites the study to investigate the potential for finding a principle process from which other processes can be derived.
- Absence of information on how AM standards and guidelines have been developed, especially in case of indirect AM practices. For instance, the PAS 55 (BSI, 2008a) guidelines require asset managers to provide various requirements such as training, awareness and competence of employees. In another example, the RICS (2012) guidelines cover indirect practices that may influence AM practices; leadership and change management, organisation culture, data and information management. These practices and elements were not found in some of the seven international AM standards and guidelines. Therefore, part of the work of this thesis is to reveal what are the factors influencing SAMP in SPS.
- The criteria upon which inclusion and exclusion of different stages in AM practices is decided are not clear. Therefore, the next chapter attempts to find the underlying principle upon which the reasons for bringing together various stages are founded. However, based on the previous review of AM standards and guidelines, a general pattern that was imposed over all of the AM standards and guidelines is observed. The pattern found was the consistency of using a process as the main driver of AM practices.

These points highlight the need for further investigation of AM practices. This need emanates from the desire to find explanations to the phenomenon of physical AM practices in order to assist the study to find the underlying principle upon which improvement to AM practices can be achieved. Therefore, the next chapters attempt to develop an AM conceptual framework to resolve the previous obstacles and achieve the study's overarching aim.

2.4 Conclusion

Asset is a wide term which includes various types: financial, intangible, information, human and physical assets. The physical asset is central to other assets besides its centrality in this thesis. Typically, physical assets go through various stages in their life cycle; creating a physical asset, establishing, exploiting and finally divesting that asset. These four stages are targeted by various AM standards and guidelines in order to reap benefit for organisations. The findings have shown that drivers for AM practices are numerous, including for instance recognition of financial payoff for better real AM, increasing budget demand, accountability to the public sector and best value for the public money spent.

Although drivers for AM practices are abundant, the situation of the current AM practices in the Saudi public sector is not known. Few studies on the current asset management practices in SPS have been carried out, and with various deficiencies: some of these studies are conducted for either specific practices or for generic management practices. However, most of the research indirectly indicates the need for better management of physical assets in SPS. For instance, Daghistani, (1991) stated that one of the SPS ministries lacks planning formulation practices, while Almohawis and Al-sultan (1994) claim that Saudi public sector management practices lack method, procedures and formal approach. However, none of these studies discussed the systematic asset management practices in the Saudi public sector. As a result, the lack of knowledge in this area motivated the study to explore it.

The characteristics of AM practices can hardly be known without investigating leading international AM standards and guidelines. Therefore, the targeted AM standards and guidelines are the first movers into the AM domain. Seven international AM standards and guidelines are studied; TAM, IIMM, the Asset Management Primer of the U.S. Department of Transportation, OECD, property asset management in the USA, property asset management in the UK, and PAS 55.

After investigating the leading AM standards and guidelines, six remarks were deduced. First, diversity in AM standards and guidelines is prevalent even when these standards and guidelines are developed for the same type of physical asset. These differences can

be found in stages, numbers, types or configuration. Second, some of the AM standards and guidelines provide considerable information and guidelines to asset managers, while others are limited in their information. This abundance of information affects the configuration and number of horizontal and vertical processes of the standard or guideline. Third, some of the guidelines do not require asset managers to implement all stated practices in the guidelines but require them to check the applicability of the implementation.

Fourth, some of the AM standards and guidelines require asset managers to carry out practices not directly related to physical assets' life cycles, such as developing training plans for the employees. Fifth, the absence of a theoretical model to assist asset management users to understand reasons for this diversity is part of the current observation. The last observation is related to the dominant characteristic found to be imposed over all AM standards and guidelines, which is the process structure.

These observations led the study to derive the meaning of systematic asset management practices (SAMP) from these AM standards and guidelines that can be shared by all AM standards and guidelines.

(SAMP) Systematic asset management practices are certain practices which are dedicated to capturing the life-cycle of physical assets. These practices are connected with each other in a process form.

CHAPTER 3

PUTTING PRACTICE INTO THEORY

The previous chapter explored various international AM standards and guidelines in order to uncover the shape and meaning of the systematic asset management practices (SAMP). The findings led to various conclusions that encouraged the study to develop a conceptual framework for exploration of the systematic asset management practices (SAMP). Therefore, this chapter is dedicated to developing that model, informed by existing literature on process, strategic, portfolio, and programme management thinking, and then coupled with the international AM standards and guidelines previously explored in order to build the intended conceptual framework on a solid justification. Consequently, to part of this aim, this chapter is divided into five parts. The first part discusses the foundation of the intended conceptual framework, based on process theory and the formation of strategy. The second part discusses the intended strategy. The third part focuses on the programme management. The fourth part discusses the portfolio management thinking, and the final part covers the conceptual framework for systematic asset management practices (SAMP).

Part 1

Foundation of the Conceptual framework

This part is devoted to developing the foundation of the intended conceptual systematic asset management practices model. Based on this foundation, the work will proceed until all the components of the model are detailed and theoretically brought together. Therefore, it is beneficial prior to starting this to briefly mention the previous chapter's conclusion. Chapter 2 identified several attributes of the systematic approach to asset management practices, upon which a definition of the systemic asset management practices (SAMP) was developed:

(SAMP) Systematic asset management practices are certain practices which are dedicated to capturing the life-cycle of physical assets. These practices are connected with each other in a process form.

Consequently, from the definition and Chapter 2 conclusion, two vital points can be inferred. Firstly, asset managers have to carry out certain practices "frequently". Secondly, these practices are connected with each other in a process form. The former will be addressed throughout the subsequent discussion, while the latter is central to the current part, as it establishes the foundation for the thinking presented in the study. Therefore, the following discussion starts with the process-based perspective, in which an understanding of process theories is pursued in order to establish a platform. The second part of the discussion is related to process strategy formation, in order to provide the foundation and generic principles of the intended conceptual framework upon which all the future work is built.

3.1 Process-based perspective

Chapter 2 reviewed various international AM standards and guidelines and found a general pattern that was imposed over all of them. The pattern found was the consistency of using a process as the main driver of their AM practices implementation. Therefore, defining what process is seems the best starting point to approaching this concept.

Van de Ven (1992 p.169) after intensively reviewing numerous process models found that the term was being used in many different ways. Therefore, three definitions of the meaning of process are introduced:

1) a logic that explains a causal relationship between independent and dependent variables, 2) a category of concepts or variables that refers to actions of individuals or organizations and 3) a sequence of events that describes how things change over time

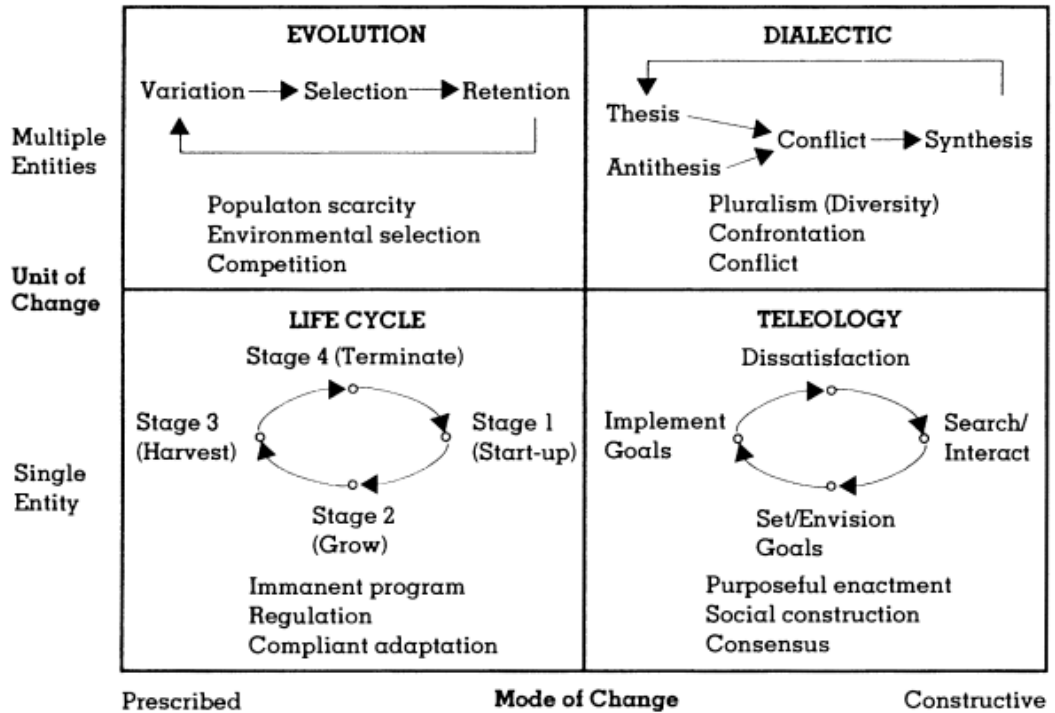
Reviewing these definitions, it appears that the last definition is the most appropriate to the current AM practices because practices are connected with each other in a process form. In addition, these practices take on a different character with each event. For instance, practices in the early stages of the process might be related to performance indicators, while later practices relate to evaluation. Therefore, practices are in a sequence of changes with different characteristics. While defining process is vital for the research in order to identify which type of process will be adopted, the need for a theory of process to explain what, how and why process events unfold over time is pivotal (Van De Ven, 1992). With this in mind, the following discussion focuses on process theories.

3.1.1 Explaining development and change in organisations

A perspective on change processes was introduced by Van De Ven and Poole (1995), following a comprehensive interdisciplinary literature review to identify theories explaining processes of change in the social, biological, and physical sciences. Van De Ven and Poole (1995) found 20 different process theories, and grouped these into four basic schools of thought; life-cycle, teleology, dialectic and evolution theories. These are discussed below and illustrated in Figure 3.1.

According to the dialectical theory, different entities are competing with each other in order to dominate or control. This type of process has emergent characteristics in which each event is disconnected from the next. The second theory is evolutionary theory, in which an entity changes over time through a continuous cycle of variation, selection and retention. In this theory, events unfold through a process of events where these events depend on each other. These two theories are not part of the study's domain because at the practice is considered as a single entity. The most relevant theories that can be

adopted in order to explain the AM reality are the teleological and life cycle theories. Therefore, the following argument focuses on both theories.



^a Arrows on lines represent likely sequences among events, not causation between events.

Figure 3.1. Process theories of organisational development and change. Source: Van de Ven and Poole, 1995, p.520.

The third theory of the process is the life cycle theory, in which the entity develops from its initiation and subsequently evolves until it reaches its termination. The life cycle theory is the most common explanation of the management of change in management literature (Van De Ven and Poole, 1995). In addition, Van de Ven and Poole (1988, p. 37) state that:

Change is imminent: that is, the developing entity has within it an underlying form, logic, program, or code that regulates the process of change and moves the entity from a given point of departure toward a subsequent end that is prefigured in the present state. Thus, the form that lies latent, premature, or homogeneous in the embryo or primitive state becomes progressively more realized, mature, and differentiated. External environmental events and processes can influence how the entity expresses itself, but they are always mediated by the immanent logic, rules, or programs that govern the entity's development

Finally, in the teleological theory, the process comprises a sequence of events, and each event does not rely on the next. In addition, each event in this theory follows a purpose or goal, which is the final cause for guiding the movement of an entity (Van de Ven and Poole, 1995):

According to teleology, development of an organizational entity proceeds toward a goal or an end state. It is assumed that the entity is purposeful and adaptive; by itself or in interaction with others, the entity constructs an envisioned end state, takes action to reach it, and monitors the progress. Thus, proponents of this theory view development as a repetitive sequence of goal formulation, implementation, evaluation, and modification of goals based on what was learned or intended by the entity. The theory can operate for an individual or for a group of individuals or organizations who are sufficiently like-minded to act as a single collective entity (Van de Ven and Poole, 1995, p.516)

According to the description of teleological and life cycle theories and Figure 3.1, it can be claimed that there is an interaction between the teleological and life cycle theories, as shown in Figure 3.2 below, where the life cycle process theory is bound by teleological process theory. This claim can be justified based on the following reasoning.

Justification of the upper level of the process is that the very basic level of the AM practices process is the constructive nature that follows teleological theory. This claim is based on the Mintzberg (1979) argument, in which Mintzberg claims that the behaviour of the pattern of decisions on a long term basis is always undergone in relation to ongoing changes where emergent decisions replace the intended one. Further evidence that supports this phenomenon is evident in the learning school of thought, where scholars claim that the prediction of the future events is to some extent unattainable (Mintzberg, 2009; Steurer and Martinuzzi, 2005). Accordingly, decisions related to physical assets life cycle stages are part of this phenomenon due to the generic nature of this phenomenon.

In case of the lower level of the process, two accounts can justify the nature of the lower process. Based on the evidence collected during the previous exploration of the international AM standards and guidelines in Chapter 2, the following is revealed. Practices within the AM standards and guidelines are different from each other and this,

it is suspected, is due to the teleological nature of the AM practices interpreted in the emergence characteristics of the practices. For instance, The RICS (2012, p.37) guidelines, at the delivery plan stage, mention that:

The property asset manager is now in a position to determine the broad tasks that need to be undertaken to implement the property asset management plan and to turn these tasks into delivery projects. Not all delivery projects will produce final results and some will be 'preparation' projects putting in place the business infrastructure to achieve final results

This kind of practice, as requested by the RICS guidelines, is totally overlooked by the Property Asset Management of the U.S. guidelines, despite the same type of asset, property. Therefore, the previous claim still valid, the practices within the AM standards and guidelines are different and this is suspected to be due to the teleological nature of the AM practices. In the same line of thought, the lower level stages of the international AM standards and guidelines do not prescribe in detail every single practice that is needed to accomplish the stage. Therefore, it is worth repeating here that again there are interactions between the teleological and life cycle theories as shown in Figure 3.2.

The last justification comes from Van de Ven and Poole (1995), who report that most models of strategic planning and goal setting follow a teleological theory. Therefore, Van de Ven and Poole's (1995) report is accepted, because most of the international AM standards and guidelines have the basic characteristics of the strategic planning models, as will be seen later, in Part 2.

Having established the diagram in Figure 3.2, approaching the boundary is the next step. It is well known that one of the AM standards and practices' functions is to articulate the strategic intent of organisations, as this intent is going to be implemented. This process of articulating the strategic intent until the strategy is implemented is captured by the process strategy (Smart et al., 2009; Pritchard and Armistead, 1999). Smart et al. (2009, p.495) state that "this deployment is achievable through the consistent pattern of decisions". In the same realm, Siminia (2009) claims that Mintzberg's works have contributed greatly to this research stream, as Mintzberg clearly presents how the intended strategy actually comes about. In addition, Mintzberg's research can be categorised as among that related to the strategic

management process. Building on this conclusion, the following argument is devoted to unfolding the process strategy phenomenon, based on Mintzberg's theoretical framework.

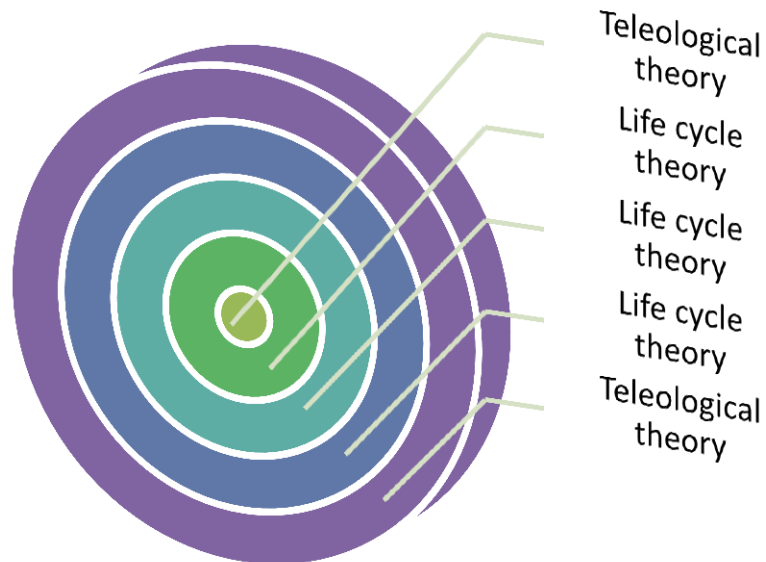


Figure 3.2. The interaction between process theories in AM practices.

3.2 Process strategy research

Mintzberg (1979) states that how a current scenario is realised or how strategies form in an organisation is difficult to uncover unless researchers undertake longitudinal studies. The difficulties involved emanate from two sources. First, strategies do not change in a short-time period, and they may remain active for several years or decades. Second, even if strategies have changed, the process might be very complex (Mintzberg, 1982). Therefore, researchers need to conduct longitudinal studies to unpack previous decisions or actions leading to the current situation. In addition, it can be understood that the logic of process formation stands behind this intention.

Mintzberg (1979, p.72) states that *strategy formation over periods of time appears to follow distinct regularities that may prove vital to understanding the process*. Interestingly, Mintzberg's statement clearly articulates the benefit from investigating

longitudinal decisions in terms of uncovering process behaviours. In addition, Mintzberg (1979) points out that the formation of strategy can be perceived as consistencies of the behaviour of organisations. Based on this perspective, Mintzberg (1979), Mintzberg and Waters (1982), and Mintzberg and McHugh, (1985) divide the formation of strategy into five main concepts: intended, deliberate, realized, unrealized and emergent strategies.

This categorization, as illustrated in Figure 3.3 below, serves the intended conceptual framework for two reasons. First, based on this clarity of the delineation among reality, formation of strategy enables the study to satisfy the teleological process theory principles. To clarify, each concept in the formation of strategy has an implicit goal. The next point is that the formation of strategy framework has emergent characteristics of the teleological process theory. For instance, the non-realized strategies and the emergent strategies have the emergent characteristics of the teleological process theory.

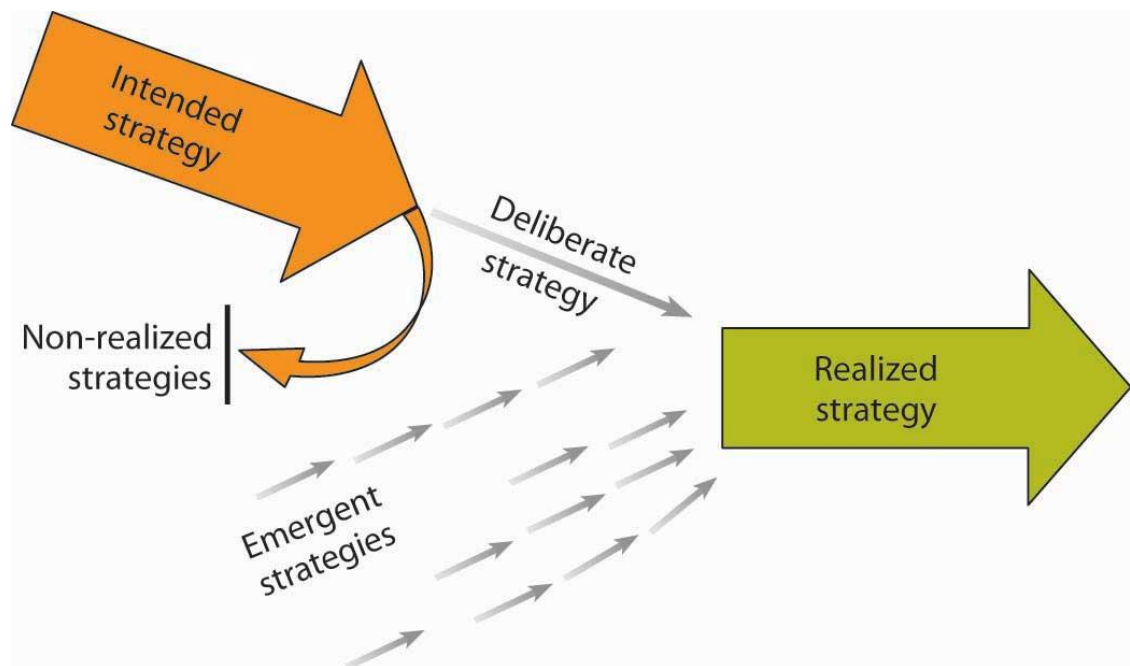


Figure 3.3. Formation of strategy. Source: Mintzberg, 1979, p.80.

The second reason for adopting Mintzberg and Waters' theoretical framework (1982) belongs to the applicability of their findings to any kind of decision, as these findings are both generic and not specific to certain sectors or assets. To prove this, Mintzberg

(1979) conducted four major studies on four different organisations in order to develop the formation of strategy framework. These studies were conducted on: a large automobile company, a government military strategy, a magazine, and a national firm agency. In addition, Mintzberg (1979) claims that over twenty smaller studies were carried out. Therefore, that the formation of strategy is useful concept to constitute the underlying principles of the intended SAMP framework. However, in order to dispel any doubts regarding adopting the formation of strategy as a framework for systematic asset management practices, the following arguments discuss the definition and characteristics of the five concepts and later contextualize the concepts with one of the international AM standards and guidelines, the TAM guidelines. The reason behind selecting the TAM guidelines is due to its explicit presentation of the required evidence.

3.2.1 Characteristics of the basic parameters

The five basic parameters or concepts in the formation of strategy framework constitute the basic building blocks of the intended conceptual SAMP framework. The following arguments focus on each parameter to define it, explore its characteristics and later contextualize it with the AM practices.

The first concept is the intended strategy, and a brief review of the available literature in the strategic field reveals that the notion of strategy is widely used by different scholars here. Consequently, researchers could be left in confusion when attempting to find a precise definition for strategy. There are many differing opinions over most of the key issues in the strategic field, and disagreements run so deep that even a common definition of the terms strategy is elusive (Wit and Meyer, 2004). Mintzberg and Jorgensen (1987) define the intended strategy for the public sector as a plan. When strategy is defined as a plan, it means a conscious intended course of action, or a guideline to deal with a situation. For instance, a plan in management is perceived as; a unified strategy, comprehensive, and integrated plan designed to ensure that the basic objectives of the enterprise are going to be achieved (Mintzberg and Jorgensen, 1987).

This definition, intended strategy, is totally consistent with the international AM standards and guidelines as reviewed in Chapter 2 because all the AM standards and guidelines require asset managers to develop at the end of the followed stages a

collection of various kinds of assets related to different stages of the physical asset life cycle. The intended strategy, then, covers considerable stages in the process of the AM practices. Therefore, the intended strategy is intensively discussed in Parts 2, 3 and 4 in order to reveal the underlying principles working behind the concept and their relation to the international AM standards and guidelines.

On the other end of the spectrum of the formation of strategy is the second concept, the realized strategy. This strategy depicts what an organisation does, not what it says or claims to do, no matter the degree of intention (Mintzberg and Jorgensen, 1987). To clarify, the realized strategy is the organisation current state. The current state can be translated into the current state of physical assets distribution or form. Therefore, the realized strategy “term” can be replaced with the current asset “term”.

The third concept is the deliberate strategy, Mintzberg and Waters (1985) claim that, for a strategy to be perfectly deliberate, at least three conditions should be satisfied. Firstly, there must be precise intentions on the part of the organization, articulated in a relatively concrete level of detail. Therefore, doubts about what was desired before any actions were taken should disappear. Secondly, organisations should undertake collective actions that are common to virtually all actors; either shared as their own or else accepted from leaders, probably in response to some sort of control. This criterion is required to dispel any possible doubt about whether or not the intentions were organisational. Thirdly, these collective intentions must be realized exactly as intended, which means that no external forces (market, technological, political, etc.) could have interfered with them. In this sense, the deliberate strategy is the product of the intended strategy.

The fourth concept is the emergent strategy; this concept stands against deliberate strategy, in which strategy takes place when intention is absent. Mintzberg (1979, p.75) states that:

There is no need to dwell on the point that strategy formation is not a regular, nicely sequenced process running on a standard five-year schedule, or whatever. An organisation may find itself in a stable environment for years, sometimes for decades, with no need to reassess and appropriate strategy. Then, suddenly, the environment can become so turbulent that even

the very best planning techniques are of no use because the impossibility of predicting the kind of stability that will eventually emerge

This fact is also noticed by other researchers, where they claim that 90% of intended strategies fail to be realised as was intended (Mintzberg, 2009). Moreover, Galliers and Baker (1994) state that most realized strategies come about after adopting an informal and creative process which is far from formal and rational decisions. It should also be noted that this phenomenon is not limited to the private sector because Mintzberg conducted the study on both private and public sectors (Mintzberg, 1979). Obviously, the emergent strategy is incident that needs to be adopted but have not been planned for. This incident influences the deliberate strategy and the intended strategy as well. Therefore, asset managers need to pay attention to the emergent incidents for any amendments on the plan.

The last concept is unrealized strategy, which depicts the phenomenon by which organisations find that their intended decisions or actions are not suitable or no longer applicable. In this case, organisations will either discard the intended decision or amend it to suit the reality (Mintzberg, 1979). Therefore, this strategy is the assets that were planned for but at the time of implementation become needless.

According to the last three concepts, the deliberate strategy represents planed assets that need to be implemented. The unrealized strategy is part of the intended asset strategy but becomes needless at the time of implementation. The emergent strategy is the new incidents that emerged. Based on this interpretation, the following argument is devoted to focus on; contextualizing the five concepts with one of the AM guidelines, and then discussing the future actions.

3.3 Contextualising the formation of strategy

In order to satisfy the previous intention, the following argument is divided into two parts. First, the two concepts, the intended and realized strategies, are intensively discussed in Parts 2, 3 and 4. However, the bullet points below provide the reasons behind this decision:

- The intended strategy constitutes the largest part of AM practices, as presented in Chapter 2. This claim is discussed and elaborated on in Parts 2, 3 and 4
- There are several models that reflect the intended strategy reality. Therefore, it is suitable here to stop at this level of detail in order to avoid any misunderstanding and confusion.

Secondly, based on the definitions and characteristics of the three concepts (deliberate, emergent, and unrealized strategies), all the three concepts can be encapsulated and contained within one single theme:

Monitoring the implementation of the intended strategy

Justification of this decision is based on the following quotations drawn from the TAM guidelines. These quotations are mentioned in the stage which regards monitoring and reviewing the capital investment strategic planning (CISP) implementation (NSW, 2006c, p.10):

- *The CISP, as a ten (10) year rolling plan, is updated annually and constantly reviewed to ensure that it incorporates, as practicable, changes to the service strategy as well as changes to resources available, including funding*
 - This quotation obviously inform the asset manager to update their intended strategy to include **emergent changes to the intended strategy**
- *Updates are provided to treasury on the progress of agencies' capital investment programs/projects throughout the year. Agencies should ensure they have in place the processes to monitor the progress of, and expenditure on all capital projects both to manage the procurement process and to report the program status to treasury*
 - This quotation includes practices that obviously fall under **deliberate strategies**, because progress reports are updated in order to make sure the strategies are being implemented as previously stated
- *Complete capital projects are reviewed and the results compared to the project outlines and cost estimates developed for them. did they deliver the project objective? Significant failures to deliver the objectives set down should result in a review of the capital investment strategic planning process. It may indicate that the agency's service delivery strategy was not clearly defined or that alternative delivery strategies were not adequately considered. Alternatively it may show that the project objectives did not adequately translate the service delivery*

strategy or that there were problems with the project options generated. Documented measures should be put in place to prevent recurrence

- This quotation includes practices that obviously fall under the **unrealized strategies** concept because asset managers must pay attention to failures to deliver the stated objectives

In light of the above, the previous evidence about the inclusion of the three concepts (deliberate, emergent and unrealised strategies) under a single theme, *monitoring the implementation of the intended strategy*, means that it is not overstating the case to assert that monitoring of the intended strategy is a part of systematic asset management practices, and the intended conceptual SAMP framework has been established on a combination of theory and practice. It is beneficial here to depict all the previous findings in a diagram in order to establish the basic principles upon which the future work can proceed.

To summaries the discussion, Figure 3.4 below shows the fundamental process of the intended conceptual SAMP framework. The very basic process in the figure below represents what is meant in this thesis by systematic asset management practices (SAMP). The parts which follow aim to detail these concepts to a level which would make them operational for measuring systematic asset management practices of the SPS, confirm part of the concepts, and finally, delineate between existing practices within international AM standards and guidelines.

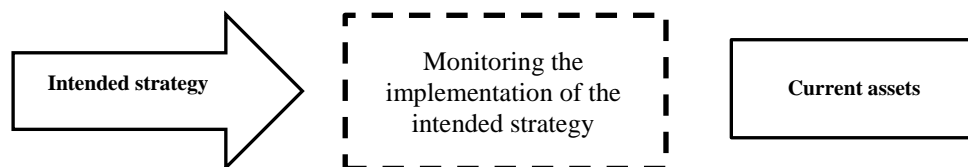


Figure 3.4. The basic stages of SAMP, formation of strategy process.

3.4 Conclusion

This section aimed to establish the foundation of the intended SAMP theoretical framework. The departure point was from the process theory perspective, due to its apparent dominant pattern imposed over all AM standards and guidelines. The findings

have shown that AM standards and guidelines are bound by the teleological process theory. This claim is justified based on the following five pieces of evidence. First, Mintzberg claims that the behaviour of the pattern of decisions on a long term basis is always undergone in relation to ongoing changes where emergent decisions replace the intended one. Second, evidence that supports this phenomenon is evident in the learning school of thought, where scholars claim that the prediction of future events is to some extent unattainable (Mintzberg, 2009; Steurer and Martinuzzi, 2005). Thirdly, practices within the AM standards and guidelines are different from each other and this, it is suspected, is due to the teleological nature of the AM practices interpreted in the emergence characteristics of the practices. Fourth, the lower level stages of the international AM standards and guidelines do not prescribe in detail every single practice that is needed to accomplish the stage. The last piece of evidence is that most models of strategic planning and goal setting follow a teleological theory.

Having established the underlying principles of SAMP framework, the next aim of this section was to investigate a generic model upon which the whole explanation of how decision behaviour, in reality, is carried out is articulated. Fortunately, Mintzberg's works have contributed greatly to this research stream, as Mintzberg clearly presents how the intended strategy actually comes about. Based on Mintzberg's work, decisions in reality can be broken down into five distinct patterns; intended, deliberate, emergent, unrealized and realized strategies. All these five concepts interact with each other consistently in order to form the basic building blocks of the SAMP model. In this sense, the underlying principles of the SAMP framework have been established and confirmed which leads to the next part of the study, regarding building the conceptual framework.

Part 2

The intended strategy

The previous part explored the behaviour of the formation of strategy in reality, and it was found that intended strategy is a part of this reality but needs to be discussed in further detail. Therefore, this part is devoted to intended strategy exploration. The part starts by exploring various existing arguments about the intended strategy upon which an appropriate strategy for the public sector and AM is selected. The strategy selected as suitable is then discussed and explored, to be used as part of the intended conceptual framework for SAMP framework. The last part of the part discusses the future work of the intended conceptual framework.

3.5 Public sector strategy formulation

Many scholars have written about the formulation of strategy from differing perspectives. Edwards (1977) for instance claims that strategy is a mixture of rational process assessment and cultural factors. In addition Edwards (1977) stresses the importance of organisational style at the time of strategy formulation, and requests that planners diagnose the targeted organisation before undertaking any strategic planning. These diagnostic activities should take into consideration both the impact of the strategy on the established way of thinking and the enterprise's reaction and vice versa.

Another researcher, Faucheux (1977), attempts to understand the influence of differing cultural contexts on the strategy formulation process. Faucheux (1977) limited himself to the differences existing between Anglo-Saxon and Latin cultures, and found that the Latin world tried to conduct top-down management practices, while the Anglo-Saxons tried to conduct bottom-up management practices. At the end of the study, Fuchou's (1977, p.136) claimed that:

A successful union of Anglo-Saxon and Latin cultural traditions could result in a kind of strategy formulation that could be called experimental policy. Anglo-Saxon pragmatic empiricism would contribute its capacity for initiative and for trial-and-error learning in concrete action, while Latin

thought would assist in making underlying assumptions explicit and in determining the significance of results

Pettigrew (1977) acknowledges that formation of strategy is a continuous process, but that the emergence of specific dilemmas transforms this ongoing nature of strategy formation into discrete decisions in a form of strategy formulation. This process, as seen by Pettigrew (1977), brings differing parties together, and each has their opinion and different degree of attention. The search for a solution to this dilemma usually mobilizes power around various demands and, hence, strategy emerges.

Hedberg and Jonsson (1977) approach strategy formulation from the perspective of interaction between rational analysis and emotion. Hedberg and Jonsson (1977) stress that rational analysis takes place within the boundaries set by the meta system. In addition, the researchers emphasise the discontinuous nature of strategies caused by changes that take place in the strategy. This change emanates from how participants perceive and interpret the surrounding environment, which leads in due course to a new world view. However, the change does not only emanate from the strategists' world views to shape reality. Reality itself might also impose changes on the strategists' world view. In fact, Ansoff (1977) proposes that strategy formulated results from the attempts of managers to relate a complex organisation to its turbulent environment. Mintzberg (1977) terms this approach a learning organisation.

All these differing perspectives and understandings encouraged Mintzberg et al. (2009) to depict strategy as an elephant, and researchers as blind people who are attempting to define and recognise this elephant, and that different individuals could define the same elephant in different ways. In fact, Mintzberg et al. (2009) state that there are ten schools of thoughts in the strategic management domain. The ten schools are divided based on two major types of strategies: deliberate and emergent. In case of deliberate strategy, Mintzberg et al. (2009) list six schools: design, planning, positioning, power (macro), cultural and entrepreneurial. In the case of emerging strategy, the authors list four schools: cognitive, learning, power (micro) and environmental.

With the purpose of streamlining the selection of the best strategic approach, Mintzberg et al. (2009) mapped out the ten schools of thoughts on the Figure 3.5 below. Mintzberg et al. (2009) suggest that the proper strategy can be selected based on two criteria: the

internal process of the organisation (the horizontal axis) and the external environment of the organisation (the vertical axis). The external environment of the public sector can be considered stable and controllable based on the characteristics of machine organisations, as the public sector is made up of these (Mintzberg, 2000, p.399).

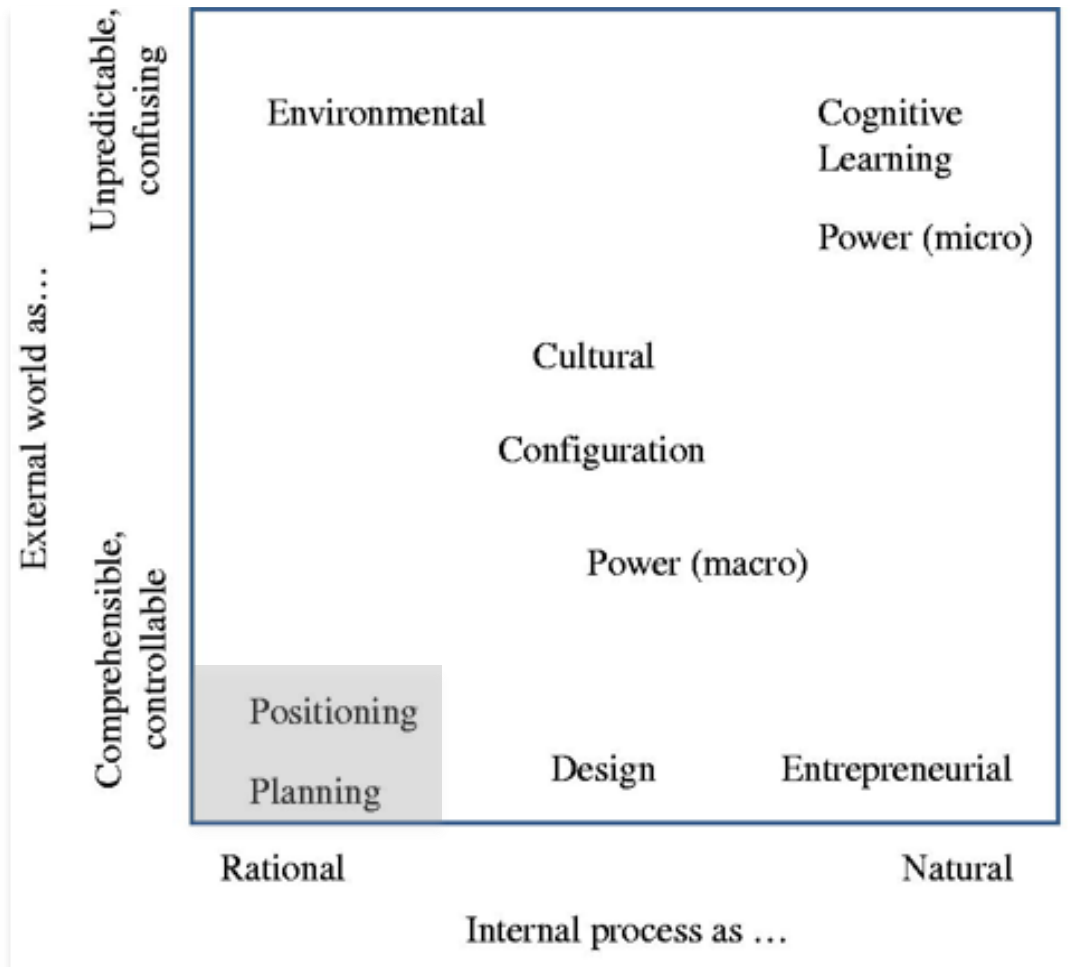


Figure 3.5. Mapping the schools of strategy formation. Source: Mintzberg et. al., 2009, p.348.

The internal process in public sector organisations is influenced by two factors. First, the internal process of public organisations intends to be rational because the public sector is not made up of entrepreneurial organisations (Mintzberg, 2000). In addition, the public sector requires managers to show explicit processes in decision-making practices for accountability reasons (Bovens, 2005). Second, there are certain areas of both discretion for and constraint on public sector managers (Bovens, 2005). Consequently, the selected strategy should fall into the shaded area in Figure 3.5, which

indicates that the most plausible strategy for the public sector is positioning and planning schools of strategic management practices.

However, Steurer and Martinuzzi (2005) oppose this orientation because they consider strategy in public sector should be built on informal and mutual adjustments among a variety of actors (learning school) rather than through formalized planning procedures, conducted by distinctive planners. Based on this argument, three schools of thoughts are considered up to this stage: positioning, planning, and learning schools. Therefore, the following argument is devoted to justify the plausible strategy for the intended conceptual SAMP framework.

Hansen (2007) investigates the applicability of the positioning school in public government organisations and finds that when public organizations are highly regulated with a fixed budget and not working under market-like conditions, the positioning school cannot be adopted, because positioning schools focus on value appropriation and choice. Against this argument, the strategic planning school is the candidate school for the intended strategy, even if this decision is challenged by Steurer and Martinuzzi (2005, p.456), when they stated that adopting strategic planning school in public sector have three major fallacies:

- *planning builds on a predetermination of future developments and discontinuities, which are highly uncertain and therefore not predictable*
- *Because, according to the planning school, those who have developed plans are rarely the same people who implement them, planning is detached from implementation in terms of both the time line and the key actors involved*
- *The most fundamental fallacy of the planning school is the assumption that strategy formation can be accomplished by formalizing the process through distinct planners, who are isolated from daily routines*

In spite of the previously discussed fallacies of the strategic planning school, the study still intends to adopt this school due to three reasons:

- All AM standards and guidelines reviewed in Chapter 2 require asset managers to follow certain processes and procedures in order to develop the required AM plan.

- One of the strategic planning issues is the detachment of the planners from the reality. However, this issue is not totally accepted due to two points. First, according to the AM standards and guidelines reviewed in Chapter 2, it seems that the people who are responsible for developing the asset plan are the same people who are working in the public sector. Therefore, the detachment is not totally realised. Second, the intention is to improve AM practices in the SPS. Therefore, the future development of the SPS is related to improving current public sector employees not to delegating AM planning to external planners.
- In Part 1, it is assumed that the AM practices process is bounded by teleological theory, within which the life cycle theory falls. Accordingly, the study's aim is not to detail every practice of the AM process but to build on the following theoretical perspective. One of the objectives of the study is to investigate all AM practices in the SPS. Within this, it is necessary to stop at a certain level of detail during the journey of delineation between AM practices (parameters or concepts). This restriction is required because physical assets are varied and might need certain types of practices such as forecasting physical asset failure, as will be seen later.

3.6 Strategic planning for AM in the public sector

Those who believe in strategic planning see planning as a way of future thinking, decision making, controlling the future, integrated decision making and a formalized procedure to produce vivid results in the form of an integrated system of decisions (Mintzberg, 2000). Young (2001), for instance, reports that many of the U.S. states and local governments perceive strategic planning as a process of long-term planning upon which objectives, goals and mission are articulated and pursued.

In addition, Young (2001) states that there are many models for strategic planning, and that no one of these is completely exceptional to another, and no one model is clear of illness or problems. Young (2001) argues that there is a widespread agreement, as evidenced in recent literature, on the existence of six general steps which are presented in a strategic planning process. These steps as stated by Young (2001, p.4) are:

- An environmental scan or a situational analysis of the strengths and weaknesses of one's organization, including an analysis of external threats and opportunities (SWOT). This includes also a stakeholder analysis which is an analysis of persons, groups or organizations whose interests and concerns are of key importance to the overall strategic process
- The formation of a vision for the future and an accompanying mission statement which defines the fundamental purpose of an organization, its values, and its boundaries
- The development of general goals, specific targets or objectives, and performance measurements to gauge organizational progress"
- A set of action strategies to indicate what will be done to accomplish its goals and objectives
- The implementation of detailed operational or tactical plans that provide for staff assignments and schedules
- An evaluation component to monitor and revise the overall strategic approach as it unfolds

Bryan (1997), for instance, explores how strategic planning links together the internal power of organisation with the external environment in order to fulfil the organisation's mission by introducing fit for purpose solutions, as shown in figure 3.6. Unfortunately, Bryan (1997) model does not articulate clearly par of Young's (2001) general principles in strategic planning process. Therefore, it is justified here to revise other model in the strategic planning process.

Bryson and Roering (1987) studied the usage of six models of strategic planning in private sector and discuss their key features, assumptions, strengths, weaknesses, applicability to the public sector, and contingencies governing their use. As a result of their investigation, Bryson and Roering (1987), and Bryson (2004) propose a model of strategic planning to the public sector that differs from the earlier models in the following. The model emphasises the innovation as a strategy, specific management practices to support the strategy, development of a vision of success that provides the decentralized and entrepreneurial parts of the organisation with a common set of superordinate goals toward which to work, nurture of an entrepreneurial company culture, and maintaining central control.

In addition, Bryson (2004) claims that this model is a form of Strategy Change Cycle, in which the strategy is flexible in adapting to new situations or factors, and therefore the

strategy works under an ongoing state of thinking, acting and learning. In addition, the Strategy Change Cycle becomes a strategic management and planning process to the extent that it is used to link planning and implementation of strategy in order to manage an organization strategically. This model, as claimed by Young (2001, p.15) is:

Methodical, participative, conventional, and particularly adaptive to public organisations. It combines the concepts, issues, processes, and results that several other experts in the field of strategic planning have advanced

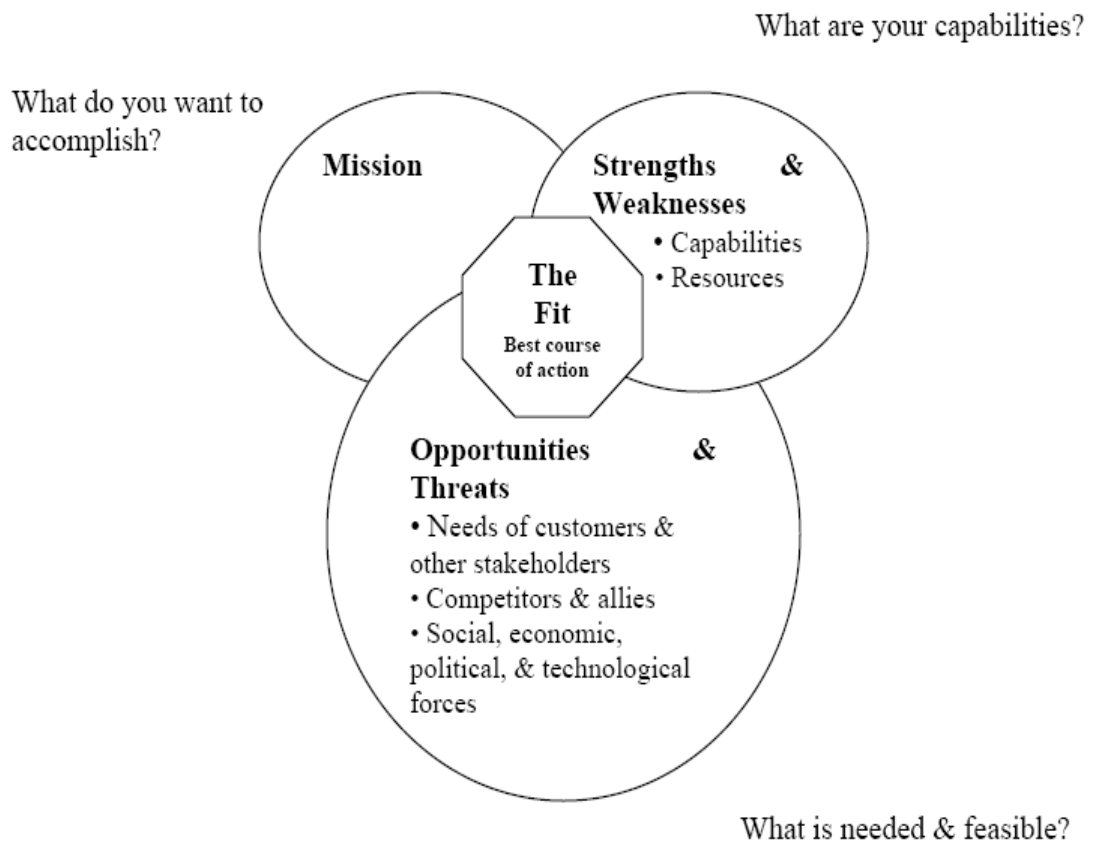


Figure 3.6. Generic strategic planning model. Source: Bryan, 1997.

The Strategy Change Cycle model consists of ten steps as claimed by Bryson (2004, p.32) shown in figure 3.7:

- *Initiate and agree on a strategic planning process*
- *Identify organizational mandates*
- *Clarify organisational mission and values*
- *Assess the external and internal environments to identify strengths, weaknesses, opportunities, and threats*

- *Identify the strategic issues facing the organisation*
- *Develop, review and adopt the strategies or strategic plan*
- *Establish an effective organisational vision*
- *Develop an effective implementation process and finally*
- *Reassess the strategies and the strategic planning process*

In this sense, Bryson's (2004) model is compatible with the orientation of this study in terms of visualising AM practices as process practices besides its clear delineation between reality's concepts. Although Bryson's (2004) model looks suitable for the intended conceptual SAMP model, yet several points could influence consideration of its inclusion in its totality in the intended conceptual framework.

Initially, Bryson's model starts the strategic planning activities by inviting strategic planners to obtain an agreement from policy makers. Although this activity is vital, the aim of this thesis is to diagnose the current SAMP characteristics at SPS and, then, improving AM practices. Therefore, excluding or merging this activity might be preferable. Further, Bryson's model provides many details that can be merged; stages 2, 3, 6 and 7 as shown in figure 3.7. These stages provide several practices that can be merged into a single stage based upon their main purpose. Finally, stage 8 is optional, while the aim is to find very basic stages of the strategic planning process. Although these practices are vital, the preferred interest is to meet the current aim of the study is to reach the basic stages of the process and then derive other processes if needed on the basis of international AM standards and guidelines.

Based on the above insight, it would be useful to look at other strategic models which have a higher level of abstraction. The reason behind this thinking is to draw boundary between the upper and lower possible levels of abstraction which most of AM standards and guidelines can fall in. Bryson and Roering (1987, p.20-21) stated that *since strategic planning tends to fuse planning and decision making*. In this sense, it is beneficial to review the reasoning models that might works in higher level of abstraction of the strategic planning process.

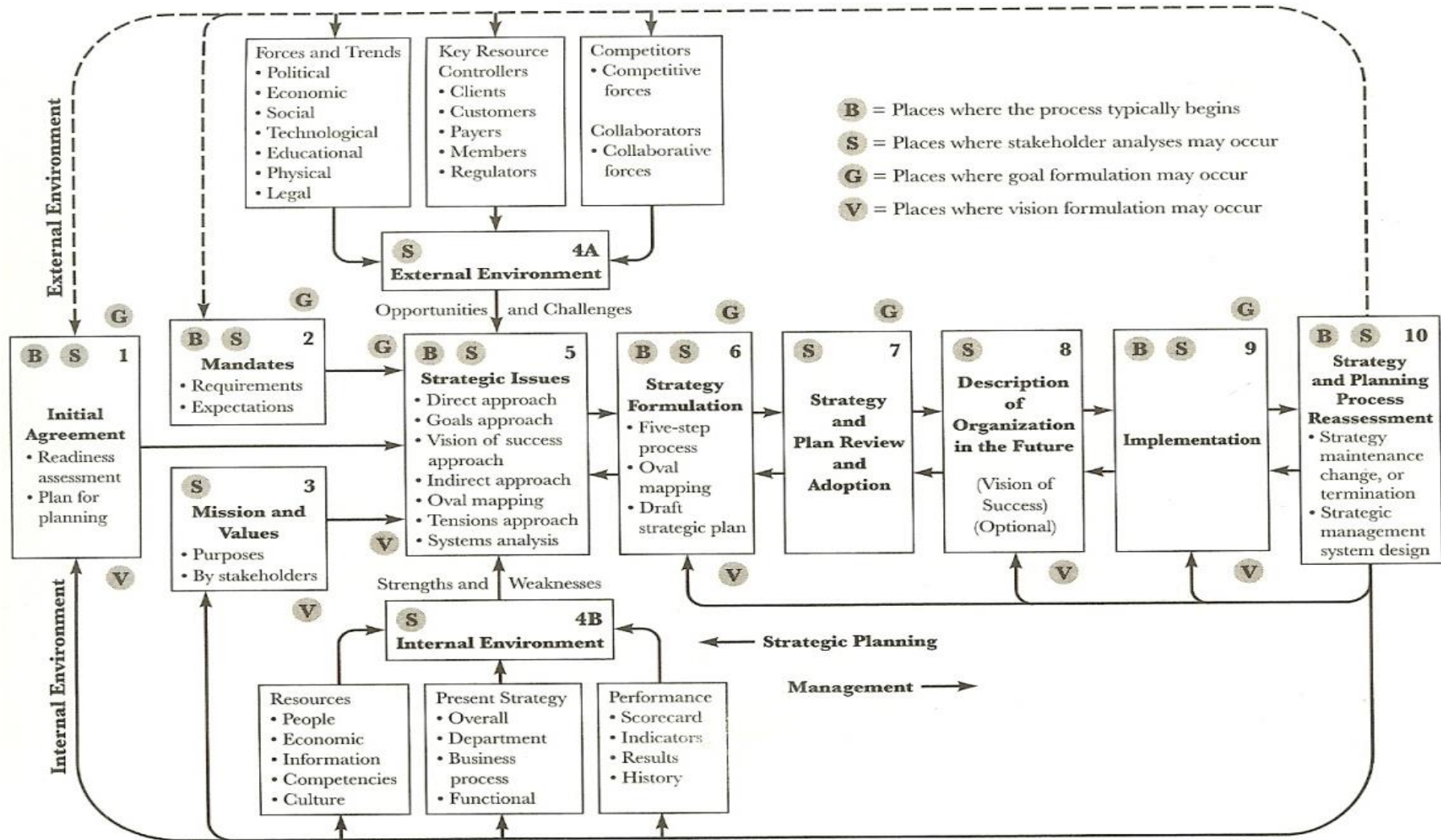


Figure 3.7. Strategic Change Cycle. Source: Bryson, 2004, p.33.

The strategic/rational reasoning process introduced by Wit and Meyer (2010) are used, and shown in Figure 3.8 below. This model is composed of four sequential stages: identifying the problem, diagnosing and analysing the problem, conceiving and formulating a solution and, finally, realizing action. These four stages, as presented by Wit and Meyer (2010), can be broken down into eight stages as shown in the figure below.

In fact, after comparing and comprising the Bryson's model with Wit and Meyer's model the following is found. There are two differences between these models. The first is related to the nature of Bryson's model, which stresses on thinking, acting and learning because the organisation's strategies usually might drift away from strategic intentions. Consequently, the model requires these organisations to realign their strategies to suit organisation's strategic objectives by using feedback from the realised strategy for the diagnosing and identifying stages. Therefore, this concept of feedback will be adopted in the intended theoretical SAMP model.

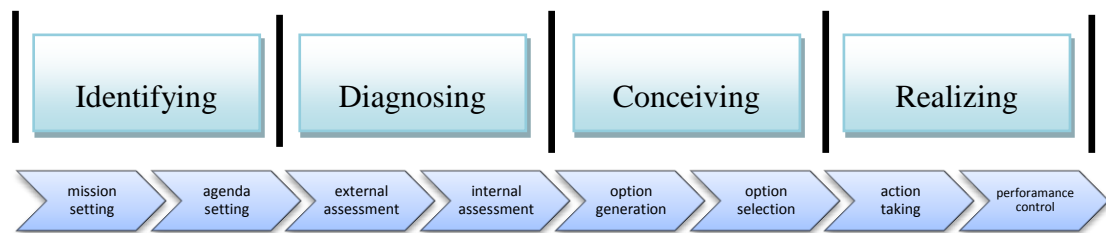


Figure 3.8. Strategic reasoning process. Source: Wit and Meyer, 2010, p.109.

The second difference is related to the level of detail offered by Bryson's model against the proposed strategic/rational reasoning process of Wit and Meyer (2010). The Bryson model (2004) included much detail in terms of elements and factors in the lower level of the proposed model. This level of detail resulted in making the strategic planning process more usable in delineating between the international AM standards and guidelines. However, some of these details are not going to be included in the intended theoretical SAMP framework due to certain contextual specifics, such as including some of the external environment variables as part of the intended model.

Although there are some differences between both models, however, there is also considerable similarity. Bryson's model resembles, to some extent, the Wit and Meyer (2010) strategic/rational reasoning process, especially if Bryson's model is consolidated, all these re-arrangements of concepts are illustrated in Figure 3.9 below. Figure 3.9 below presents the three models together: Figure 3.4 in Part 1 (The basic stages of SAMP framework), Bryson's framework and Wit and Mayer's framework. To clarify, the following bullet points explain the re-arrangements of concepts:

- The identifying stage of Wit and Meyer's model (Figure 3.8 above) corresponds to the first three stages of Bryson's model (Figure 3.7 above)
- The diagnosing stage of Wit and Meyer's model (Figure 3.8 above) corresponds to stages 4 A and B of Bryson's model (Figure 3.7 above)
- The conceiving stage of Wit and Meyer's model (Figure 3.8 above) corresponds to stages 6 and 7 of Bryson's model (Figure 3.7 above).
- The realising stage of Wit and Meyer's model (Figure 3.8 above) corresponds to stages 9 and 10 of Bryson's model (Figure 3.7 above).

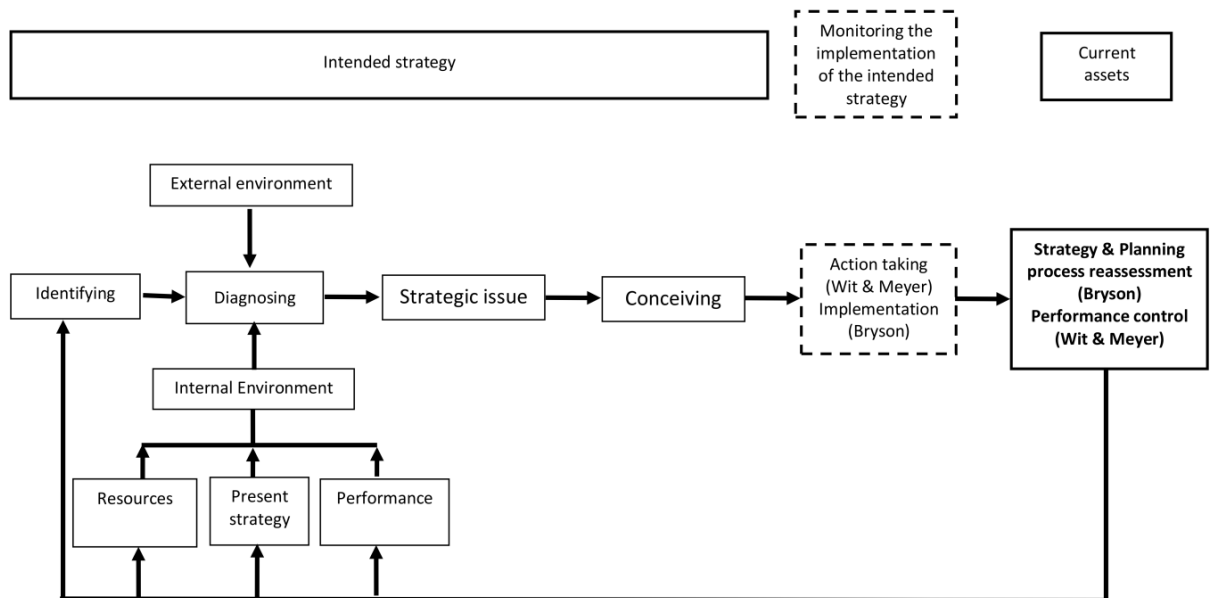


Figure 3.9. The hybrid framework of strategic formation and strategic planning/reasoning process.

In fact, the only additional stage in Bryson's model which is not part of the Wit and Meyer model is the strategic issues stage. However, all these stages (concepts) are detailed and discussed in the following subheadings. The purpose from this argument is to answer several questions; what are the characteristics of each concept? What is the definition of each concept? Why concepts are merged together? Do these concepts have the same purpose in order to be merged? What is the domain of each concept? What is the relation between these concepts and the international AM standards and guidelines? Answering these questions will clarify and also justify the reason behind re-arranging and fusing all models. In addition, the work, as will be seen later, will result on discarding some of these stages, breaking down some stages into several other stages, emerging new stages that are not part of Bryson and Wit and Meyer models but they are part of the AM standards and guidelines. Therefore, it is beneficial to start the argument from the first stage of the hybrid model, identification stage.

3.7 Identifying stage (problem and issue)

The identifying stage, as identified by Pearce and David (1987), is the beginning of the strategic planning/reasoning process. In this stage, identification of issues (Wit and Meyer, 2010; Johnson et al., 2008; Bryson, 2004) or problems (Robbins et al., 2009) should be recognized, clarified and written (Blair-Loy et al., 2011). Other authors and researchers such as Johnson et al. (2009) suggest that at this stage strategists should seek to understand governance structure, social responsibilities and ethics and stakeholder expectations.

Some authors, such as Robbin et al. (2009), consider the gap between what we want and what we have is the source of issues and problems besides organisational policies, deadlines, financial crises, competitor actions, customer complaints, expectations from bosses and upcoming performance evaluation. Scholars such as Saloner et al. (2001) and Wit and Meyer (2010) believe that the identification stage encompasses two distinct elements; organisation mission and agenda setting. The first is related to the core values, beliefs, business definition and purposes of organisations. The second element is related to knowing the cognitive map of strategists, group culture and political skills inherent in the people involved.

In addition, Bryson (2004) at this stage requires strategists or people working at organisations to identify and understand formal and informal mandates within the organisation and then to clarify the organisational mission and values. Formal mandates can be found in various requirements, restrictions, expectations, pressures, legislation, policies, ordinances, charters, articles and contracts. In addition, informal mandates can be summarized as political behaviour in general terms. Therefore, grasping all mandates with the clarifying organisation mission and values will provide public servants their cause of existence. Bryson (2004, p.38) claims that:

Clarifying purpose can eliminate a great deal of unnecessary conflict in an organisation and can channel discussion and activity productively. Agreement on purpose also defines the arenas within which the organization will collaborate or compete and at least in broad outline charts the future course of the organization

Pearce and David (1987) agree that an effective mission statement could motivate employees to recognise where their business activities fall, whether in the market or public arena. In addition, an effective mission statement supports and enhances organisations to distinguish their self from other organisations. It provides the scope of organisations and alternative objectives and strategies. Blair-Loy et al. (2011) state that a mission statement may come in different formats; it may be referred to as the credo, core values, corporate philosophy, vision statement or guiding principles of the organisation.

In the past 20 years, scholars have studied the impact of the mission statement on organisations' performance. These studies reach two different opinions; some of them find an impact on performance; while the others are sceptical (Blair-Loy et al., 2011). Nevertheless, Weiss et al. (1999) report that the mission statement has spread through US public agencies, and accordingly that the government made a decree which states that "The Government Performance and Results Act (PL 103-62) requires federal departments and agencies to write a mission statement before developing strategic plans and measuring performance to that mission" (Weiss et al., 1999, p.195). Bart (2001, p.360) defines the mission statement as:

A formal written document intended to capture and organizations unique Raison d'être. It should answer such vital questions as: why do we exist, what is our real purpose and what are we trying to accomplish

Campbell and Yeung (2004; 1991) complain that management literature has paid little attention to mission statement activities. Therefore, Campbell and Yeung (2004; 1991) have attempted to take remedial action regarding this problem by proposing a model to define and design mission statements. The researchers see the mission statement as a combination of business strategy, philosophy and ethics. However, Campbell and Yeung (2004; 1991) also suggest that mission statement is an ongoing task which requires continuous revision and development. They also describe the building blocks of the mission statement as; purpose, strategy, behaviour standards and values, as shown in Figure 3.10 below. They also claim that a strong definition of mission statement must firmly link together these four elements, articulating them and allowing them to reinforce each other. The discussion which follows will cover these building blocks separately.

The purpose of the organisation should be clarified by answering several questions as stated by Campbell and Yeung (2004, p.272), such as:

What is the company for? For whose benefit is all the effort being put in? Why should a manager or an employee do more than the minimum required? For a company these are the equivalent of a person asking why I exist.

Strategy is a vital part of the mission statement, but is also a means to an end. Therefore, asset managers should understand how organisations achieve their purpose of tracking and uncovering an organisation's strategy. However, if strategy is not explicitly stated, this does not mean that there is no strategy. Strategy can be found implicitly in organisations' movements, behaviours, actions, policies or other sources, (Parthasarthy, 2007; Bryson, 2004; Christensen et al., 1987).

The third element of the building blocks of the mission statement is the existence of standard behaviour. Campbell and Yeung (2004; 1991) report that the simple existence of purpose and strategy is insufficient to the organisation's activities. Rather, purpose

and strategy should be translated into life activities through standard behaviour which is coded as employee behaviour or organisational policies.

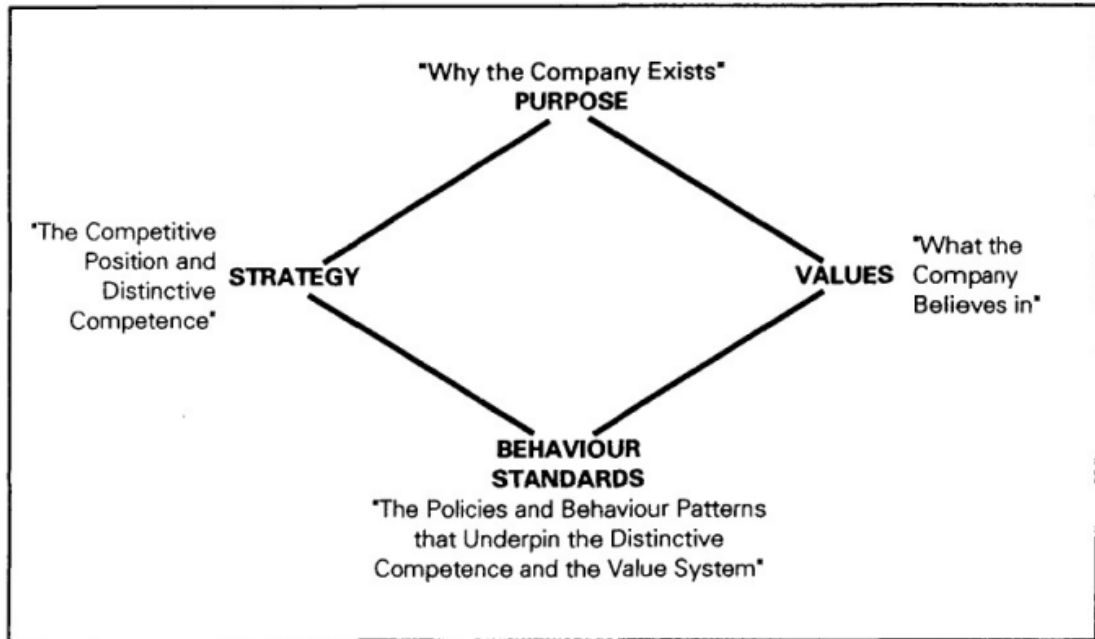


Figure 3.10. Mission statement development. Source: Campbell and Yeung, 1991, p.13.

The last element of the mission statement is the embedded value of the organisation; *values are the belief and moral principles that lie behind the company culture* (Campbell and Yeung, 2004, p.275). In addition, values are the emotional rationale that links purpose with behaviour as presented in the model, and strategy is the commercial rationale that links purpose with behaviour (Campbell and Yeung, 2004). Having established the argument in the identification stage, the following subheading is to investigate international AM standards and guidelines based on this understanding.

3.7.1 Identifying stage and asset management

Undoubtedly, the identifying stage is central to all asset management approaches. For instance, the Asset Management Primer of the U.S. department of transportation states that (FHWA, 1999 p.20):

Organizational goals, policies, and budgets establish a consistent evaluative philosophy". In addition, "decisions regarding program investments are optimized according to goals established by elected officials and policy makers". Moreover, "organizational policies may be thought of as a broad

overlay to the process. Nonengineering/noneconomic factors that reflect the agency's value, perceptions, and predispositions may modify performance-based decisions", and "the key to establishing performance goals is determining user priorities, values, and standards

The TAM (NSW, 2006a, p.2) guidelines state that:

Agency strategic plans should reflect the government's strategic agendas and priorities. These are communicated in various ways including through the NSW State Plan, current and emerging policy and legislation, Budget statements and Cabinet decisions

In addition:

Service deliver information contained in the RSP and corporate planning documents provide necessary service details about which services are to be delivered and how to develop an Asset Strategy that best meets the agency's needs (NSW, 2006a, p.7)

The RICS guidelines have allocated a separate stage to the identifying stage, and created several clauses. For instance:

To develop a business focused property asset strategy, property asset managers must have a complete understanding of the corporate policies of their organisation (RICS, 2012, p.22).

Other clauses included are listed as:

Corporate goals objectives and strategy, Corporate values and policy, The organisation's vision for its future, Operating Unit's aspirations and plans, Changes in internal organisation and structure, The organisation's vision for property, Impact of alternative work style (RICS, 2012, p.25)

Apparently, the previous asset management approaches require asset managers to understand what their organisations are for. Therefore, from the previous discussion, the following recommendation can be distilled; defining, designing and writing the mission statement, as suggested by the U.S. Government and Campbell and Yeung (2004; 1991), is beneficial.

3.8 Diagnosing stage (SWOT or SWOC)

Strategic planning/reasoning at the diagnosing stage is in its situational analysis mode, which results in the identification of solutions to the strategic issue. At this stage, strategists attempt to link both the internal and external contexts of the organisation to resolve the strategic issue or problem. Once the connection between both contexts is fulfilled, the results can be highly effective and hence create public value (Wit and Meyer, 2010; Robbins et al., 2009; Johnson et al., 2008; Barney, 1991; Bryson, 1988; Christensen et al., 1987). Therefore, SWOT or SOWC (strength, weaknesses, opportunities and threats or challenges) analysis is the stage where all these factors are linked together in order to understand the organisation's position and physical assets, in turn. The discussion which follows investigates both environments in order to establish a basic process that includes all AM practices.

3.8.1 Internal environment (S and W)

From existing strategic management literature, various perspectives are deduced on the internal environment of organisations. Many researchers, such as Christensen et al. (1987), Row et al. (1994), Thompson and Martin (2005), Parthasarthy (2007), Grant (2008), and Wit and Meyer (2010), see competences and resources of an organisation as playing a significant part in the organisation's success. Although this perspective is vital, and significant in the strategic planning/reasoning concept, it does not serve the intended conceptual framework because it does not lead to next level of abstraction.

It is necessary to know, at this level, what should be done with the assets themselves in order to manage them. Therefore, Bryson's (2004) perspective might be more suitable. Bryson (2004) sees the internal capability of organisations as comprising three sequential stages. In the first stage, the required inputs or resources needed for implementing the organisation's business should be articulated and become known.

In the second stage, these resources are processed for delivering the required outputs. This output in the last stage of the internal environment should be delivered in an efficient and effective manner. These three interlinked stages are separately discussed in the following parts, and combined with asset management practices.

3.8.1.1 Resources (Input)

Any factor increasing the strengths and weaknesses of an organisation can be thought of as a resource (Wernerfelt, 1984). Bryson (2004) classifies resources into five elements; people, economy, information, competencies and culture, while Johnson et al. (2008) classify resources into four kinds of resources; physical, financial, human and, finally, intellectual capital. Others, such as Wit and Meyer (2010), divide resources into two main classes; tangible and intangible, with each class broken down into many other factors. PAS 55 (BSI, 2008a) categorises organisations' resources into five main groups of assets; financial, human, information, intangible, and finally, in the centre of all the assets, are physical assets. These physical assets interplay with other types of assets (BSI, 2008a). It would seem from this that physical assets are crucial to organisations.

Therefore, Johnson et al. (2008) encourage managers who are responsible for the organisation's assets to employ them efficiently and effectively in order to achieve the requirements of customers' expectations, or in some cases requirements for increasing the competency of organisations in achieving competitive advantage against rivals. Similarly, physical asset managers might need to achieve the expectations of accountees or adopt a proactive approach to create public value (Moore, 1995).

Therefore, Johnson et al. (2008) suggest that resources might have two different levels of capabilities. The upper level's capability is based on the capabilities of physical assets to achieve competitive advantage. However, this concept is not suitable in the case of the public sector, due to the absence of a market environment (Hansen, 2007). Meanwhile, the lower capability level of physical assets enables organisations to accomplish the required services. Interestingly, thinking about the lowest capability level of the physical assets lead to take into consideration the following question, What if physical assets capability falls and become lower than the lowest level of capability? Can we call that failure of physical assets or what? Basically, this thinking takes us into two concepts related to threshold: failure of physical asset(s) and performance failure. The latter concept is discussed in the relevant part (performance subheading).

The former concept is already being used by various maintenance approaches, such as the asset management primer of the U.S. department of transportation (FHWA, 1999).

In addition, within predictive maintenance practices, asset managers are required to take into consideration various practices, and one of these is the optimum equipment life (Mobley, 2004). Therefore, this thesis does not introduce a new concept to physical asset management practices, but rather the novelty is in the inclusion of the concept within the diagnosing phase of the strategic planning/reasoning process, which provides delineation between practices in the internal environment.

Predicting physical asset failure is also found in asset management approaches, whether in terms of using risk management approaches or performance indicators. In terms of risk management, many asset management approaches consider this as part of their practice, including; FHWA (2007, 1999), TAM (NSW, 2006a), OECD (2001), IIMM (2006), and PAS 55 (BSI, 2008a). Therefore, the main message behind this stage concerns the need to pay attention to predicting physical asset failure.

3.8.1.2 Present strategy (Process)

At this stage, asset managers attempt to transform input (physical asset resources) into output (performance). In addition, this activity, as stated by Bryson (2004), is crucial and pivotal, but difficult at the same time. Moreover, Bryson (2004, p.137) states that:

Organisations generally cannot say succinctly what their present strategy is- overall, by business process, or by function. One of the most important things a strategic planning team can do is simply to articulate clearly what strategies the organization currently practices. This role of finders of strategy is very useful role for planners. The recognition of patterns and the discovery of pockets of innovative strategies in various parts of the organization can be immensely instructive and can give the strategic planning team a better-informed basis for assessing strengths and weaknesses

Based on this statement, asset managers need to discern and reveal the relationship between physical assets and the organisation's strategy. This relationship is proposed by Bryson (2004) to occur in three distinct areas; business process, overall organisational strategy, and function.

The first area, business process, has been totally overlooked by all international asset management approaches. To clarify, asset management standards and guidelines have not indicated how the business process interacts with physical assets in order to improve

the strategic activities of the organisation. Therefore, the intended framework will cease at this level of detail.

The second area recommends that managers pay attention to the overall organisational strategy. This area has drawn a considerable amount of attention from almost all of the international AM standards and guidelines. These approaches continuously require asset managers to take into consideration other organisation's asset strategies, in addition to national and organisational strategies (RICS, 2012; BSI, 2008a; NSW, 2006a; IIMM, 2006; FRPC, 2004; OECD, 2001; FHWA, 1999). Therefore, it can be assumed that this activity is immensely significant to asset managers.

The final activity of the present strategy stage is to investigate the relationship between the physical assets' function and the organisation's function. As discussed by Bryson (2004), the organisation's function might express the strategy. However, it is assumed that function in general terms has two directions. Functions can be derived either from the organisation, top down, or from the physical assets, bottom up. This assumption is borrowed from Mintzberg's (2000, p.71) work on a hierarchy of objectives. To clarify, in terms of top down direction, Mintzberg states that *objectives are decided upon by the top management for the entire organisation and then, cascade down the structural hierarchy, as devices of motivation and control*. On the other hand, in terms of the bottom up direction, Mintzberg (2000, p.71-72) states that:

If the objectives truly exist to motivate, then according to behavioural scientists, people have to be involved in the setting of their own ones. So instead of cascading down, objectives have to be made in different places and then aggregated up

Based on this perspective, only two of the international approaches have allocated particular practices to this activity. The first is the RICS guidelines. The RICS (2012, p. 25) mentions four required activities in the strategic phase; *suitability and alignment of the existing property portfolio, efficiency saving, possibilities for co-location, and impact of alternative work style*. All of these activities catalyse asset managers to think about how physical assets satisfy the organisation's function. However, the RICS guideline stopped at this level of detail without providing more information about the method of application.

The second set of guidelines is the TAM (NSW, 2006a, p.8) guidelines, in which asset managers are required to undertake the following; *The asset portfolio developed by the agency should represent the asset response to its service requirements.* To achieve this aim, five stages of practice are required. These stages are organised sequentially. At each stage, asset managers should make a decision as to whether the taken decision should move the asset to the capital investment, maintenance or disposal packages. Figure 3.11 illustrates these stages.

The first stage is to make sure that the organisation's service is dependent on the current asset or assets. The second stage is to find how assets are effectively utilised. The third stage is related to scrutinizing how suitable the asset's location to the organisation's objectives is. The fourth stage concerns asset capacity effectiveness in terms of numbers, space or volume, or the rate of information flow, and also incorporates factors such as comfort, security, speed, power and specific safety requirements. The last stage is asset functionality, in which asset managers should make sure of the degree to which the asset is suitable for the delivery of the services. These practices are found relevant to the aim of the present stage of the intended framework. Therefore, these components can be reorganised again under the present strategy activities.

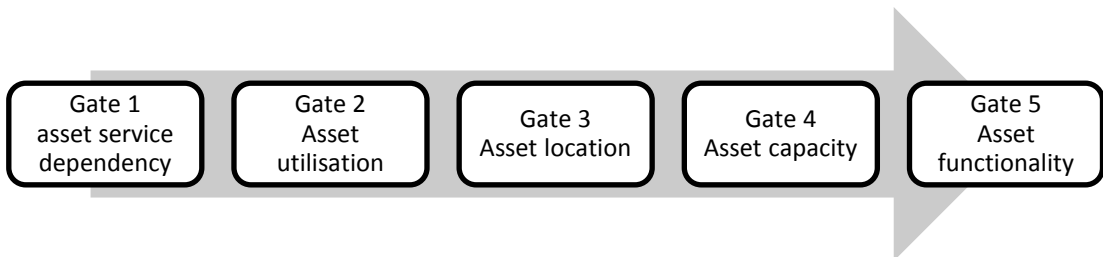


Figure 3.11. The process of developing an asset portfolio. Source: NSW, 2006a, p.8.

As a result, two considerations can be deduced from the previous discussion. First, asset managers must pay attention to the relationship between the physical assets and the organisation's services and objectives. This relationship in some cases is left to the asset managers to resolve. While in other instances might be provided by guidelines such as the TAM and RICS guidelines. Finally, asset managers must realign the physical asset strategy with the other organisation's assets strategy and with the organisation strategy itself.

3.8.1.3 Output (Performance)

A business expands every day in its aspects and a single manager becomes bounded by the many activities which might hinder businesses in fulfilling the organisation's objectives. Fortunately, the advent of performance measurements for monitoring, controlling and measuring the progress of organisations has been significant in businesses progress (Kellen, 2003). Lebas and Euske (2004, p.66) define performance as *doing today what will lead to measurable value outcomes tomorrow*. Kellen (2003) comments on this definition by stating that measuring performance is relative to some benchmark, be that a competitor's performance, or present targets. Hence, the measurement of performance has a variety of uses. Bititci et al. (2004, p.176), for instance, mention various issues that lead to organisations adopting performance measurement:

- *To monitor and control*
- *To drive improvement*
- *To maximize the effectiveness of the improvement effort*
- *To achieve alignment with organisational goals and objectives*
- *To reward and to discipline*

Moreover, the OECD (1994) reports that the main reason behind performance measurement is to embrace better decision-making upon which improvement of the services delivered to communities can be achieved. Therefore, the absence of performance measurements could lead to arbitrary decisions and/or losing control over an organisation (OECD, 1994). In addition, the need for performance measurement arises when requirements for more work with fewer resources are significant. In many cases, performance measurement is a tool to ensure the compliance of organisations with government policies and priorities.

However, some challenges exist which might impede performance measurement operations. Neely (2004) reports that performance indicators form a particularly scattered discipline, in which many scholars from different academic communities are researching the topic of performance measurement. In addition, despite developments in technology for acquiring information, there are various challenges which obstruct the

ideal implementation of performance measurement, as detailed by Kellen (2003, no pagination):

- *Technical: data quality and latency, application usability, visualisation of data*
- *Organisational: business culture, leadership, processes, strategic control and intent*
- *Individual: gesturing, biases, framing and decision-making abilities*

In order to establish effective performance systems, three main elements should be embedded in the adopted system. First, validity should exist in such a system, in which measurement should measure what it claims to measure in a reliable, correct and accurate way. Second, the legitimacy of performance measurement is a crucial part in its development. Legitimacy stems from internal and external participants' acceptance. Thus, measurement developed bottom-up is more acceptable and successful because the people who operate and use this measurement have developed it. Third, continuity is required in order to set up successful measurement (OECD, 1994).

3.8.1.3.1 Performance and AM approaches

Performance indicators are central in all AM approaches. In addition, they are either the only source of the required situational analysis, such as in the Asset Management Primer of the U.S. Department of Transportation, or part of it, such as in the TAM guidelines. However, although performance indicators are central and prevalent in all AM practices, unfortunately, they are not similar. The following discussion provides evidence derived from AM approaches.

The Asset Management Primer of the U.S. Department of Transportation, as an example, provides performance indicators to property asset managers that focused on; utilization, facility condition index, mission dependency and annual operating costs, (FRPC, 2004). Apparently, these performance indicators focus on physical assets themselves and not on managerial practice performance for instance.

In the RICS (2012) guideline, property managers are required to review performance of various areas in order to accomplish successful management, including: property asset management processes, performance of the property assets in property terms,

performance of the property assets in business terms, and finally, customer experience feedback. Therefore, performance indicators are not only for technical issues related to physical assets, instead, performance indicators include various aspects of physical assets and management as well.

The TAM guidelines allocate a separate stage for performance indicators. These indicators are divided into two groups: effectiveness and efficiency measures (NSW, 2006a). In terms of effectiveness measures, asset managers need to *demonstrate how well the asset portfolio supports agency services and the extent to which asset's performance supports the delivery of services* (NSW, 2006a, p.13). In the efficiency measures, asset managers need to *demonstrate how well assets are managed and what is the cost to operate assets* (NSW, 2006a, p.13). However, the TAM guidelines do not equip asset managers with exact indicators, and further do not provide linkage with other policies.

Based on the previous discussion and a review of Chapter 2, performance indicators are not similar among all AM approaches, even when the guidelines are developed for the same type of assets. However, the main point that can be deduced from practice and theory is the necessity of developing and adopting a performance indicator system within the organisation.

3.8.2 External environment (O and T)

The external environment of organisations imposes many threats and opportunities that lead organisations to success or failure. Unfortunately, the external environment brings ongoing changes, upon which a mismatch between the organisation and its environment can occur and lead potentially to organisational failure (Wit and Meyer, 2010; Robbins et al., 2009; Johnson et al., 2008; Barney, 1991; Bryson, 1988; Christensen et al., 1987). This fluctuation in the environment is different from public to private sectors in terms of pace, and in the factors which produce it. However, although some scholars claim that the environment surrounding the private sector is subject to rapid changes to a greater extent than is the environment surrounding the public sector, Ansof (2007) predicts that the environment surrounding the public sector is gradually increasing its pace of change and becoming more similar to the private sector (Ansof, 2007).

Johnson et al. (2008) identify three different levels in the external environment that influence organisations. Firstly, there is a macro-environment that comprises politics, economic, social, technological, environmental and legal conditions (PESTEL). The second level is the industry or sector, and the third and last level is that of competitors and markets. Most of these variables and factors are mentioned by many scholars, but using a different categorization system (see for example Laue et al., 2012; Wit and Meyer, 2010; Grant, 2008; Parthasarthy, 2007; Thompson and Martin, 2005; Row et al., 1994; Christensen et al., 1987). Certain of these variables and factors are relevant to public organisations, while others are irrelevant due to public sector characteristics such as the lack of competition and market-like situation (Hansen, 2003).

In addition, Bryson (2004) argues that organisations can add other relevant factors to this list in accordance with their environment. For instance, organisations may pay attention to the key driver for change, which is considered a high-impact factor for organisations and one which significantly affects the success or failure of strategy. Moreover, Dutton and Jackson (1987) report that types of factors or variables of the external environment which merit attention are different from one organisation to another due to varied perceptions engaging employees and strategists.

However, despite the importance of the above variables and factors in the external environment, physical assets form a part of other assets in the organisation, and therefore, a part of these variables may not be included in the external environment of the strategy phase of asset management practices due to various reasons. Superiors, for instance, is responsible for the selection of which activities should be delegated to managers' responsibilities and which should not (Bass, 2008). In addition, Carver (2006) claims that governing bodies have formal responsibility of the relation between organisation and external environment.

3.8.2.1 External environment in AM approaches

In terms of AM standards and guidelines, three guidelines mention certain factors, such as demand trends (NSW, 2006a; IIMM, 2006), community or customer needs, expectations and interfaces (RICS, 2012; AAMCoG, 2011; NSW, 2006a), changes in government policies (RICS, 2012; AAMCoG, 2011), environmental factors (RICS, 2012; AAMCoG, 2011), industrial action (NSW, 2006a), population growth (NSW,

2006a), changes in external operating environment and strategy and actions of partners (RICS, 2012). All these factors are mentioned in the three guidelines, whether the guidelines suggest using risk management approaches or leave the method of investigation and analysis to the relevant public sector departments. Therefore, the main message of this part is to highlight the significance of the external environment in asset management practices irrespective to which factors are required.

3.9 Strategic Issues

Strategic issue identification is a crucial stage in the strategic planning process. It is a fundamental policy question, or the critical challenge imposed over physical asset managers, that emanates from; mandates, mission, accountees, users, cost, financing, structure, process and management. Therefore, the need to clarify strategic issues is significant. In addition, what it is that makes an issue strategic or operational is significant to many researchers and strategists (Bryson, 2004). Nutt and Backoff (1993, p. 28) mention that:

Developments that influence an organisation's ability to achieve a desired future often become strategic issues. In addition, strategic issues direct a strategic management process by guiding the search for strategy, much the way problems direct the search for solutions in problem solving

Bryson (2004) offers at least seven approaches to identifying the organisation's strategic issues; direct, goals, vision of success, indirect, oval mapping, issue tension, and finally the system analysis approach. Selection of one of these approaches is dependent on the nature of the broad environment and the organisation/community's characteristics. However, Bryson (2004) suggests that the first two approaches - direct and goals – are the most suitable techniques for public and non-profit organisations. In the direct approach, asset managers start with mandates (formal and informal) and mission, and then, undertake the SOWC analysis.

However, selection of this approach is limited to specific situations; when the goal is abstract or not specified, then the direct approach is suitable. In addition, the direct approach can be adopted also when a pre-defined vision of success is not mentioned or drawn for physical asset managers, or when there is no hierarchical authority that

imposes a specific goal over asset managers. Moreover, the direct approach can be adopted also when the environment fluctuates, or when developing goals seems unwise. Several of the asset management approaches, including the TAM and IIMM guidelines appear to equip asset managers with various factors in the diagnosing stage in order to reconcile the external and internal environments. Therefore, it is expected that asset managers following this approach based on the guidelines.

In the goal approach however, organisations define goals and objectives and then attempt to identify issues that need to be tackled in order to achieve these goals and objectives. In some cases, these goals and objectives are embedded in predetermined performance measurements that are required from physical asset managers. Therefore, goals and objectives must be detailed enough to provide reliable guidance to develop issues and appropriate strategy (Bryson, 2004).

To sum up, both goal and direct approaches are applicable to the intended model. Therefore, the diagnosing stage is significant to asset management practices because including this stage within asset management practices allows asset managers to participate in the organisation's strategy-making practices (Bryson, 2004). In this sense, the strategic issue stage is removed from the hybrid model because the diagnosing stage has replaced the stage on the basis of the study's research intention to improve the AM practices in SPS.

3.10 Conceiving Stage (Formulating and Adopting)

The conceiving stage can be broken down into two main components or stages; generating options for the strategic issue, and evaluating the selected option. The former, in real practice, is composed of two stages; formulating, and adopting options (Bryson, 2004). However, both of these are closely linked to each other and might occur in one stage. Therefore, the intended theoretical model will deal with these as if they were one stage.

The main purpose of the strategic formulation is to create solutions for the strategic issue. At this time, participants are surrounded by the demand for creating ideas, as well as give and take dialogue. The formulated strategy might be a form of discovering the

organisation's pattern, or creating new and deliberate action (Bryson, 2004). In some cases a non-asset solution is considered, such as demand management (NSW, 2006a; IIMM, 2006). The RICS (2012) guidelines state that options usually fall among three choices:

- Status quo; no changes are required;
- Big bang; major changes might take place; and finally
- The middle ground; some refurbishment, some new build, and some disposals.

The TAM guidelines regarding the disposal of assets planning package is more advanced than any other asset management approach in terms of generating options. To clarify, once the asset is considered as surplus to service delivery, the TAM guidelines propose that asset managers need to take into consideration increasing the asset's value through attempting various options, such as changing a police station into a classroom (NSW, 2006e). Therefore, it is inferred that providing ideas and solutions to asset managers is beneficial to practice, which shows the advancement of the guidelines.

To sum up, after identifying many options for solving the recognised strategic issue, those options are dealt with in order to adopt the proper strategic plan that puts the intended action forward. However, before adopting the selected option, evaluation of different options is significant to the formulation process. The next part discusses this area.

3.10.1 Evaluating options

This stage takes place after generating several options to resolve the strategic issue, and those generated options should be evaluated by means of appropriate tools. Some, guidelines such as the TAM guidelines, specify two kinds of evaluation. The first is for the whole of the generated options, and this stage is seen as a preliminary evaluation stage, then, once the organisation has narrowed down the number of options to an acceptable number, more detailed evaluation should begin (NSW, 2006). Wit and Meyer (2010) propose three tools to evaluate the generated options in order to select the most appropriate:

- Perceived risk

- Anticipated benefits and finally
- Organisational capacity to execute.

However, Bryson (2004) proposes different tools for evaluating various options and later to select the preferred one:

- Identification of options
- Enumeration of the barriers
- Major proposals for achieving these alternatives and finally
- Actions with detailed work programme.

The Department of Infrastructure and Planning (1996) emphasises the evaluation stage of the decision making process, which can be used to generate advice for government departments to undertake preliminary evaluation of the proposed options and, when the number of options is narrowed down, more detailed evaluation will be launched. These preliminary evaluations are:

- Risk analysis
- Financial and economic analysis
- Market sounding (where assumptions are made about private sector involvement in project delivery)
- Consideration of legislative approval issues
- Consideration of whole-of-government policy issues
- Consideration of regulatory issues
- Public interest assessment and finally
- Consideration of procurement strategies.

In order to check an option's validity within the capital investment plan, the TAM guidelines have added to the above list of evaluations the following evaluation criteria: sustainable development assessment, meeting service delivery requirements, key assumptions, stakeholder considerations, and timing/sequencing considerations (NSW, 2006c). However, there are other types of evaluation tools used in case of maintaining or disposing assets. For instance, the TAM guidelines require asset managers to evaluate the impact of no action when maintenance is needed. The impact is evaluated

by conducting evaluation of the risk and cost entailed in the case of not rectifying the deficiencies (NSW, 2006d, p. 12).

The OECD (2001) requires asset managers to evaluate the generated options according to the following: cost-benefit, environmental, life-cycle cost, multi-criteria, risk, safety, and treatments-maintenance. The IIMM (2006) identifies three groups of evaluation tools: cost-benefit analysis, cost-benefit analysis community and multi-criteria analysis. Meanwhile, the FHWA (1999) proposes an engineering economic analysis (EEA) evaluation tool at the time of evaluating options.

The RICS (2012) guidelines break down evaluation tools into five main groups: non-financial assessment, financial assessment, commercial assessment, project management assessment, and risk assessment. After finishing the evaluation practices of the required projects, the RICS (2012) guidelines require property managers to evaluate two different options. The first is related to the property itself in terms of evaluating whether it is possible to apply self-ownership, shared ownership or to transfer ownership to third party. The second option is related to the property services provided in terms of in-house, shared or third party providers. Therefore, the RICS (2012) guidelines are more detailed in required practices.

Prior to concluding this part, it is important to articulate three points. The first is related to the significance of the whole life cost of physical assets in the strategic planning process. Edwards (2010) for instance stresses the need to use the whole life cost of a physical asset in the strategic phase to justify the cost of the physical asset. However, this whole life cost is already included under the financial evaluation of projects.

The second point is related to the existing diversity of evaluation tools and techniques which rely on either type of physical asset or the physical asset life cycle: creation, establishment, exploitation, and disposing. For the latter, it is noted that not all evaluation tools are suitable for all physical assets' life cycle projects, as explained earlier in the case of the TAM guidelines. The former, due to RICS (2012) guidelines, is specific for property management practices. Therefore, the RICS (2012) requires property managers to evaluate more criteria related to the property itself and to the service provider.

The final point is that concerning the evaluation stage is one of the central activities in all AM approaches. Therefore, its inclusion in the intended model as a separate stage is justified according to its significant place in both domains: theory and practice.

3.10.1.1 Project and the selected option

The word “project” has been used but without articulation as to what is meant by the term. To clarify, it is assumed here that the selected option should have project characteristics in order to be a project. The following discussion covers both project definitions and characteristics.

The Project Management Institute (PMI, 2004, p.5) defines a project as *a temporary endeavour undertaken to create a unique product, service, or result*. In addition, PRINCE2 (2002, p.7) provides two definitions for projects:

First, a project is a measure of environment that is created for the purpose of delivering one or more business products according to a specific business case. Second, a project is a temporary organisation that is needed to produce a unique and predefined outcome or result at a pre-specified time using predetermined resources

Although these definitions stress the attributes of projects from one side or another, various researchers have discussed other and similar project attributes and characteristics, as shown in Table 3.1 below. Based on the attributes and characteristics mentioned in the above definitions and in the table below, it can be inferred that these attributes can be aggregated into four main themes of a project’s characteristics; time, cost, uniqueness and specific and clear objectives.

It can be stated that any selected option should satisfy the above criteria. However, Male et al. (2008, p. 8) claim that:

Those responsible for managing in a multi-project environment have to deal with a combination of project level information and decisions which are quite detailed and organisational level decisions that are made with vague, incomplete and imprecise information

This statement could raise the following question; do these issues mentioned by Male et al. (2008) affect the characteristics of the projects or not? Unfortunately, this question was not answered by Male et al. (2008). As a result, it is suspected that the selected option will not proceed and obtain approval from the public sector until these attributes are mentioned and developed to an acceptable level. However, the main message of this part of the part is to articulate the issues around term ‘project’ without going deeper into the discussion. In this sense, the following discussion focuses on; the subsequent stage in the process of reasoning (action taking or implementation of the intended strategy), introducing the previous concepts discussion and depict it diagrammatically and finally justify the next argument.

Table 3.1. Project characteristics/attributes.

Source	Attributes or characteristics
(Bower, 2008; Meredith and Mantel, 2006; Pellegrinelli, 1997; Westland, 2006; PMI, 2004; Turner, 2006)	Temporary, having a start and a finish date,
(Westland, 2006)	Specific Budget
(Bower, 2008; Meredith and Mantel, 2006; Westland, 2006; Turner and Speiser, 1992; PMI,2004)	Unique in some way
(Bower, 2008; Meredith and Mantel, 2006; Pellegrinelli, 1997; Turner and Speiser, 1992)	Specific objectives
(Bower, 2008; Meredith and Mantel, 2006; Pellegrinelli, 1997; Westland, 2006)	Cause and means of change
(Bower, 2008; Meredith and Mantel, 2006; Westland, 2006)	Involves risks and uncertainty
(Bower, 2008; Meredith and Mantel, 2006; Westland, 2006)	Commitments of human, material and financial resources.
(Meredith and Mantel, 2006),	Importance
(Meredith and Mantel, 2006),	Life cycle
(Pellegrinelli, 1997)	Specific outcome
(Pellegrinelli, 1997; Turner and Speiser, 1992; PMI,2004)	Single delivery, independent
(Pellegrinelli, 1997)	Project manager has single point responsibility for project success
(PMI,2004)	progressive elaboration

3.11 Emergent concepts, terms and preliminary conceptual framework

The investigation in this part resulted in breaking down intended strategy into several stages as illustrated in Figure 3.12 (Figure 3.12 is a copy of Figure 3.9, the study reintroduced the figure here to facilitate the discussion). These stages are investigated in

the previous discussions which paved the way for the preliminary conceptual SAMP framework, illustrated in Figure 3.13. Therefore, the following argument is devoted to explain changes to Figure 3.12 besides the following recommended action.

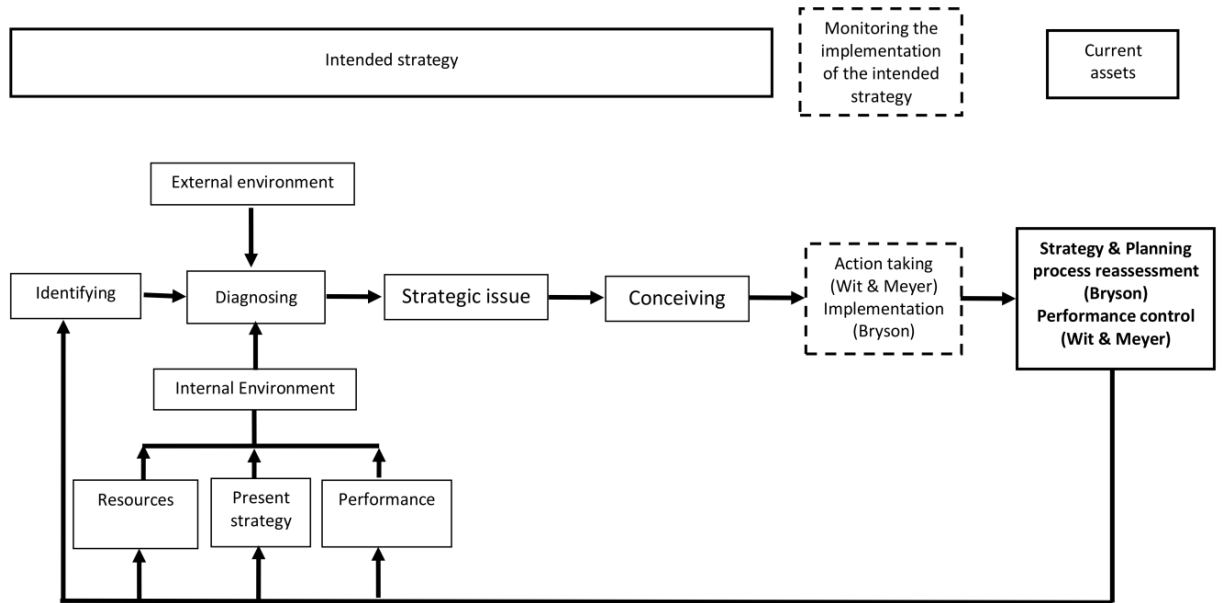


Figure 3.12. The hybrid framework of; formation of strategy, strategic planning/reasoning process.

Based on the new SAMP framework, illustrated in Figure 3.13, asset formation starts with an identifying stage in which strategists need to articulate issues or problems by understanding the organisation’s purpose, values, strategy and behaviour standards (Campbell and Yeung, 2004; 1991). In addition, other documents are also vital for physical asset managers, including both formal and informal mandates (Bryson, 2004). In this stage, identification of issues (Wit and Meyer, 2010; Johnson et al., 2008; Bryson, 2004) or problems (Robbins et al., 2009) should be recognized, clarified and written (Blair-loy et al., 2011).

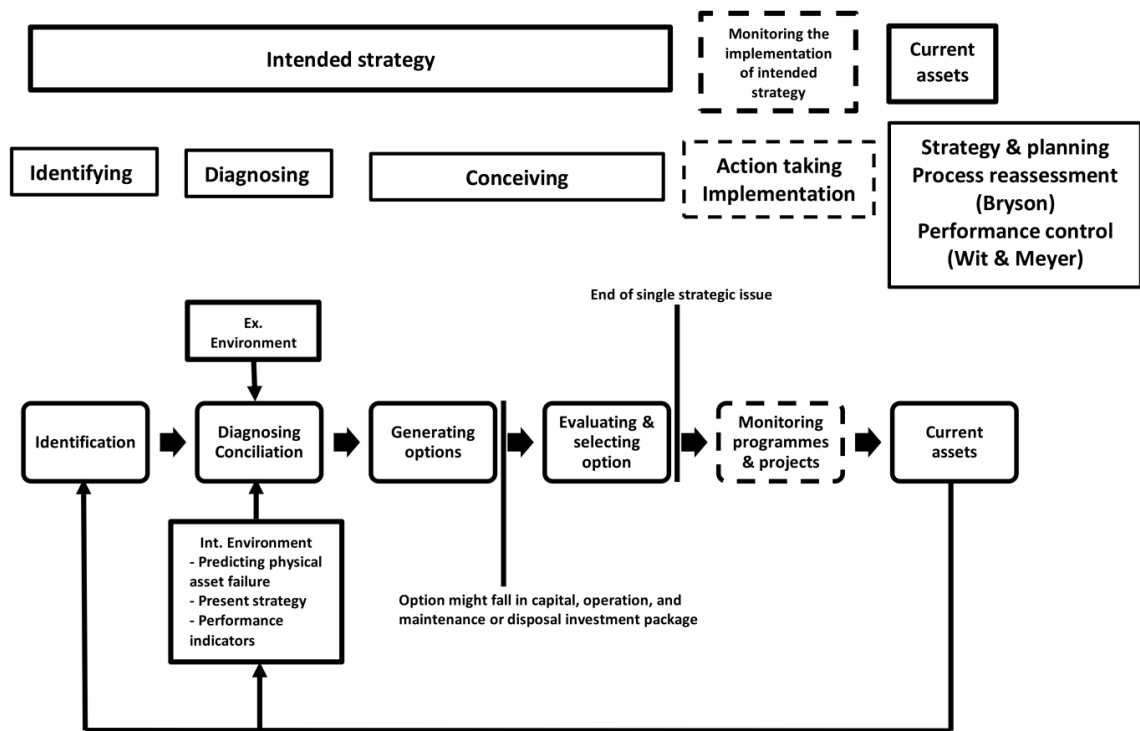


Figure 3.13. Preliminary conceptual SAMP framework.

Once the issue or problem has been identified and recognised, asset managers need to diagnose the organisation’s external and internal environments related to physical assets, and, later, attempt to reconcile them. This conciliation leads asset managers to produce effective solutions for the organisation. Each variable in both environments, external and internal, might have a unique impact on the organisation’s physical assets. Therefore, physical asset managers may need to generate solutions for each variable. At this time, asset managers need to start the strategic planning/reasoning process again with every new solution to diagnose other variables. This type of continuous repetition of the strategic planning/reasoning process leads to a portfolio of projects resulting from several strategic issues (multiple strategic issues). Accordingly, the multiple strategic issues that are developed from the repeated cycles of the strategic planning/reasoning process are clearly part of the logical AM practices development.

The next influence of this process of AM practices has made the strategic issue stage, displayed in Figure 3.12 above, no longer suitable for the new model because asset managers are following direct or goal oriented approach (refer to section 3.9 for more discussion about this concept). Therefore, Figure 3.13 does not include this stage.

The third issue is based on the previous investigation of conceiving stage (section 3.10), this stage is composed of two distinct stages: generating and evaluating options. Therefore, Figure 3.13 displays these two stages separately instead of one single stage, conceiving.

The fourth modification is to introduce the following terms. Wit and Meyer (2010) used action taking term while Bryson (2004) used implementation term in the implementation of the intended strategy, however, all these terms indicate the same concept, executing projects and programmes. Therefore, the preliminary SAMP framework from now on will use projects and programmes in the monitoring of the intended strategy stage.

The last modification is related to the last stage of the SAMP framework, current assets. All authors Wit and Myer (2010) and Bryson (2004) advise strategists to establish a feedback loop to different stages of the strategic planning/reasoning process. Therefore, the preliminary SAMP framework connects the current assets scene to the diagnosing and identification stages.

In case of the following recommended action, up to this point, the scene looks as follows, asset managers have developed portfolio of projects of physical assets or non-assets solutions. Therefore, asset managers might start to think about linking these projects together based on certain “reasons”. This linkage could be between new projects or between new and existing projects. To ease the discussion of this part for the reader, the following illustrative example is given.

Imagine that the need for a project has been initiated by increasing demand on physical assets in region A, and at the same time, region A needs to be developed in terms of the performance of their current physical assets based on predetermined indicators. Accordingly, asset managers in this case have two different projects distributed over two different packages; the first is the capital investment plan and the second is the maintenance package plan. These two projects are separate and might be tendered across two separate plans. Up to this point, the reality depicted is that understood from the TAM guidelines as well as the developed model.

Based on this argument, the finding is that programme management thinking is part of this investigation, for three reasons. The first is related to the previous argument, which is justification of the claim. The second is based on Male et al. (2008) and the “line of sight” conceptual framework, in which Male et al. (2008) confirm that programme management, exists in the environment of physical asset management practices. The last is the existence of AM practices in international AM standards and guidelines with no explanation. As a result, the next part begins with an exploration of programme management thinking before portfolio management, in order to follow the logical development process.

3.12 Conclusion

Establishing the foundation of the systematic asset management practices in Part 1 paved the way for the current part to be developed in order to facilitate the delineation between elements of the seven international asset management standards and guidelines. The intended strategy was found too variant, and no single model was able to explain the complete manifestation of the reality. Therefore, the need for an enhancement tool to select the most appropriate public sector strategy was evident. Fortunately, this dilemma was resolved by pursuing a model put forward by Mintzberg et al. (2009), which resulted in selection of the strategic planning process as a candidate strategy for the public sector.

Although strategic planning models are also varied and each one carries its own weaknesses and strengths, Bryson and Roering (1987); and Bryson (2004) facilitated the study’s selection because these scholars reviewed the drawbacks of several public strategic planning models and thus allowed a model to be created that would satisfy the study’s aim. Although Bryson and Roering’s (1987) and Bryson’s model (2004) look suitable for the intended theoretical model, several points could influence consideration of its inclusion in its totality in the intended theoretical model.

Initially, Bryson’s model starts the strategic planning activities by inviting strategic planners to obtain an agreement from policy makers. Although this activity is needed, the aim of this thesis is to diagnose the current systematic asset management practices at SPS and, then, improving AM practices. Further, Bryson’s model provides many details

that can be merged. Finally, stage 8 is optional, while the aim is to find a very basic process for the strategic planning process. As a result, the strategic/rational reasoning process introduced by Wit and Meyer (2010) is used because it has a higher level of abstraction. The reason behind this thinking is to draw boundary between the upper and lower possible levels of abstraction between which most AM standards and guidelines fall.

Nonetheless, a synthesised structure was developed to suit the study's aim on the basis of strategic planning and reasoning process. Consequently, the selected level of the strategic planning/reasoning process has delineated clearly between various international AM standards and guidelines. The emerging concepts that constitute the basic building blocks of the intended strategy are; identifying, diagnosing of external and internal environments, generating options, and evaluating options stages. However, it was found that the intended strategy is not limited to these stages, because other stages such as programme and portfolio thinking are part of the intended strategy. Consequently, this part has suggested the inclusion of these two concepts, paving the way for the parts which follow.

Part 3

Programme Management

This part is organised around four areas. First, the programme and programme management part is devoted to establishing the context of the programme, in addition to the broad idea of programme management thinking. Secondly, two central concepts in programme management are introduced; benefits and control. The third topic relates to the current practices within international AM standards and guidelines viewed through the programme management lens. The final task is to link what was found in this part with the preliminary theoretical model developed in Part 2 in order to establish the intended conceptual SAMP framework.

3.13 What is a programme?

The need to understand what is intended by the term programme, and by extension programme management, is vital to the intended conceptual framework, due to the diversity within and various uses of the term in addition to the existence of several programme management frameworks. In the case of the latter however, to understand what programme management means, it is better to first clarify the meaning of 'programme'. The diversity in the term emanates from the stated purpose of the terminology itself. For instance, when Kotler and Armstrong (2012) refer to the programme formulation in their model of the strategic business process, the authors mean that programme formulation is the required capability to implement the formulated strategy. This type of usage of the term is not part of the intended conceptual framework, because the physical assets themselves are a capability of organisations. Therefore, exclusion of this interpretation is vital to the intended model. Consequently, the following discussion examines the meaning of programme in the case of different interpretations.

The MSP (Managing Successful Programmes), one of the Office of Government Commerce's guidelines in the UK, (OGC, 2007, p.4) defines the programme as:

A temporary, flexible organisation created to coordinate, direct and oversee the implementation of a set of related projects and activities in order to deliver outcomes and benefits related to the organisation's strategic objective. A programme is likely to have a life that spans several years

Another definition, provided by the PMI (Standard for Programme Management) (2006a, p.4) is as *a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually*. Another definition is offered by Turner and Speiser (1992, p.197) who define the programme as *portfolios of projects which are managed in a coordinated way to deliver benefits which would not be possible were the projects managed independently*.

These definitions draw attention to two characteristics of the programme. First, all the three definitions have agreed that there is a relation among projects upon which benefits are derived. Although Turner and Speiser (1992) do not mention this explicitly, the authors do not perceive benefit from the programme without connecting two or more separate projects.

The second characteristic relates to the chief aim of setting up a programme. All authors and guidelines perceive that the chief aim of a programme is to reap benefits from linking separate projects together. In addition, the PMI (2006a) describe another reason for setting up a programme, which is to control projects. In terms of the former, types of benefits are not articulated by these authors, but they mention that benefits can come in a quantified or qualified form (PMI, 2006a). In addition, the PMI (2006a) states that if the benefits are not explicitly articulated, the practice cannot be considered a programme.

In addition to these two characteristics, other researchers have mentioned additional characteristics, as presented in Table 3.2. Review of these characteristics reveals the following. Certain of the characteristics can be neglected due to either their interferences with portfolio management, such as prioritizing projects, or their capacity for inclusion within the benefit to organisations concept. However, one of these characteristics that cannot be classified among either previous concept is that of the uncertain or less defined end date for programmes. For instance, the MSP guidelines do not impose a finish date (OGC, 2007). However, this additional characteristic does not

influence the intended model because the practices are not restricted by time. Having established the characteristics of the programme concept, the discussion which follows is devoted to exploring what is required from programme management practices.

Table 3.2 Attributes and characteristics of the programme.

Source	Attributes or characteristics
(Reiss et al., 2006; Ohara, 2005)	Less defined end date, uncertainty
(Reiss et al., 2006; PMI, 2006a)	Focuses on benefits of products
(Reiss et al., 2006; PMI, 2006a; Ohara, 2005)	Portfolio of projects
(Reiss et al., 2006; PMI, 2006a)	Run under changed environment
(Reiss et al., 2006; PMI, 2006a)	Macro view over conflicts between projects
(Reiss et al., 2006)	Shared resources
(Sanghera, 2007)	Prioritized between projects
(Ohara, 2005)	Scalability
(Ohara, 2005)	Complexity

3.14 Programme management

There are various definitions of programme management that range from managing multiple projects to managing organisational change (Vereeke et al., 2003). In MSP (OGC, 2007, p.4) the programme management is defined as:

The action of carrying out the coordinated organisation, direction and implementation of a dossier of projects and transformation activities (i.e. the programme) to achieve outcomes and, realise benefits of strategic importance to the business

Another definition was provided by the PMI (2006a, p.4) standard in which programme management is *The centralized coordinated management of a programme to achieve the programme's strategic benefits and objectives.*

Based on the discussion regarding programme and programme management, the following issue is deduced. Both guidelines require managers to develop a linkage between separate projects in order to manage benefits or control. This practice of bringing separate projects together, which results from an interaction between several single or multiple strategic issues, has resulted in turn in another practice characteristic. Therefore, this level of detail is sufficient to include programme formulation as part of the intended conceptual framework irrespective of the intention of managing the programme. The next part presents a discussion of the meaning of programme formulation, and in their relation to physical assets.

3.15 Typology of programmes formulation

As concluded previously programme management is adopted to reap benefits from or impose control on projects. It would be foolhardy to allocate an amount of money to a programme without any calculation of the expected revenues from the work carried out. Despite this, Reiss et al. (2006) argue that many unsuccessful programmes share vagueness in defining clear benefits. These benefits may take place, in some cases, a long time after delivery. Furthermore, the people responsible for delivering benefits are often different from those responsible for directing and managing the programme itself. Therefore, it is only when expected benefits are fully defined, understood and agreed at the outset of the programme that organisations can be fully confident in its investment (Reiss et al., 2006). In addition, the articulated benefits should be measurable, with available procedures for monitoring, reporting and responding to their achievement or non-achievement. Although Reiss et al. (2006) discuss several characteristics of benefits the authors are not particularly clear about what these benefits are. Therefore, the following argument discusses various researchers' findings about the causes for grouping separate projects together (programme formulation typologies).

Ferns (1991, p.155) for instance mentions three types of programmes. First is the *strategic programme: characterized by a group of projects that result from a change in the mission or objectives of an organization*. Second is a *business-cycle programme characterised by a group of projects within a time-related business cycle*. The third type of programme is the *single-objective programme (or macro-project) characterised by a strategically important large project that owing to its size, is managed as a group of smaller projects*.

Sanghera (2007) proposes seven typologies of the programme. First, the common attribute; projects may be gathered together because they share the same attributes. For example, projects belong to one customer. Second is the collective capability; projects are grouped together for delivering a collective or integrated capability or product. Third is escalation level; escalation of various factors, such as scope changes, quality, communication, risks, and other issues may lead to the programme. Fourth is organisational change in direction. Fifth is a resource constraint. The Sixth is risk mitigation. And finally, Task dependency.

Pellegrinelli (1997, p.143) describes three types of programmes. First is the *portfolio programmes; projects which are relatively independent of one another but have a common theme for instance common resources*. Second, Goal-oriented programmes; those projects which enable the management of initiatives or developments outside the existing infrastructure or routine. In addition, the theme can be used as a means of translating usually vague, incomplete and evolving business strategies into tangible actions and new developments. Third is *Heartbeat programmes; those projects which enable the regular improvement of existing systems, infrastructure or even business processes, via increments to functionality or occasionally an overhaul of the system or facility itself*.

Lycett et al. (2004) argue that although there are variations in conceptualisation of how projects are organised in the programme, there is still not clear explanation as to how the relatedness between projects does exist. Therefore, the authors mapped out projects' relatedness with respect to time as shown in Figure 3.14. The first category is a programme that contains a chain of projects in which one project occurs after another. The next category is a portfolio of simultaneous projects in which all projects are carried out at the same time. The last category is a network of interlinked projects. However, the typology of programmes offered by Lycett et al. (2004) is broader than previous researchers' typologies, because all of the previous cases can be included in one typology. Therefore, this typology is useful for conceptualizing how projects can be related, but not why they are related.

All of these various typologies and reasons behind grouping separate projects together could usefully be illustrated by an example in order to understand how the linkage takes place in AM practices. Therefore, the following example fulfils this intention prior to investigation of the international AM standards and guidelines.

The illustration adopts the three packages of the TAM guidelines for capital investment, maintenance and operation and disposal. In addition, the metaphorical projects represent the three packages for two regions. The example assumes that both regions need physical assets for two reasons. First, projects might be needed based on population growth. Second, there are projects which are needed due to performance deterioration of

assets. Based on these assumptions, Table 3.3 below shows the distribution of the required projects over the expected regions and packages.

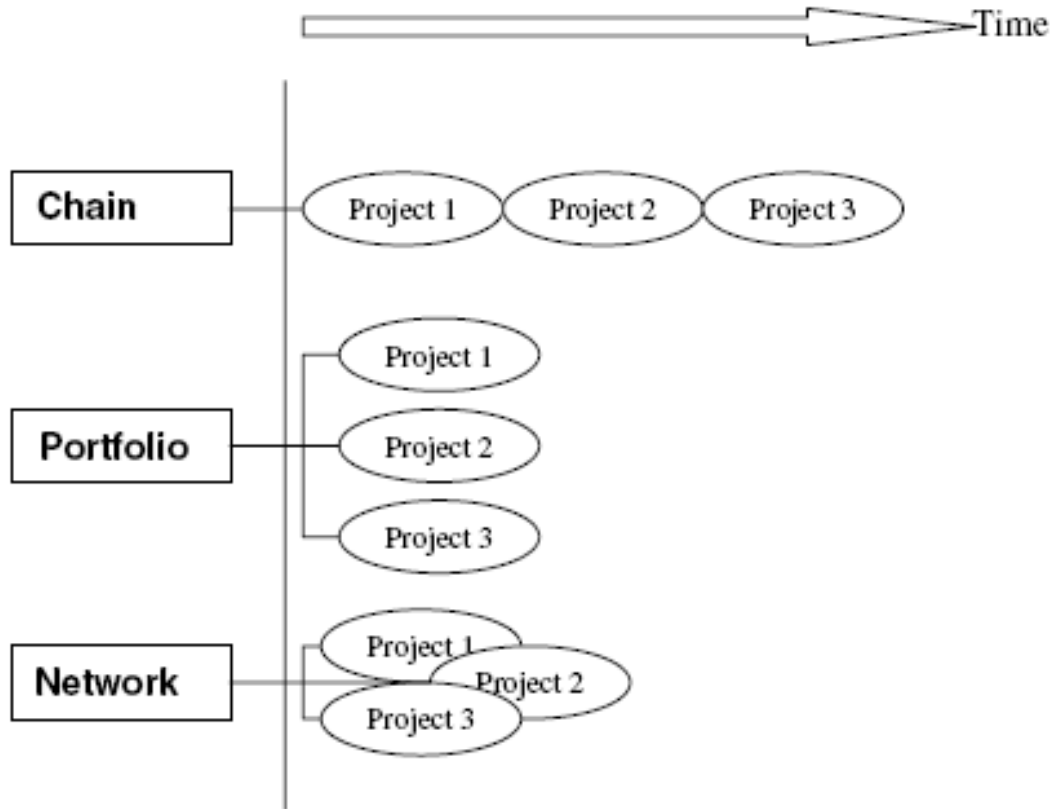


Figure 3.14. Projects organised in programmes. Source: Lycett et al., 2004.

Based on programme management thinking, each project (P) could be linked to the other projects due to various reasons. For instance, P_{AC} might start after P_{AD} due to re-use of the land after asset disposal. As another example, P_{AC} might be linked to P_{BC} due to common attributes or risk mitigation.

Table 3.3. Projects needed based on our assumptions.

	Region A	Region B
Capital investment	P_{AC}	P_{BC}
Maintenance and Operation	P_{AM}	P_{BM}
Disposal	P_{AD}	P_{BD}

To sum up, the main message of the previous argument and illustration is to show that programme management practices and their justification need to be included as a separate stage in the process of AM practices. Therefore, the following part is devoted

to investigation of international AM standards and guidelines through the programme management lens.

3.16 Programme and asset management

Programme management thinking, as discussed previously, was absent in four of the international AM standards and guidelines; IIMM, Asset Management Primer of the U.S. Department of Transportation, OECD, and property asset management in the USA. In fact, only the RICS, TAM and PAS 55 guidelines have paid attention even to a part of the programme management thinking. This partial treatment is noted in that neither of the guidelines have articulated the benefits explicitly, which in turn affects the implementation of programme management thinking.

In the capital investment package of the TAM guidelines, asset managers at the outline stage are required to pay attention to several concerns, according to the following quotation:

How does this project fit in relation to other projects currently underway? Will this be a joint-agency (Cluster) project? If so, what is the rationale for adopting this approach? (NSW, 2006c, p.6).

Interestingly, the TAM guideline clearly requires asset managers to pay attention to the relatedness between the intended project and the ongoing projects.

In another extract from the TAM guidelines, in the asset disposal strategic planning package the asset managers are required, in the implementation stage, to pay attention to the following:

Linkages should be made between the capital investment and disposal plans by listing assets for disposal that have service lives within the planning time frame. These linkages are particularly important where the proceeds of asset disposals are being relied upon to fund capital works. In such situations, it is essential to allow an adequate time and funding buffer between the disposal and acquisition events (NSW, 2006e, p.8)

Apparently, the TAM guidelines in this extract attempt to establish a linkage between projects based on resource constraints.

Other evidence comes from the RICS (2012, p.37) guidelines at the delivery plan stage, as these mention that:

The property asset manager is now in a position to determine the broad tasks that need to be undertaken to implement the property asset management plan and to turn these tasks into delivery projects. Not all delivery projects will produce final results and some will be 'preparation' projects putting in place the business infrastructure to achieve final results

The RICS guidelines in particular look at the reality through programme management thinking. The RICS (2012, p.37) guidelines clearly emphasise that *not all delivery projects will produce final results* and follow this statement with the point that some of these projects are for “preparation”. Interestingly, if this is not a chain of projects connected to each other based on time considerations, then what is it?

It is evident from the extracts from both guidelines that the presence of the management concept in AM practices is pivotal. However, three issues regarding programme management in international practices are found. First, although the TAM, RICS and PAS 55 guidelines require asset managers to pay attention to the linkage between projects, the guidelines have not explicitly provided asset managers with the reasons behind these types of practices. For instance, do the asset managers need to think about shared resources or risk mitigation? However, it is assumed that asset managers have discretion in the reasons behind considering the linkage between projects.

Second, the three guidelines do not use a unified terminology. For instance, the TAM guidelines require asset managers to take the linkage between separate projects into consideration at the outline stage, while the RICS guidelines consider this at the delivery plan stage. Therefore, does that mean that the programme management concept is not essential to physical AM practices? It is considered in this thesis that programme management should be a part of physical AM practices because the concept has drawn the attention of two popular standards, the PMI and OGC.

The third issue relates to the position of the programme management concept in guidelines, as the TAM guidelines locate programme activities within the early stage of the capital investment strategic plan package, while in the asset disposal strategic planning package this was at the end. The RICS guidelines insert the stage at the end of

their process. However, irrespective of these guidelines, it is clear that portfolio management should encapsulate projects and programmes. Therefore, programme management should be placed before portfolio management practices. The following discussion focuses on the preliminary conceptual framework to include programme management practices.

3.17 Upgrading the preliminary SAMP model

Based on the preceding discussion, programme management does not only fall among the intended strategy stage of physical AM practices, but also forms part of the implementation stage (Male et al., 2008; OGC, 2007; PMI, 2006a). In light of this, it is necessary to update the preliminary conceptual framework developed in the previous part to include programme management. Figures 3.15 below present this development.

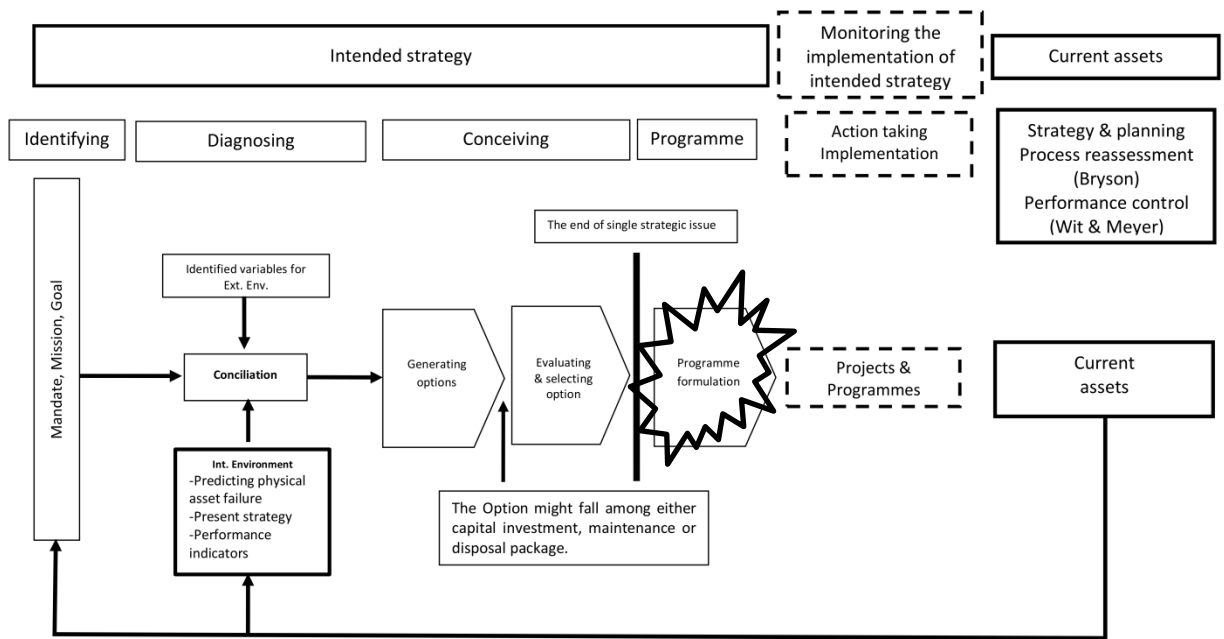


Figure 3.15. The preliminary conceptual framework of SAMP with the programme formulation stage.

The only change made to the preliminary conceptual framework developed in Part 2 (see Figure 3.13) is to include a programme formulation stage in the intended strategy, as the programme was already a part of the monitoring of the intended strategy stage. This inclusion is vital to physical AM practices, because programme formulation has

certain characteristics which are different from both strategic planning/reasoning process activities and portfolio management activities.

3.18 conclusion

This part aimed to investigate the connection between programme management thinking and the intended SAMP framework. The findings have articulated several requirements. First, programme management consists of two distinct stages; the programme formulation stage in the intended strategy process and benefit monitoring stage in the monitoring of the implementation of the intended strategy stage. Within the former, asset managers' duty is to connect two separate projects together based on reasons related to two distinct aims; benefits and control. For the latter, asset managers have to monitor the expected control or benefit from establishing the programme.

The second set of findings in this part has shown that programme management is one of the basic building blocks of AM practices, from to two points of evidence. Firstly, three out of seven international AM standards and guidelines (RICS, TAM and PAS 55) partially included part of the programme management thinking. Also, the position of the programme formulation practices comes in the middle of the process of asset managers' thought. This position comes in between the reasoning process and portfolio management thinking. Consequently, thinking about the programme formulation is inescapable and interlinked with the basic practices of asset managers.

Based on these findings, the developed SAMP conceptual framework has clearly stressed these practices and allocated a separate stage for programme management practices. Having established the argument for inclusion of programme management thinking, the discussion of the portfolio management thinking is an evident next step.

Part 4

Portfolio Management

The discussion in Part 2 concluded that portfolio of projects and programmes are part of AM practices. Therefore, this part is devoted to discussing the implications of portfolio management for the intended conceptual framework. The justification for including portfolio management was established based on two reasons. First, as discussed in Part 2, the intended strategy is composed of various projects distributed over different stages of the physical asset life cycle, such as new assets, maintained assets etc. Therefore, this portfolio of projects could forms part of the justification. Second, the formation of strategy theory discussed in Part 1 concluded the following; deliberate strategies are not usually realized due in some situations to the need to discard some chosen actions. Accordingly, certain areas of portfolio management emerge as a solution for this issue as explained later. Based on this justification, this part is dedicated to a discussion of portfolio management thinking. In order to accomplish the aim of this part, the following structure will be adopted. First, definitions and characteristics of portfolio management will be discussed. After this, various portfolio management models will be explored, before an investigation of AM practices through the portfolio management lens.

3.19 background

Many researchers attempt to develop tools which can help organisations to formalize and improve decisions. The PMI (2006b) for instance states that the typical goal of portfolio management is to do the right work and not to do the work right. In addition, Cooper et al. (2001; cited at Patanakul, 2011) claim that the typical goal of the portfolio is to maximize portfolio value, balancing the portfolio and ensure the strategic alignment of new product development. This managerial activity, as part of its purpose, requires managers to recognize intended projects which are unrequired after approval is realised.

However, to accomplish the complete purpose of portfolio management, several researchers have introduced different portfolio management approaches (Meskendahl, 2010). Therefore, this part is devoted to a review of existing portfolio management models and how these fit with the intended conceptual framework.

PMI (2006b, p.4) defines a portfolio as:

A collection of projects (temporary endeavours undertaken to create a unique product, service, or result) and/or programs (a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually) and other work that are grouped together to facilitate the effective management of that work to meet strategic business objectives. Components of the portfolio are quantifiable; that is, they can be measured, ranked, and prioritized

In addition, the PMI (2006b, p.5) defines portfolio management as:

Centralized management of one or more portfolios, which includes identifying, prioritizing, authorizing, managing, and controlling projects, programmes, and other related work, to achieve specific strategic business objectives

In the OGC (2008, p.5) standards, a portfolio is described as *totality of an organization's investment (or segment thereof) in the changes required to achieve its strategic objectives*. In addition, The OGC (2008, p.5) defines portfolio management as *a coordinated collection of strategic processes and decisions that together enable the most effective balance of organizational change and business as usual*.

Considering these definitions, two comments are deduced. First, the PMI (2006b) links the main purpose of the portfolio's existence to implementing the strategic intention of the organisation, while the OGC (2008) considers that part of its aim is to coordinate strategic processes. This difference between the two models is significant to the intended model due to the following. If these practices moved backward to the beginning of the intended strategy, then they become part of the strategic planning/reasoning process, while if the practices moved outward to the end of the intended strategy, then they are considered management (Bryson, 2004).

However, it would be beneficial in the meantime to show how the OGC (2008) model is connected to the intended strategy. The OGC (2008, p.19) states that:

During the process of creating the organisational strategy, the strategic planning Team were working extremely closely with the Portfolio Office, primarily because the Portfolio Office has the most up-to-date information on all changes and understands how those changes are contributing to the strategic objectives. In addition, the strategic planning team produced the annual plan, which contains a snapshot of information on the portfolio and, as such, it was critical that the two teams were aligned, particularly, during reviews and creation of the annual plan and the organisational strategy

Based on these statements, portfolio management practices are in continuous interaction with the strategic planning/reasoning practices. Therefore, this might provide further explanation as to why portfolio management practices at the OGC (2008) may include some part of the strategic planning/reasoning activities. However, there is no difference between the models at this point, as monitoring of the approved portfolio entails this kind of interaction (PMI, 2006b).

The second comment to be made is that the OGC (2008) model emphasises change in order to match the business as usual with the intended projects, while the PMI (2006b) model focuses on implementing the strategic business objectives. Interestingly, does that mean that the strategic solution might not lead to change? This query will be answered later during discussion of the differences between the two models in terms of the lower level practices of the portfolio management.

Based on the source discussed above as well as the work of other researchers such as Moore (2010) and Levine (2005), several points can be noted regarding the characteristics of portfolio management. First, portfolio management is responsible for implementing all strategic outputs, whether in terms of projects, programmes or other activities (Moore, 2010; OGC, 2008; PMI, 2006b; Levine, 2005). Second, portfolio management is responsible for monitoring the external environment of the portfolio (Moore, 2010; OGC, 2008; PMI, 2006b; Levine, 2005). In order to clarify the content of portfolio management, the following discussion focuses on existing models introduced by various researchers and institutions.

3.20 Portfolio management models

The first portfolio management model is the OGC (The Office of Government Commerce) model; this model is not only for delivering programmes and projects, but as the OGC (2008, p.4) states, *portfolio management is about choosing the right change in order to realise the agreed strategic objectives*. In addition, The OGC (2008, p.5) model ties the effectiveness and successful implementation of the portfolio management in with existing *organisational strategy that contains well-defined and agreed strategic objectives with associated targets and measures*. Therefore, to achieve this aim, the OGC introduces the model presented in Figure 3.16.



Figure 3.16. Portfolio management model. Source: OGC, 2008, p.4.

The OGC (2008) model consists of two distinct groups. The first is the definition group, which encompasses five stages; understand, categorise, prioritise, balance and plan. The second group is the delivery group, which is responsible for reviewing and monitoring programmes and projects in order to ensure their compatibility with the strategic objectives. This second group (the delivery group) consists of seven elements; management control, benefits management, financial management, risk management, stakeholder engagement, organisation governance, and resource management. However, one element of the portfolio delivery group (benefits management) needs to be reviewed before discussing the following model. Benefits management practices here are not

similar to the benefits management practices within the programme management guidelines. the aim of the former, as stated by the OGC (2008, p.57), is *to clearly identify and manage the benefits being realised from the Changes, ensuring that they contribute to performance and Strategic Objectives as defined in the Business Case*, while the latter is for the benefit reaped from the relation between projects and activities (OGC, 2007).

The second model is the PMI (2006b) standard. The PMI proposes a model for portfolio management which consists of two main groups, as shown in Figure 3.17. The first group is concerned to align programmes and projects objectives with the organisation's strategic objectives before taking decisions. This group of activities comprises seven practices; identification, categorization, evaluation, selection, prioritization, balancing and authorization. The second group regards the monitoring and control of programmes and projects using performance indicators. The PMI (2006b) guidelines rely on several factors for monitoring the portfolio; resource allocation and capacity data, environmental constraints, organizational governance standards, controls, and constraints, and performance indicators.

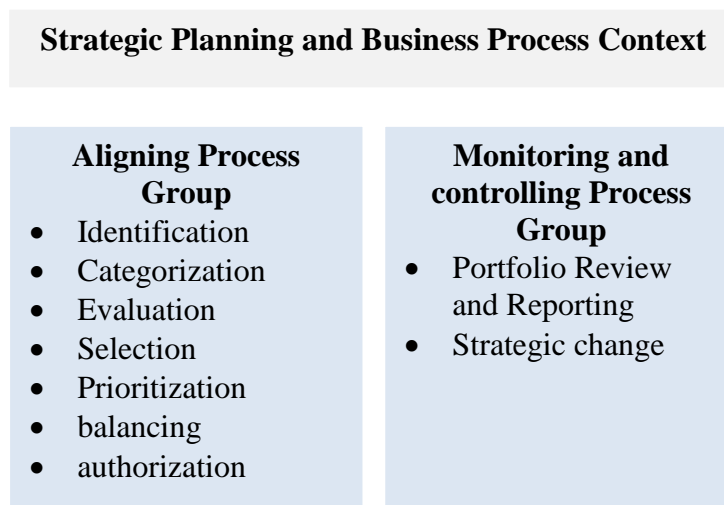


Figure 3.17. Portfolio management process groups. Source: PMI, 2006b, p.25.

The PMI (2006b) claims that their standard suit all organisations, whether for-profit or governmental organisations. Moreover, the standard is considered an extension to the previous standards, project and programme management standards. Further, the PMI clearly states that the standard is not limited to financial investment projects but instead

can be applied to other kinds of projects. Patanakul (2011) claims that the PMI framework is widely practiced by various organisations.

The third model was introduced by Moore (2010) to the IT community due to the disconnection between organisations' strategic orientation and ongoing projects. Moore's model (2010) is built on a clear need to relate the organisation's practices to its strategic direction. Although Moore (2010) presents his model in scattered components, it is presented here in a process form, as shown in Figure 3.18. The first stage is devoted to building a registry for all existing projects. The second stage is for identifying strategic objectives and finding out how closely each project is linked to the organisation's strategic objectives. The third stage is to prioritize and categorize projects based on their closeness to the strategic objectives, which involves ranking projects based on assigned values. The last stage is managing and reviewing the portfolio to realign projects with the strategic objectives.

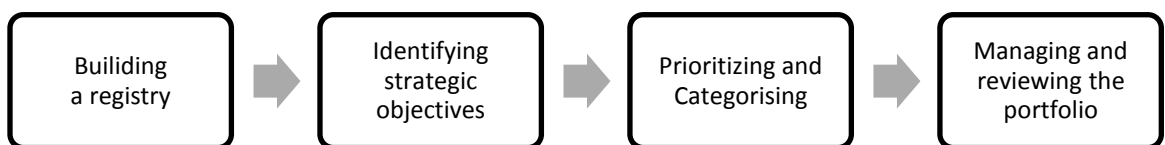


Figure 3.18. Portfolio management for IT projects. Source: Moore, 2010.

The previous discussion focused on three different models to portfolio management practices. Each of the three models has a similar pattern in some aspects of the portfolio management approach, but there are also differences. The similarities between the approaches can be aggregated into three main points. Firstly, all models, at the top level of abstraction, have the same two groups of activities; portfolio preparation (alignment) and portfolio monitoring. In addition, the required activities for the alignment process group in the models are extremely similar, entailing monitoring. Secondly, all models try to relate the strategic process intention to the business objectives and strategy. In addition, both standards almost have similar indicators for monitoring the portfolio to align it with the strategic direction of the organisation. Thirdly, all models have two similar activities within the preparation (alignment) stage; categorisation and prioritisation.

The differences between the approaches can be summarized through two points. Firstly, the PMI (2006b) standards claim that the portfolio management standards are an extension of previous standards, both project and programme management, while the OGC (2008) has shown the potential for disconnection between portfolio management and project and programme management. Therefore, the PMI standard is more consistent with the intended conceptual framework for AM. Secondly, the PMI (2006b) insert an authorization stage as part of the processes group of portfolio alignment. This emphasis on the authorization stage is consistent with the bureaucratic requirements of the public sector (Mintzberg and Jorgensen, 1987).

Based on portfolio management thinking, the following can be concluded. The whole idea of portfolio management practices starts with the existence of several programmes and/or projects. These projects and programmes need to be realigned with the strategic direction of the organisation. Based on this need, the following part attempts to investigate international AM standards and guidelines through the portfolio management lens.

3.21 Portfolio and asset management

Portfolio management practices within international AM standards and guidelines fall along a spectrum of vague and clear practices. In some cases, portfolio management practices are not clearly stated, whether in terms of an independent stage or in terms of clear practices required for a portfolio of projects. In others meanwhile, portfolio management practices are clearly stated, either in terms of an independent stage or through clear delineation between portfolio management practices and other practices. The discussion will focus on ends of the spectrum.

In terms of vague practices for portfolio management practices, the last four stages of the approach given in the Asset Management Primer of the U.S. Department of Transport are redrawn in Figure 3.19. In both the alternative evaluation and programme optimization stage and short and long range plans, asset managers are required to answer various questions as stated by the FHWA (1999, p.19) guidelines, including:

What investment options may be identified within and among asset component classes? What are their associated costs and benefits? Which option, or combination of options, is optimal?

Based on these two stages, it is difficult to delineate which practices are required for a single project and which practices are required for a portfolio of projects. In addition, it is unclear whether the guidelines attempt to align the whole portfolio with the strategic direction, or the asset managers' work with a single project.

In terms of monitoring the portfolio, the FHWA (1999, p.19) guidelines give the following questions related to the programme implementation and performance monitoring:

How do we monitor the impact of our decisions? How do we adjust our decision-making framework when indicated? How can we best manage our assets in order to least inconvenience the motoring public when we repair or replace these facilities?

Based on this, it is apparent from both stages that they are related to the monitoring of portfolio of projects, but that different practices exist in the theoretical frameworks of portfolio management practices. However, the FHWA guidelines have clearly provided two comments on the portfolio management thinking. First, there is no delineation between portfolio and single project practices. Second, portfolio management thinking in terms of alignment and monitoring is part of the asset management practices.

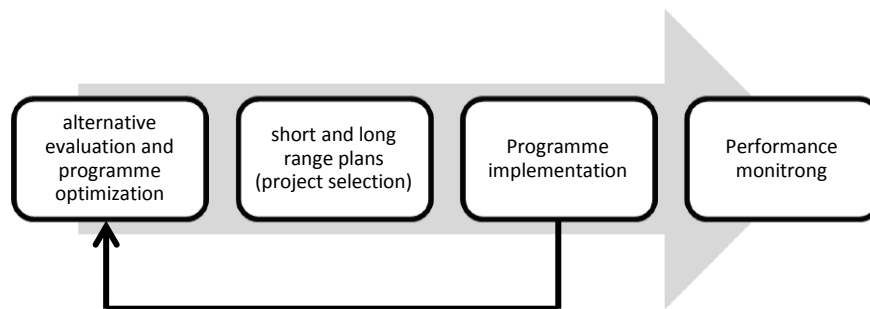


Figure 3.19. Part of the FHWA guidelines' asset management process. Source: FHWA, 1999, p.19.

In terms of clear portfolio management practices, the TAM guidelines are selected for comparison. As seen in chapter 2, the TAM guidelines are composed of three packages; capital investment, operation and maintenance and disposal packages. In the capital

investment package, stage no. 3 (prepare CISP and business cases), organisations are required to submit to the government the organisation's portfolio of intended projects with the following satisfied requirements (NSW, 2006c):

- Governance of the intended projects
- Planning horizon and alignment for ten years
- Enhancement and maintenance of efforts
- Prioritisation of projects
- Project profile; and finally
- Business case

It is clear from the requirements of the TAM (NSW, 2006c) guidelines that this stage is to prepare a portfolio of projects for submission to government. This portfolio resembles, to a considerable extent, the portfolio alignment activities in the theoretical argument of portfolio management practices. Moreover, some of the components of the required stage are similar to the PMI (2006b) and OGC (2008) standards; such as prioritisation of projects and governance. However, the differences between the portfolio components at this level of detail are not part of the intention of this thesis, and the only required aim is to confirm the existence of a portfolio management alignment stage.

In the capital investment package, stage no. 4 (monitor and review), organisations need to pay attention, at the time of implementation (deliberate strategy), to the addressing the following factors:

- *the CISP, as a ten (10) year rolling plan, is **updated annually** and constantly reviewed to ensure that it incorporates, as practicable, changes to the service strategy as well as changes to **resources available**, including funding.*
- *Updates are provided to treasury on the progress of agencies' capital investment programs/projects throughout the year. Agencies should ensure they have in place the processes to monitor the progress of, and expenditure on all capital projects both to manage the procurement process and to report the program status to treasury.*
- *Completed capital projects are reviewed and the results compared to the project outlines and cost estimates developed for them. Did they deliver the project objectives? Significant failures to deliver the objectives set*

down should result in a review of the capital investment strategic planning process. It may indicate that the agency's service delivery strategy was not clearly defined or that alternative delivery strategies were not adequately considered. Alternatively it may show that the project objectives did not adequately translate the service delivery strategy or that there were problems with the project options generated. Documented measures should be put in place to prevent recurrences (NSW, 2006b, p.10)

Apparently, the TAM guidelines (NSW, 2006b) require monitoring of the deliberate strategy. Interestingly, parts of these practices are similar to the PMI (2006b) and the OGC (2008) practices, such as investigating resource availability. However, the current aim is to confirm the existence of monitoring of the deliberate strategy at the higher level of abstraction, irrespective of the required details. The remaining packages, asset maintenance strategic plan (NSW, 2006d) and asset disposal strategic plan, (NSW, 2006e), also contain portfolio management thinking, but scattered over several stages.

Based on this investigation of portfolio thinking in international AM approaches, two observations are recognised. First, despite the existence of two international guidelines for portfolio management thinking, unfortunately portfolio management has not been paid enough attention in AM approaches. This point is recognised because some of the guidelines appear to marginalize portfolio management practices; a conclusion arrived at based on the position of the portfolio management practices in the AM approaches. For instance, the IIMM guidelines cite portfolio management activities within the evaluation tools and techniques of the project evaluation stage.

The second observation based on the review is that although the term portfolio management is not used by all AM international approaches, the content and purpose of the assigned practices appear to signal portfolio management thinking. For instance, the TAM guidelines assign portfolio alignment management practices among the stage for preparing the capital investment strategic plan and business cases. Conversely, within the monitoring activities of the portfolio the TAM guidelines adopt the same terminology (monitor and review) (NSW, 2006c). Apparently, both stages intend to deal with portfolio management thinking. Therefore, portfolio management practices exist within international practices, but need improvement.

3.22 conclusion

This part aimed to explore portfolio management theory, for to various reasons. First, international AM standards and guidelines have frequently used portfolio management practices, but with no explicit demarcation between portfolio management practices and other practices. Second, during the journey of SAMP framework development, the output of the process demanded the need for practices that are similar to portfolio management thinking. In this line of argument, three models of portfolio management thinking were investigated; PMI, OGC, and portfolio management for IT projects. The three models have a similar pattern in some aspects of the portfolio management approach, but there are also differences.

The similarities between the approaches can be aggregated into three main points. Firstly, all models, at the top level of abstraction, have the same two groups of activities. Secondly, all models try to relate the strategic process intention to the business objectives and strategy. Thirdly, all models have two similar activities within the preparation stage; categorisation and prioritisation.

The differences between the approaches can be summarized through two points. Firstly, the PMI (2006b) standards claim that portfolio management standards are an extension of previous standards, both project and programme management, while the OGC (2008) has shown the potential for disconnection between portfolio management and project and programme management. Secondly, the PMI (2006b) insert an authorization stage as part of the processes group of portfolio alignment.

Based on the findings developed from investigating portfolio management thinking, the international AM standards and guidelines were investigated through the portfolio management lens. The investigation concluded that portfolio management practices within international AM standards and guidelines fall along a spectrum of vague and clear practices. In some cases, portfolio management practices are not clearly stated, whether in terms of an independent stage or in terms of clear practices required for a portfolio of projects, whereas in others, they are. As a result, the following conclusion is reached: portfolio management practices exist within international practices, but need improvement.

Part 5

The Conceptual framework

In Chapter 1 an attempt was made to highlight the word “**systematic**”. Using a dictionary, the Longman dictionary (2003, p.1685) defines systematic as *organized carefully and done thoroughly: a systematic approach/way/method, a systematic approach to solving the problem / a systematic way of organizing your work*. Therefore, from this definition, asset management activities should be organized carefully and done thoroughly.

Based on this knowledge, Chapter 2 investigated how current AM standards and guidelines may be described as are systematic. This investigation resulted in several conclusions. However, one of these conclusions claims that Systematic asset management approaches are varied among international AM standards and guidelines even when the approaches are developed for the same physical assets. This diversity can be summarized as follows.

The number of stages in each approach is different. In addition, each approach has a different level of detail. The TAM guidelines for instance are explained via five separate documents, while on the other hand, the Asset Management Primer of the U.S. Department of Transportation discusses the approach through only one document. Moreover, some guidelines have an interaction between their processes, such as in the TAM guidelines. This interaction needs to be disentangled in order to grasp the idea behind the practices. These difficulties and more obstruct the researcher in adopting one of these approaches as a measurement tool for assessing the extent to which the Saudi public sector is systematic. However, based on the knowledge developed from investigating various international AM standards and guidelines, in Chapter 2, the following definition of SAMP was reached:

(SAMP) Systematic asset management practices are certain practices which are dedicated to capturing the life-cycle of physical assets. These practices are connected with each other in a process form.

Therefore, in Chapter 3 (Parts 1, 2, 3 and 4) the identified hurdles were overcome by developing a conceptual framework to explain, as supported by Dubin (1976) and Whetten (1989), how practices in AM standards and guidelines can be integrated into one single conceptual framework. This work resulted in the framework given in Figure 3.20 below.




Therefore, in order to clarify and articulate the extent and nature of the links between the conceptual framework proposed in this study and international AM approaches. Textual thematic analysis technique was undertaken over these standards and guidelines which resulted in the matrix presented in Table 3.4. The first column of the table includes the concepts of the developed conceptual framework, while across the first row, the seven international AM standards and guidelines are displayed. The aim of this table is to match every practice mentioned in the seven international approaches with its corresponding stage within the developed conceptual framework. This intention will assist in distinguishing between the various international AM approaches. In addition, the classification of the practices in accordance with the conceptual framework will assist in understanding the current gap between the international AM approaches and the conceptual framework. All of the analysis undertaken for this is available in appendix A.

Based on the analysis, three observations are made. First, the developed conceptual framework includes all AM practices in all international AM approaches: the only practices overlooked by the conceptual framework are indirect physical asset life cycle practices such as data inventory or organisational culture.

Secondly, the comprehensive nature of the developed conceptual framework provides the opportunity to distinguish between various existing AM approaches. Obviously, the TAM, RICS and PAS 55 guidelines are the most comprehensive AM approaches, all of them covering most of AM practices. However, all of them overlook certain required practices such as physical asset failure in case of the RICS guidelines and articulating programme formulation practices in RICS and TAM guidelines. On the other hand, the U.S. property management practices (OMB USA) represents the lower comprehensive AM approach in terms of the number of practices in international AM approaches.

Table 3.4. Matching the seven international approaches with the developed theoretical model.

	FHWA	TAM and ISAM	IIMM	OECD	OMB USA	RICS	PAS 55
Identification stage							
External environment				=====		=====	
Physical asset failure prediction	=====			=====			
Present strategy				=====			=====
Performance indicators							
Generating options	=====	=====	=====	=====	=====	=====	=====
Evaluating options							
Programme formulation		=====				=====	=====
Portfolio alignment							=====
Portfolio monitoring							

Legend:  separate stage;  mentioned but without separate or incomplete stage;  External source; the blank square is for no practice.

Thirdly, there are various ways of presenting AM practices. For instance, some of approaches mention practices implicitly within other stages and without allocating a specific stage to those practices. Some guidelines provided a link to other policies in the case of certain practices, such as the external environment in the FHWA guidelines. Having discussed the main characteristics of the international AM standards and guidelines using the Table 3.4 and the developed conceptual SAMP framework, the following discussion elaborates on how the conceptual framework, systematic asset management practices (SAMP), work.

This framework was developed based on other theoretical frameworks introduced by different researchers in different areas of management in general, as well as in process, strategic, portfolio, and programme management. This action is supported as legitimate, as argued by Zahra and Newey (2009) who state that importing other developed frameworks from other disciplines is both legitimate and constructive. Therefore, the backbone of the developed framework is based on concepts jointly combined to constitute the foundation of the developed conceptual framework for depicting SAMP.

The teleological process theory that translated later into the formation of strategy constituted the underlying principles of the developed SAMP framework. At Part 1, the formation of strategy is divided between intention and realised and unrealised strategies upon which unexpected events may emerge and then change part of the intended strategy. Therefore, based on these concepts, a special public sector reality was constructed.

This speciality emanates from the inherent characteristics of the public sector regarding accountability and monitoring of decisions (Bovens, 2005; Hood, 2002), as well as from evidence found in various international AM standards and guidelines (FHWA, 2007; OECD, 1999). The formation of strategy was converted into three basic stages that constitute the higher level of abstraction of SAMP framework; the intended strategy, monitoring the implementation of the intended strategy and current assets scene, as illustrated in Figure 3.20.

In the next level of the developed conceptual framework, physical asset formation starts with strategic planning/reasoning process in which physical asset managers should start by identifying the strategic issues by understanding the organisation's purpose, values, strategy, and behaviour standards (Campbell and Yeung, 2004, 1991).

In addition, other documents are also vital for physical asset managers, such as formal and informal mandates (Bryson, 2004). At this stage, issues (Wit and Meyer, 2010; Johnson et al., 2008; Bryson, 2004) or problems (Robbins et al., 2009) should be recognized, clarified and recorded (Blair-loy et al., 2011).

Once the strategic issue or problem is identified and recognised, physical asset managers need to diagnose the organisational environments related to physical assets and, later, attempt to reconcile them. This reconciliation leads asset managers to produce effective solutions for the organisation. However, each variable within either environment might have a unique impact on the organisation's physical assets.

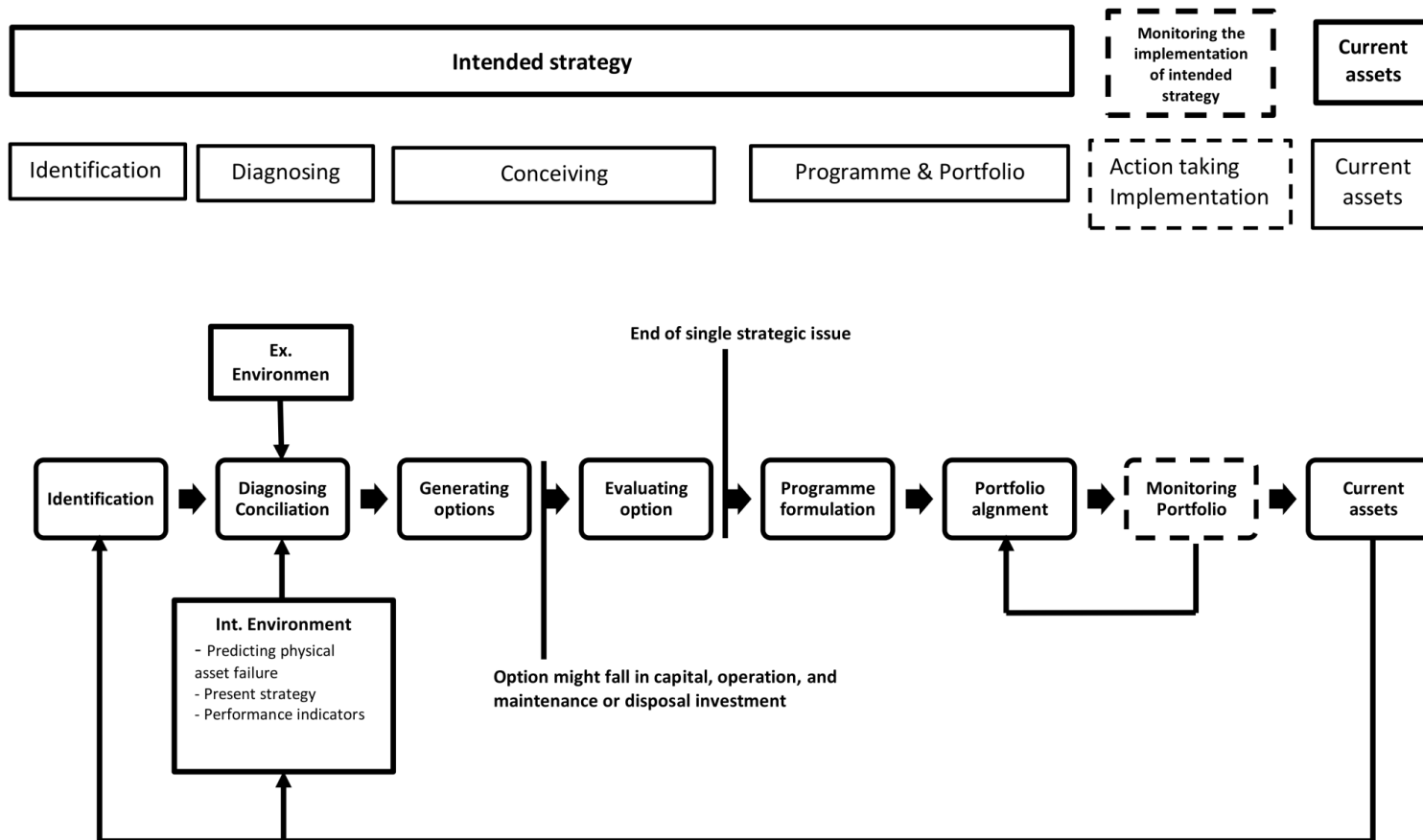


Figure 3.20. The conceptual framework for SAMP.

Therefore, physical asset managers may need to generate solutions for each variable. These solutions for various variables constitute the ingredients of the future physical assets portfolio. Up to this point, asset managers might need to repeat the cycles of the strategic planning/reasoning process in order to satisfy the organisation's need. These repeated practices will generate what is here termed, based on what was found in the literature, programme formulation. Surprisingly, apart from the RICS, TAM and PAS 55 this concept was totally overlooked by all the investigated international approaches. However, the reason behind conducting or bringing about programme management, as claimed by many, such as Turner and Speiser (1992); PMI (2006a); and OGC (2007), is to manage the expected generated benefits or to control collection of projects if this leads to better outcomes.

This claim can be justified by two points of evidence. First, researchers such as Ferns (1991), and Pellegrinelli (1997) Sanghers (2007) have proposed several typologies of programme formulation and also suggested various reasons behind establishing programmes of projects. The second justification is implied in the model itself and the point has already been clarified in Part 2 Section 3.11.

Once a portfolio of projects and programmes is established, physical asset managers need to investigate portfolio management thinking in order to align the whole portfolio with the organisation's strategy. Finally, asset managers are required to think about, managing and monitoring the portfolio.

The last stage occurs when assets are received by end users, and thus starts the utilization stage. At this stage, various sets of information about assets are required and these are fed back to the diagnosing and identification stages, where the process starts again, as well as fed forward to the remaining processes of AM practices.

To sum up, it is suggested here that the developed conceptual framework provides a solution to all the three issues mentioned in Chapter 2 regarding using a proper model to measure systematic AM practices in the SPS. The following paragraphs discuss how these issues have been resolved.

First, the following was stated in Chapter 2:

Although AM approaches, provided by various organisations, are to some extent similar, there are some considerable differences in the way they are organised even when these approaches are developed for the same type of physical asset

This issue was resolved by finding a common area between the AM approaches, upon which practices are grouped together. For instance, at the evaluation stage, the researcher found that parts of the evaluation techniques are used in separate stages while they have similar purpose, with evaluation logic such as on the RICS guidelines.

The second issue is that the reviewed AM practices are not always presented in a single process. This is resolved by integrating these multiple processes using the developed theoretical perspective in terms of formation of strategy. In addition, this action has also resolved the third issue, of why these activities or stages are included and connected to each other in this way. What is the underlying logic behind these models? Prior to ending this part it is important to address or revisit this question, how is the researcher going to measure the systematic asset management practices of the SPS? The discussion which follows aim to answer this question.

It was found in Chapter 2 that AM standards and guidelines require asset managers to repeatedly check certain activities. These activities within all approaches are connected to each other in a sequential manner: especially in case of the higher level of abstraction. In addition, the asset managers need to check if these activities are applicable to their situation or not, as found in the RICS (2012) guidelines. However, in the current thesis, a conceptual framework has been developed which brings together activities based on the various theoretical perspectives that facilitate both their connectivity and operational level of abstraction.

Therefore, the established level of abstraction is considered the bench mark of the intended systematic asset management practices measurement tool. In this sense, asset managers are required to visit each stage of this level of abstraction in order to be systematic irrespective to the implementation of the practice. To clarify, practice

in some cases may not be required as claimed by the RICS guidelines, but what needs to be articulated is to make sure that asset managers systematically check applicability of certain practices.

Having established the essence of systematic thinking, the next stage is to identify the boundary of the systematic measurement tool. In the previous discussion seven international AM standards and guidelines were analysed using thematic analysis techniques. The analysis intended to establish levels of systematic AM practices on the basis of all the seven international standards and guidelines. The findings have shown that two levels of systematic practice can be identified. The lower level is represented by the OMB USA (property asset management in the USA) and the upper level of the systematic asset management practices is represented by the TAM and ISAM guidelines. Therefore, any ministry in the SPS that falls between these two levels will be considered systematic as measured against the international AM standards and guidelines. The next chapter focuses on research methodology to discuss how the research is going to be implemented.

3.23 Conclusion

This part brought together all the previous work of parts 1, 2, 3, and 4 and completed the process of finding an underlying logic upon which to build the intended SAMP model. This model aims to bring together the various activities set out in international AM standards and guidelines in order to both understand current AM practices in these standards and guidelines and also measure the extent to which SPS asset management practices are systematic. The teleological process theory and the formation of strategy were found to be the best candidates for the intended reality. However, although these two concepts constitute the intended model's foundation, the conceptual framework remained to be detailed in order to accomplish the aim of the study's aim, which is to measure the extent to which asset management practices in the SPS are systematic and upon which improvement plan should be recommended. Therefore, process, strategic planning/reasoning process, portfolio, and programme management were brought into the discussion in order to satisfy the aim.

The next step was to clearly delineate between international AM standards and guidelines besides displaying the gap between theory and practices. In the case of the former, the TAM, RICS and PAS 55 standards and guidelines are the most comprehensive asset management approaches, all of them covering all of the basic building blocks of the developed SAMP framework. On the other hand, the U.S. property management practices (OMB USA) represents the lower asset management approach in terms of the number of practices in international AM approaches. In the case of the latter, in the gap between theory and practice, there are various ways of presenting asset management practices in these AM standards and guidelines. For instance, some approaches mention practices implicitly within other stages and without allocating a specific stage to those practices. Some guidelines provide a link to other policies in the case of certain practices, such as the external environment in the FHWA guidelines.

The last stage of the discussion articulated two levels of systematic practice that were difficult to uncover without the developed SAMP framework. The lower level is the basic systematic level represented by the U.S. property management practices (OMB USA) and the higher level of systematic can be represented by the TAM and PAS 55 standards and guidelines.

CHAPTER 4

RESEARCH METHODOLOGY

The manner in which this research is conducted is of central concern. Therefore, this chapter is devoted to clarifying how the aim will be fulfilled. Generally, the chapter is constructed from three main parts. The first part will articulate the main framework of the study and how the reality is approached. The second part presents and discusses the appropriate research method, tools and techniques in order to implement the study's aim, while the final part discusses ethical issues.

4.1 Research strategy

This part discusses the principles upon which the whole future work is built. In addition, this part presents various questions and their answers, including:

What research methodology seems to work best for me? Am I committed to a particular research model which implies a particular methodology? Do I have a gut feeling about what a good piece of research looks like?
(Punch, 1998, p.244-5)

The answers to these questions rely considerably on what model is adopted to provide the overall framework for viewing reality (Silverman, 2008). Models, as claimed by Silverman (2008, p.97-98), “tell us what reality is like and the basic elements it contains (ontology) and what is the nature and status of knowledge (epistemology)”. This viewpoint can roughly be equated to the paradigm or perspective in other researchers' terminologies (Silverman, 2008). Mathison describes the paradigm as:

A term used to capture a worldview or perspective that, in the case of research and evaluation, includes conception of methodology, purpose, assumption, and values.....a paradigm consists of an ontology (the nature of reality), an epistemology (what is knowable and who can know it), and a methodology (how one can obtain knowledge) (2005, cited in Donaldson et al., 2009).

Although Patton (2002) argues that there is no consensus on paradigm categorisation, Patton (2002) proposes thirteen different paradigms as shown in Tables 4.1a and b below. These paradigms can be distinguished from each other on the basis of the underlying questions that orient the study. This method of differentiation between paradigms was suggested by Patton (2002) based on the perception that the underlying question is the essence of the differences between paradigms.

To clarify, Patton (2002, p.80) claims that:

A foundational or burning question, like the mythical burning bush of Moses, blazes with heat (controversy) and light (wisdom) but is not consumed (is never fully answered). Disciplines given birth by the mother of all disciplines, philosophy, can be distinguished by their core burning questions

However, Lincoln and Guba (2000) reduce the number of paradigms to five; positivism, post-positivism, critical theory, constructivism, and participatory. Others such as Saunders et al. (2009) identify four paradigms, originally adopted from the work of Burrell and Morgan (1979), as applicable to business and management science; functionalist, radical structuralist, radical humanist and interpretive. Meanwhile, Creswell (2013) lists eleven different paradigms; positivism, post-positivism, interpretivism, pragmatism, transformative frameworks, constructivism, hermeneutics, feminism, racialized discourses, critical theory and Marxist models, cultural studies models, queer theory and post-colonialism.

These differing views of paradigms are organised by many researchers in different ways. For instance, Denzin and Lincoln (2008) refer to paradigms in a chronological list of phases, while other scholars mention them in a discrete and time-free list of perspectives. Bryman's (2008) point of view is inclined more toward describing the paradigms as time-free perspectives because some paradigms conducted in the earlier stages of the development of paradigms' development are still conducted currently.

Table 4.1a, Paradigms as mentioned by different scholars.

Paradigm	Perceived reality	authors
Functionalism	Looks at the functions of social institutions	Silverman (2008)
Behaviourism	Defines all behaviour in terms of stimulus and response	Silverman (2008);
Symbolic interactionism	Focuses on how we attach symbolic meanings to interpersonal relations	Silverman (2008); Patton (2002); Miles and Huberman (1994)
Ethnomethodology	Encourages us to look at people's everyday ways of producing orderly social interaction	Silverman (2008); Patton (2002); Miles and Huberman (1994)
Auto-ethnography and evocative forms of inquiry	How does my own experience of this culture connect with and offer insights about this culture, situation, event, and/ or way of life?	Patton (2002); Miles and Huberman (1994);
Truth and reality-oriented correspondence theory: positivist, postpositivist, realist and analytic induction approaches	What is really going on in the real world? What can we establish with some degree of certainty? What are plausible explanations for verifiable patterns? What is the truth insofar as we can get at it? How can we study a phenomenon so that our findings correspond, insofar as it is possible, to the real world?	Patton (2002); Bryman (2008); Teddlie and Tashakkori (2009); Saunders et al. (2009); Holloway and Wheeler (2010); Kane and Brun (2001); Miles and Huberman (1994); Coln and Guba (2000)
Social Construction and Constructivism	How have the people in this setting constructed reality? What are their reported perceptions, "truth", explanations, beliefs, and world-view? What are the consequences of their constructions for their behaviours and for those with whom they interact?	Patton (2002); Bryman (2008); Teddlie and Tashakkori (2009); Holloway and Wheeler (2010); Lincoln and Guba (2000)

Table 4.1b, Paradigms as mentioned by different scholars.

Phenomenology	What is the meaning, structure, and essence of the lived experience of this phenomenon for this person or group of people?	Patton (2002); Holloway and Wheeler (2010); Kane and Brun (2001); Miles and Huberman (1994)
Heuristic inquiry	What is my experience of this phenomenon and the essential experience of others who also experience this phenomenon intensely?	Patton (2002)
Hermeneutics	What are the conditions under which a human act took place or a product was produced that make it possible to interpret its meanings?	Patton (2002); Miles and Huberman (1994)
Narratology or narrative analysis	What does this narrative or story reveal about the person and world from which it came? How can this narrative be interpreted so that it provides an understanding of and illuminates the life and culture that created it?	Patton (2002)
Ecological psychology	What is the relationship between human behaviour and the environment?	Patton (2002)
A systems perspective and systems theory	How and why does this system as a whole function as it does?	Patton (2002)
Chaos and complexity theory: Nonlinear dynamics	What is the underlying order, if any, of disorderly phenomena?	Patton (2002)
Grounded theory	What theory emerges from systematic comparative analysis and is grounded in fieldwork ?	Patton (2002); Miles and Huberman (1994)

In contrast to Patton's differentiation between paradigms, many researchers distinguish between paradigms by articulating their underlying philosophical assumptions. Tashakkori and Teddlie (1998, p.7) describe the philosophy of the positivist's paradigm as the following. Positivism is adopted by philosophers of natural science, and their distinction emanates from:

- *Ontology (nature of reality): positivists believe that there is a single reality.*
- *Epistemology (the relationship of the knower to the known): positivists believe that the knower and the known are independent.*
- *Axiology (role of values in inquiry): positivists believe that inquiry is value-free.*
- *Generalizations: positivists believe that time- and context- free generalisations are possible.*
- *Causal linkages: positivists believe that there are real causes that are temporally precedent to or simultaneous with effects.*
- *Deductive logic: there is an emphasis on arguing from the general to the particular, or an emphasis on a priori hypotheses or theory.*

These characteristics triggered tensions during the 1950s and 1960s between social and behavioural scientists especially in terms of on ontology, epistemology and axiology, giving rise to post-positivism. The post-positivists retain some tenets of positivism:

- *Value-ladenness of inquiry: research is influenced by the values of investigators.*
- *Theory-ladenness of facts: research is influenced by the theory or hypotheses or framework that an investigator uses.*
- *Nature of reality: our understanding of reality is constructed (Tashakkori and Teddlie, 1998, p.8)*

The remaining paradigms can be allocated under qualitative methodology. The following bullet points outline the beliefs of this philosophy:

- *Ontology: naturalists believe that there are multiple, constructed realities.*
- *Epistemology (the relationship of the knower to the known): naturalists believe that the knower and the known are inseparable.*
- *Axiology (the role of values in inquiry): naturalists believe that inquiry is value-bound.*

- *Generalizations: naturalists believe that time- and context-free generalisations are not possible.*
- *Causal linkages: naturalist believes that it is impossible to distinguish causes from effects.*
- *Inductive logic: there is an emphasis on arguing from the particular to the general, or an emphasis on grounded theory (Tashakkori and Teddlie, 1998, p.10)*

In contrast to the paradigms discussed above, Creswell (2013) claims that there is one paradigm which is outside the domain of philosophical assumptions. This paradigm is pragmatism. Those who follow the pragmatism paradigm believe in the following:

- *Individual researchers have a freedom of choice. They are “free” to choose the methods, techniques, and procedures of research that best meet their needs and purposes.*
- *Pragmatists do not see the world as an absolute unity. In a similar way, researchers look to many approaches to collecting and analysing data rather than subscribing to only one way.*
- *Truth is what works at the time; it is not based on a dualism between reality independent of the mind or within the mind.*
- *Pragmatist researchers look to the “what” and “how” of research based on its intended consequences-where they want to go with it.*
- *Pragmatists have believed in an external world independent of the mind as well as those lodged in the mind (Creswell, 2013, p.28)*

These philosophical orientations set out the differences between various paradigms in social sciences and, consequently, reveal the basic belief of the researcher. Based on this consideration, the most suitable paradigm for the current thesis is the pragmatism paradigm, as the intention is to systemize AM practices in SPS irrespective of the heated debate between existing paradigms. Having established the philosophical orientation of the study, the discussion which follows is devoted to the logic of knowledge development of the study due its connection with the research paradigm (Blaikie, 2007).

4.1.1 Logic of knowledge

Logic of knowledge or inquiry is the way to knowledge development as seen by many scholars (De Vaus, 2014; Blaikie, 2007; and Wallace, 1969). This method

consists of two prominent approaches, inductive and deductive logic. However, other scholars such as Blaikie (2007) claim that logic of inquiries are not limited to two approaches to knowledge development (inductive and deductive), but instead encompass four approaches: inductive, deductive, retroductive and abductive. Moreover, these four approaches are carried out in both directions; top-down and bottom-up. Based on this line of thought and subject of interest, the study has adopted two approaches of logic of inquiries, inductive and deductive, and the discussion which follows will explore how these approaches are carried out.

De Vaus (2014) introduces the very basic process of logic of knowledge development approaches (inductive and deductive) as shown in Figure (4.1) below. This process is similar to Wallace's (1969) process but on a more generic level. De Vaus (2014) claims that the inductive approach is concerned with theory construction intention, while the deductive approach is concerned with theory testing and confirmation. In the inductive case, researchers start by observing the reality and eventually end up with theory about reality while in case of the deductive approach, the intention is to test or confirm theory by observing the reality. Although argument about the cycle of inductive and deductive approaches seems to be linear, in reality it is not (Wallace, 1969; Blaikie, 2007; and De Vaus, 2014). This brief introduction about situating the study in the logic of knowledge development approaches paves the way for the application of inductive and deductive approaches.

The traditional method in inductive logic is the adoption of a bottom-up approach which moves from particulars to generals. However, although this approach is well known and often-adopted, several drawbacks are identified which circumvent its potential application in the current study. Shepherd and Sutcliffe mention that (2011, p.363-364);

When theorists do not start with data close to the phenomenon, they might miss constructs and relationships important in describing and explaining the phenomenon. In addition, the data might less to speak to researchers. Moreover, preconceived notions and naïve theories reduce the openness and life of a concept or idea. Lastly, the bottom-up approach that requires starting with the data without any

consideration of a theory under construction is laudable but impossible to achieve in its purest form.

Shepherd and Sutcliffe (2011) suggest the inductive top-down approach as a solution to this: especially when there are vast, dynamic and complex literatures. This is applicable here, as it was shown in Chapter 2 that there are various and complex forms of AM standards and guidelines, besides the existence of a huge amount of literature in management that can be used to help in explaining and understanding the phenomenon of AM practices. The inductive, top-down approach is therefore adopted in this study and the processes within this approach are discussed below.

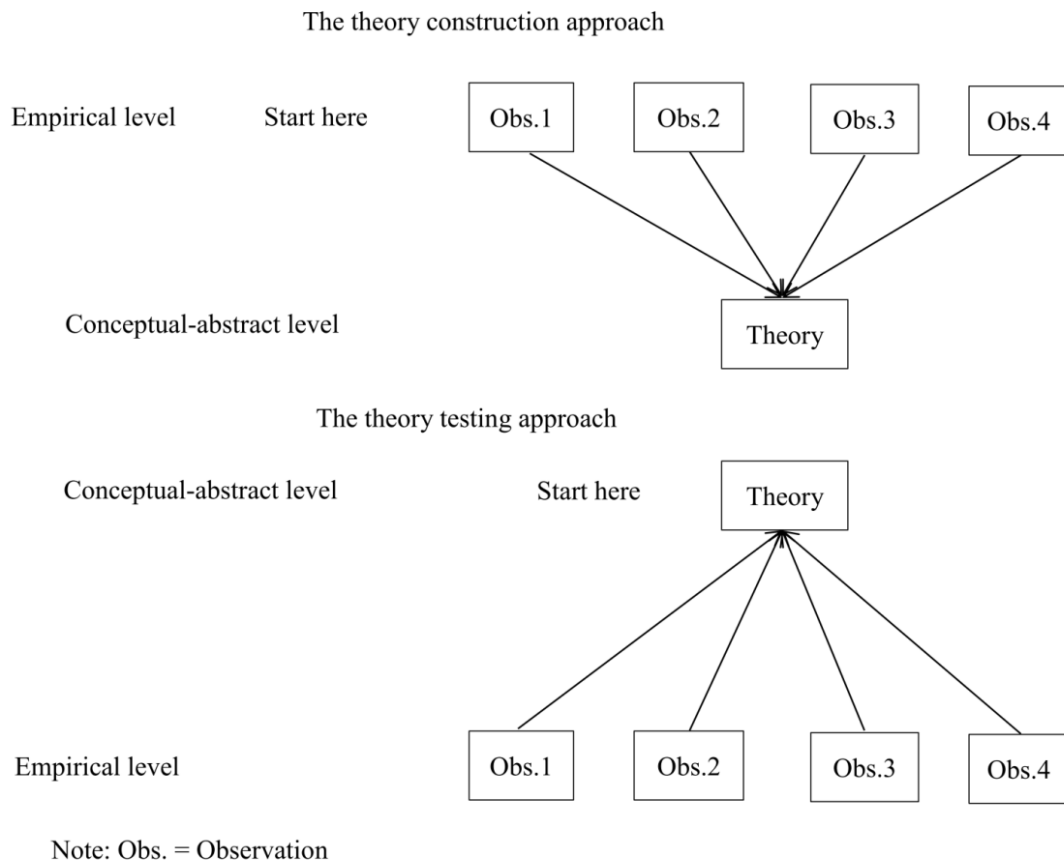


Figure 4.1. Logic of knowledge development. Source: De Vaus, 2014, p. 30.

After reviewing international AM standards and guidelines, the following is found. All AM standards and guidelines follow the same pattern in improving AM practices. This pattern is represented by adopting the process theory to implement the required improvement. Therefore, the inductive top-down approach was adopted by interrogating existing management theories; process theory, strategic planning, rational reasoning process, programme and portfolio management. This revision in Chapter 3 resulted in the development of a theoretical framework that can be used to understand and explain AM standards and guidelines, the SAMP framework.

Having established the theoretical framework in Chapter 3, the following step is to move to the next cycle of the logic of knowledge development, a deductive approach. A deductive approach, as explained previously, is useful to test or confirm theories (De Vaus, 2014). The remaining part of this chapter will consider how the deductive approach is followed and adopted in the study.

4.2 Deductive logic of knowledge

The deductive approach was selected as this was perceived as the logical development for the study. The deductive approach can be implemented by adopting either quantitative or qualitative research steps (Saunders et al., 2009). This study adopts both approaches at the stage of analysing the collected data, while most of the subsequent stages, to the analysis stage, follow quantitative methodology steps logic. The following discussion justifies the reason behind this approach. First, in Chapter 3 the SAMP conceptual framework was developed. This framework was built on the basis of international AM standards and guidelines, and existing management theories. In addition, this framework supplies the researcher with the required criteria upon which the gap can be identified between the SPS and developed nations, besides revealing AM characteristics across the SPS. Accordingly, the conceptual framework (SAMP) furnishes the study with a pre-construct that can be used for both methodological approaches; qualitative (Yin, 2009) and quantitative (Bryman, 2008).

Second, the developed conceptual framework requires certain methodological considerations at the time of planning the research, in order to acquire knowledge

(Bryman, 2008). Teddlie and Tashakkori (2009) explore the differences and similarities between various inductive and deductive methodologies and reach the following conclusion: when researchers are interested in numerical data, the research can be allocated among quantitative methodology; on the other hand, when the interest lies narrative data, the work can be allocated among qualitative research. The current study attempts to find variation between ministries in terms of AM practices. This variation cannot be captured without constructing certain benchmarks upon which the required measurement can be established, and these are constructed by adopting the SAMP framework. The measurement tool for SAMP attempts to measure participants' managerial behaviour. As a result, the preferred methodology for the study is to follow quantitative steps. However, this adoption does not exclude the logic of qualitative research because the analysis stage of the data encompasses both techniques of analysis. In addition, the structured interview attempts to satisfy the aim of the acquired knowledge by qualitative and quantitative research methodologies. To avoid confusion, this discussion is deferred to the data analysis stage (Section 4.2.10). The following discussion is devoted to the process of quantitative research steps.

4.2.1 Quantitative research steps

Various processes have been proposed for conducting quantitative research. Robson, for instance, mentions five stages:

1. *Deducing hypothesis from the theory*
2. *Expressing the hypothesis in operational terms which propose a relationship between two specific concepts or variables*
3. *Testing this operational hypothesis*
4. *Examining the specific outcome of the inquiry*
5. *If necessary, modifying the theory in the light of the findings* (2002, cited in Sanders et al., 2009; p.124-5).

Kumar (2005) proposes eight stages for conducting quantitative research and later aggregates these stages into two main parts: planning a research study and conducting the study, as shown in Figure 4.2 below. Although Kumar's (2005) process might describe the logic of quantitative research, still, the process is inappropriate for the intended research due to the following. First, the planning stage

incorporates writing a research proposal, while the process for this thesis does not include such a stage. Secondly, Kumar's process (2005) is not sufficiently detailed to guide the process of research for the study.



Figure 4.2. Research process. Source: Kumar, 2005, p.20-25.

Bryman (2008) includes further detail, describing eleven steps for conducting quantitative research. These stages are set out in Figure 4.3 below. However, Bryman's quantitative research steps have not explicitly included four vital stages for the study. The first is the pilot study. Bryman (2008, p.247) states that *it is always desirable to conduct a pilot study before administering a structured interview schedule*. This is a critical step for this research, because the structured interview developed needs to be tested in terms of validity and reliability (Oppenheim, 1992). In the pilot study stage, as discussed later, the researcher has undertaken two pilot studies to check the validity of the questions. The intention was to avoid any unexpected behaviour in any future application. The first and second pilot studies are used for scrutinizing stability (one of the reliability factors) of the measures (Bryman, 2008).

The second and third stages are; logic of the structured interview and structured interview for administration. The last added stage is related to the aim of developing recommendations for SPS. This stage is needed as one of the basic steps in the thesis, in which the researcher intends to present the current AM characteristics in SPS and suggest how to improve the Saudi public sector. Accordingly, these four

stages are included in the process and discussed later. Therefore, Bryman's (2008) research process presented in Figure 4.3 is adopted and modified to achieve the study's aim. The following discussion is devoted to an examination of each step in the process that belongs to chapter 4.

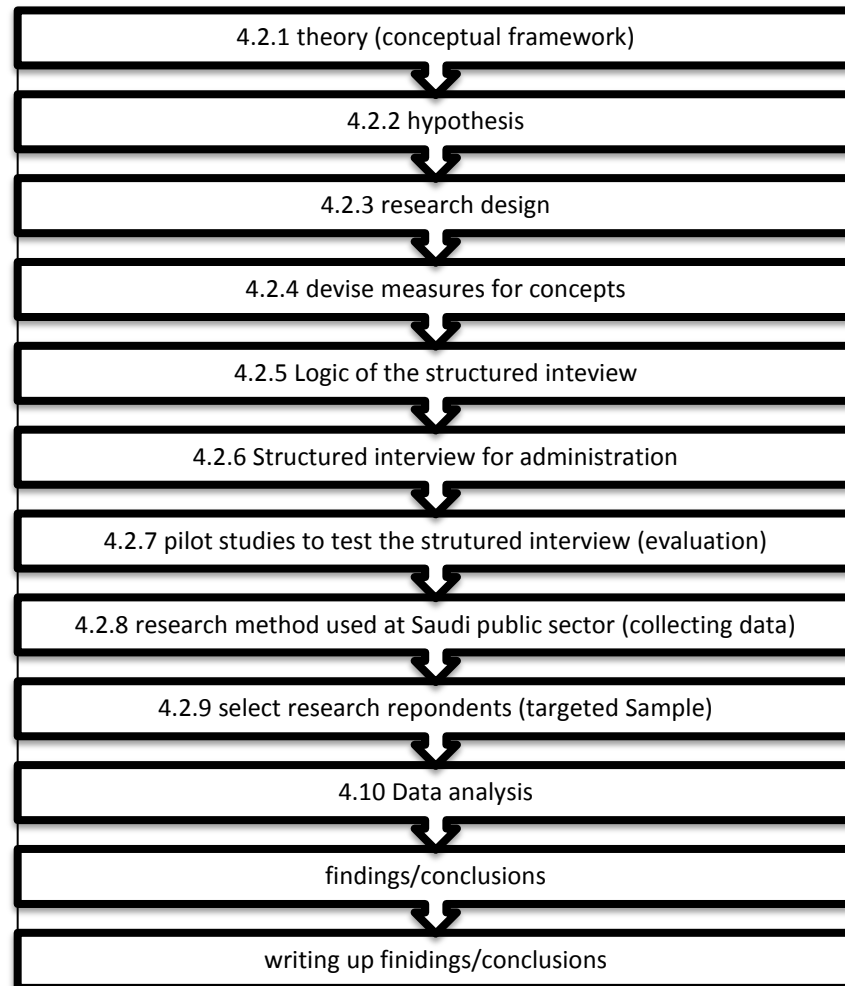


Figure 4.3. Quantitative (deductive) research process. Source: Bryman, 2008, p.141.

4.2.1 Theory at the system of science

It was decided in Chapter 2 that none of the international AM standards and guidelines can be selected to measure the SAMP of the SPS. This failure was mainly attributed to both the absence of theory that can explain the current variation between these approaches and the needed level of abstraction that facilitate measurement intention. Therefore, the failure catalysed the researcher to look for an

underlying principle (theories) upon which all international AM standards and guidelines can be explained and understood and later used for developing SAMP measures. Theory, as mentioned by Dubin (1976, p.26), is an attempt to:

Model some theoretical aspect of the real world for making sense of the observable world by ordering the relationship among elements that constitute the theorist's focus of attention in the real world

In addition, Sutton and Staw (1995, p.378) claim that:

Theory is about the connections among phenomena, a story about why acts, events, structure, and thoughts occur. Theory emphasizes the nature of causal relationships, identifying what comes first as well as the timing of such events

Moreover, Weick (1985, p.386) mentioned that “theory belongs to the family of words that includes guess, speculation, supposition, conjecture, proposition, hypothesis, conception, explanation, model”. Weick (1985) also encourages writers to feel free to use, in their communication, theory as a word whenever they are theorizing. This concept occupies central position at the system of science for testing and building theories (Mone and McKinley, 1993), irrespective of whether the science’s aim is to collect evidence for facts or to use evidence to predict and forecast a phenomenon (Sapsford, 2007).

The purpose of theory is different from one scholar to another. For instance, Dubin (1976) and Whetten (1989) perceive theory as a tool for understanding phenomena, while others such as Bacharach (1989) and Gregor (2002) stress the explanation and prediction purpose of theories. However, part of the intention of this thesis is to understand how physical assets are managed in the public sector context. Consequently, part of this intention is to explain the meaning of systematic.

The model developed in Chapter 3 is based on the principles of the process theory upon which the researcher’s point of view was to transform the inherent characteristics of the teleological process theory nested in the AM practices into a life cycle theory. This intention was sought by transforming the emergent nature of

AM practices into prescriptive practices. Consequently, the demand to combine various disciplines together in order to explain a phenomenon became obvious.

Combining of various theories is recommended by Zahra and Newey (2009), where Zahra and Newey (2009) encourage researchers and scholars to borrow and use theories from different disciplines and fields. Zahra and Newey (2009) classify borrowing of theories into three categories. The first is borrowing and replicating mode, in which researchers borrow concepts and theories from within or across fields and disciplines to study phenomena at the interpret. The second mode is borrowing and extending theory, in which researchers adopt theories from parent fields/disciplines to study the phenomenon and later feedback the findings to scholars in these parent fields/disciplines. The third mode is transforming the core of the theory in which the researchers will apply well-known theories to new phenomenon and, later, diffuse their findings to the parent field. Accordingly, based on this classification, the developed model can be allocated within the first mode, where the multiple theories of management field had been used to explain management of physical asset phenomenon in several international AM approaches. These theories are borrowed from; process theories, strategic planning, rational reasoning process, programme management and portfolio management.

4.2.1.1 What constitute a good theory?

Many scholars have embarked on the quest to answer this question, besides clarifying the distinction between strong and weak theory in social science. These attempts include:

Dubin's (1976) analysis of theory building in applied areas, Feese's (1980) review of formal theorizing, Kaplan's (1964) philosophical inquiry into the behavioural sciences, Merton's (1967) writings on theoretical sociology, and Weick's (1989) ideas about theory construction as disciplined imagination (Sutton and Staw, 1995, p.371)

Although scholars have attempted to explain theory, the researchers are left more rather than less confused about the subject (Feese, 1980; cited in Sutoon and Staw, 1995). However, to establish whether the SAMP conceptual framework is theory or

not, Whetten's (1989) has developed four criteria upon which decision on what constitutes theoretical contribution is facilitated. These four criteria developed by Whetten's (1989) are followed. The reason behind selecting Whetten is that Whetten has developed these elements based on his daily editorial activities on the *Academy of Management Review*. In addition, Whetten (1989) presents the four elements in a simple manner in order to explain the theory development process for researchers, with the intention of easing communication problems.

The first element in the development of the theoretical model process is to answer the question; *what factors (variables, constructs, concepts) logically should be considered as part of the explanation of the social or individual phenomena of interest?* (Whetten, 1989, p.490). To answer this question, the theory should include the right factors. These factors can be judged according to two criteria; comprehensive and parsimony. Based on this, it is believed that the proposed conceptual framework encompasses only the needed factors which can contribute to an understanding of managing physical assets in the public sector. In addition, these factors are not trivial in terms of adding value to the practice, because the factors are built based on vital existing theories of management thinking and their existence in reality.

The second element of the theoretical development process is to answer how these factors are related. The entire discussion of Chapter 3 was devoted to explaining the underlying principles behind bringing together different elements of systematic asset management practices (SAMP). The results of this were presented in Part 5 in the form of a diagram in order to facilitate the logical development of AM practices.

The third element of the theoretical development process, as claimed by Whetten (1989, p.491), is to answer the question:

What are the underlying psychological, economic, or social dynamics that justify the selection of factors and the proposed causal relationships? This rationale constitutes the theory's assumptions – the theoretical glue that welds the model together

The discussion in Chapter 3 revealed three fundamental ‘glues’ which underpin the developed systematic asset management practices (SAMP) framework. The first is to follow the process theory thinking in terms of teleological and life cycle theories. The second is related to the work of Mintzberg and Waters (1982), upon which the idea of formation of strategy was adopted as the main model of the whole process of physical AM practices in the public sector. The third point relied on the theories of strategic planning, rational reasoning process. Accordingly, these fundamental principles were the main foundation of the developed systematic asset management practices (SAMP) framework.

The last element of the theoretical development process is to answer where, when for whom these factors are valid. These questions, as claimed by Whetten (1989), attempt to contextualize the adopted factors in terms of their influence in place and time. In light of these questions, the study has taken into consideration the impact of context on the systematic asset management practices (SAMP) in stressing the application of the systematic asset management practices in the public sector. Having discussed all the required elements of the theory stage in the research process, this will pave the way for the next stage; research design.

4.2.2 Hypothesis

Bryman defines a hypothesis as an informed speculation, which is set up to be tested, about the possible relationship between two or more variables (2008, p.694). This definition is also conceived by researchers such as Creswell (2013), Saunders et al. (2009), Corbin and Strauss (2008), Silverman (2008), Kumar (2005), Blaikie (2003), and Kervin (1992). The informed speculation aspect of the definition comes from several sources. Kumar, for instance, states that a hypothesis can be constructed from hunches, assumptions, suspicions assertions or ideas about a phenomenon, relationship or situation, the reality or truth of which you do not know (2005, p.73). However, Blaikie (2003) has different opinion regarding some sources of hypothesis such as hunches, claiming that hypotheses derived in this way usually make limited contributions to knowledge development due to their likely disconnection with existing theories. Therefore, Blaikie (2003) rejects hypotheses

that come from hunches. On the other hand, other scholars such as Bryman (2008) limit the usage of the hypothesis in social science but admit its usage in experimental research. In terms of social science research, Kumar states that it is acceptable to carry out valid investigation without constructing a single formal hypothesis (2005, p.73). In addition, Silverman (2008) claims that hypotheses are developed and generated during qualitative research.

There are different typologies of hypothesis types. Kumar (2005) mentions four types of hypothesis; null hypothesis, hypothesis of difference, hypothesis of point-prevalence and hypothesis of association. Blaikie (2003) on the other hand divides hypotheses into two forms; theoretical and statistical hypotheses. Based on the needs of the current study, statistical hypotheses are not part of the empirical analysis. However, theoretical hypotheses are managed and implicitly stated (informally) in the discussion of the empirical data of Chapter 5 (Section 5.2).

Having discussed the location of hypothesis in the study, the following section is devoted to the next stage of the process of deductive logic of knowledge development.

4.2.3 Research design

Research design falls between research strategy that delineates between qualitative and quantitative approaches and research methods dedicated to explaining what methods the researcher will use in order to collect data. Therefore, research design is considered to seek what it is the best approach that can be used to answer the research questions (Bryman, 2008).

The research questions that need to be answered can be recognised from the study's objectives and associated questions presented in Chapter 1 (refer to Chapter 1 for the questions). Therefore, the current section objective is to obtain the best design that can be used to answer research questions.

Bryman (2008) states that research design comprise five types of approaches; experiment design, longitudinal design, case study design, comparative design and cross-sectional design (survey). In contrast, other scholars and authors such as

Kumar (2005); and Saunders et al. (2009) have different perspective. For instance, Kumar (2005) classifies research design on the basis of three aspects; number of contacts, reference period, and nature of the investigation. Each aspect, in turn, is divided into several elements. Saunders et al. (2009) divide the whole researches on the basis of two main groups either cross-sectional or longitudinal studies. However, the next part is devoted to explore various research designs with the purpose to choose the most appropriate approach for the research's questions. The adopted classification is according to the Bryman's research design approaches (Bryman, 2008).

4.2.3.1 Experiment design

Imitating real life in a laboratory or other environment similar to the laboratory is the main aspect of this approach. In addition, an attempt to isolate the subject under study and impose specific variables on the subject in order to understand the impact of this variable is also another aspect of this approach. Thus, experiment is the most appropriate type of research design for natural science, and against which other research designs are assessed in terms of rigour. However, it has been borrowed by the social science research for a long time, especially in psychology. The purpose of using this approach is to explore or explain causes of variables, in addition to the high standard control on samples. This type of design is not applicable to this research thesis due to the absence of the experimental environment (Saunders et al., 2009).

4.2.3.2 Longitudinal Design

This type of research design is usually associated with two factors; prolonged time period and cost. In addition, the researchers need to use distinct types of research methods such as self-completion questionnaire or structured interviews. However, longitudinal design is rarely used due to time constraints and cost (Bryman, 2008). Although this type of design is suitable for this research, because it would enable the researcher to observe the development of the physical assets in public sector besides scrutinising every decision made, but unfortunately, access to public practices might be restricted, in addition to the lack of time and funds.

4.2.3.3 Case study design

A case can come in various forms; individuals, organisations, countries, groups, or particular situation. Yin (2009, p.18) defines the case study as:

A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context is not clearly evident

Robson (2002) deduces some points from this definition:

- A case study is a strategy, not research methods such as interviews or observations.
- A case study is concerned with research in a broad sense.
- Empirical strategy which can be relied on in order to collect evidence.
- It is particular; it can be for a specific purpose or case.
- Case studies focus on phenomena in context; the case provides a link between the case and the surrounding context.
- Can be used in multiple methods of evidence or data collection.

However, Bryman (2008, p.30) claims that *a case study entails the detailed exploration of a specific case which would be a community, organization, or person*. It is deduced from this that the case study is undertaken when the aim of the study is to explore in detail the case under investigation with specific attention is paid to unique characteristics of the case. Therefore, this contradicts the aim of the study.

4.2.3.4 Comparative design

It is worth considering this type of research because it compares and contrasts between two cases by using identical research methods (Saunders, 2009). However, this type of research design is not suitable for the researcher's aim because there is no purpose for comparison.

4.2.3.5 Cross-sectional design (Survey)

Cross-sectional research is very popular in business and management science. The researcher approaches the survey by using a questionnaire form while targeting a considerable sample. In addition, survey strategy is closely linked to quantitative

methodology because it lends itself to quantitative analysis (Saunders, 2009). Moreover, Bryman (2008, p.44) states that:

A cross-sectional design entails the collection of data on more than one case (usually quite a lot more than one) and at a single point in order to collect a body of quantitative or quantifiable data in connection with two or more variables (usually many more than two), which are then examined to detect patterns of association

In addition, Bryman (2008, p.46) defines survey research as comprising:

A cross-sectional design in relation to which data are collected predominantly by questionnaire or by structured interview on more than one case (usually quite a lot more than one) and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables (usually many more than two), which are then examined to detect patterns of association

From previous definitions of cross-sectional design and survey, no difference is found here between these two notions. In addition, they are sometimes used interchangeably. Based on the previous discussion, the preferred research design is the cross-sectional design due to the following reasons.

Firstly, the researcher is interested to reveal existing variations between public sector practices themselves and the gap with international AM approaches and guidelines. Therefore, the structured interview leads to this aim. Secondly, the cross-sectional design occurs at a single point in time in which the researcher is able to collect data for the whole targeted sample. Third is the availability of quantifiable elements in which the researcher uses a systematic and standardised method to uncover the variations between the respondents. The fourth and last reason for selection of a cross-sectional design is the patterns of association in which the researcher can examine the relationships between variables if needed. Having decided which research design type is plausible for the research, the next stage in the research process is to devise measures for concepts.

4.2.4 Devise measures for concepts

Concepts are the main building blocks of the proposed conceptual framework (theory). These concepts are all the research about (Bryman, 2008). The label that we give to these concepts represents the main research's domain. In addition, the developed conceptual framework encompasses the main concepts needed to measure SAMP in SPS.

Each concept might comprise multiple or different dimensions. For instance, the performance concept can measure two dimensions. The first dimension is the current formal process and procedure articulated in current practices and activities undertaken by asset managers. The second dimension of the concept is to measure existing practices and activities (Bryman, 2008). Therefore, the intention is to accomplish the study's aim by investigating two dimensions of each concept:

- Measuring how frequently each practice is undertaken.
- If practice is undertaken by an asset department, then the researcher intends to find out what factors influencing the practice. To clarify, if these practices are conducted whether informally or are required by other sources such as certain organisational policy or professional standard.

These concepts and their dimensions need to be measured in order to uncover existing AM practices. However, Bryman (2008, p.144) claims that the main reasons behind measurement in quantitative research are to:

- *Allow the delineation of fine differences between people (in this case to delineate differences between asset departments' practices) in terms of question characteristics. These characteristics can be pursued by using an appropriate scale to operationalize the concepts.*
- *Give a consistent device or yardstick for making such distinctions. This means that measurement should deliver consistent results; particularly in terms of time. Therefore, reliability and validity of social research is a prominent notion in quantitative research. These two terms will be discussed and fulfilled in the next part.*

- *Provide the basis upon which precise estimates of the degree of relationship between concepts can be achieved. For example correlation between these concepts.*

The above discussion is related to the measurement required for gauging the concepts. The required measures in social science research are called indicators; especially as many concepts cannot be contained directly in quantifiable measures or expressed in countable terms such as is possible for personal income, age etc. Therefore, the prominent term used is indicator. There are number of ways in which indicators can be devised, and one of these, as claimed by Bryman (2008), is through questions that are part of the structured interview. Therefore, the intention in this research is to build questions which satisfy all of these implications, as discussed in the subsequent subheadings.

4.2.4.1 Operationalising the concepts

As discussed earlier, the developed concepts need to be measured in order to uncover the reality and satisfy the study's aim. Bradburn et al. (2004) state that each measurement tool artificially consists of two parts: question formulation, and techniques for recording answers. The part which follows will elaborate in terms of question formulation.

Question formulation is related to how questions are worded. However, prior to exploring wording, it is vital to understand that questions are mainly grouped into three categories: behavioural or factual, knowledge and attitudinal (Bradburn et al., 2004). Although Kervin (1992) groups questions into only two categories, factual and attitudinal, here the previous categorisation is adopted due to its accuracy. The questions developed in this thesis can be allocated to the behavioural category due to the following.

Behavioural or factual questions focus on *characteristics of people, things people have done, or things that have happened to people that are, in principle, verifiable by an external observer* (Bradburn et al., 2004, p.27-28). Accordingly, the domain of behavioural questions covers practices in AM because physical asset managers attempt to organise their practices according to an intended action (things people

have done), and once this action has been implemented, the behaviour can be externally recorded. Therefore, the researcher has developed a structured interview in order to capture the behaviour of asset managers' decisions.

During the structured interview development, the study attempts to avoid weak questions on one hand and to increase questions' strength by using certain aids on the other. In case of the former, Bradburn et al. (2004, p.5-6) mention two factors adversely affecting question quality: *loaded words produce loaded results, the nuances of politically charged issues*. Therefore, the questionnaire was examined in order to avoid these two factors.

In terms of strengthening the questions, the researcher attempts to ensure that the developed questions are readily can be answered. The purpose of this action is facilitated by using the following insights (Bradburn et al., 2004):

- Using visual aids; the researcher provided the respondents with a table that presents the equivalent percentage of the measured frequency
- Making the questions specific
- Selecting an appropriate time period to ask about. This occurred by giving interviewees the freedom to select the time they want
- Using the right words
- Determining the appropriate length of questions. The total time of each interview is between 45 minutes to 1 hour

Techniques to answer recording are the next part of the measurement tool. As we have approached the reality by adopting quantitative approach, therefore, developing a closed-answer response is the next. Accordingly, a predetermined category is necessary for the research (Bradburn et al., 2004). The category is related to the meaning of systematic asset management practices (SAMP). As articulated in Chapter 2, asset managers are required to carry out certain practices in order to be systematic. In some circumstances, these practices can be modified, altered or cancelled, as claimed by the RICS (2012) guidelines (refer to Section 2.3.4). Based on this knowledge, ministry can be systematic if asset managers rarely to always carry out the intended practice, as illustrated in figure 4.4. The reason behind

adopting categorical five-point scale is to measure validity of practices application. Having established the operationalizing logic of the structured interview, the subsequent subheading is devoted to present the structure interview questions.

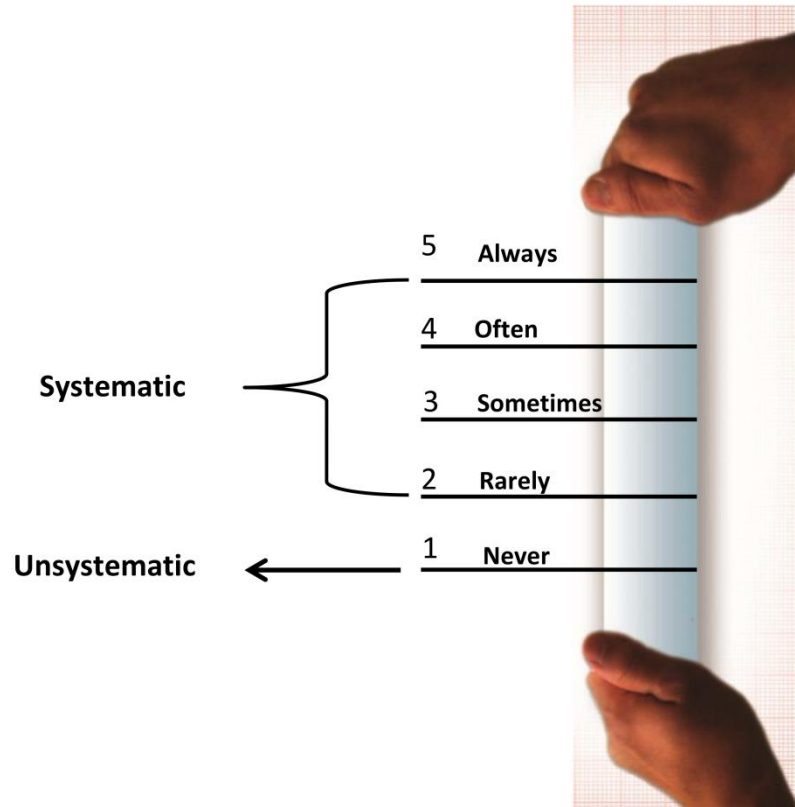


Figure 4.4. Scale of measurement.

4.2.5 Logic of the structured interview

Chapter 3 established the conceptual framework for systematic asset management practices (SAMP) (refer to Figure 3.20). Figure 4.5 below shows the middle strand of the conceptual framework in order to facilitate the discussion of the logic of the structured interview.

Figure 4.5 illustrates the linkage between practices and the conceptual framework. The practice as seen in the figure below takes on different roles as the practice moves from one stage to another. To clarify, type of required practices in the diagnosing stage is different from type of required practices in the conceiving stage. The subsequent subheadings discuss each stage with their practices and the derived

questions. All the questions are organised and produced in Appendix B, therefore, Appendix B is part of the discussion throughout all the questions.

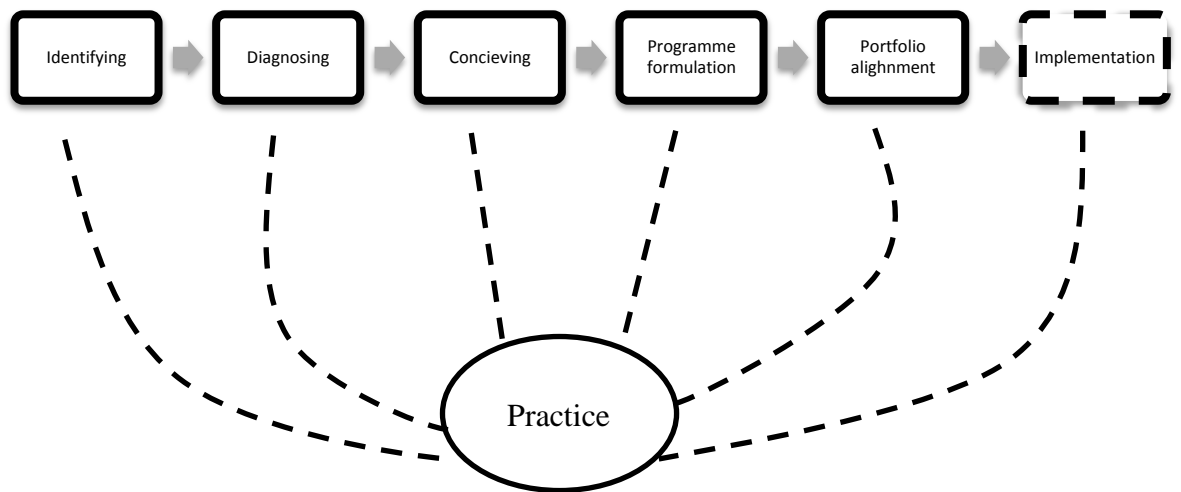


Figure 4.5. Practice (event) in the AM process.

4.2.5.1 Identifying stage

The identifying stage, as claimed by Pearce and David (1987), is the beginning of the strategic planning/reasoning process. In this stage, issues (Meyer, 2010; Wit and Johnson et al., 2008; Bryson, 2004) or problems (Robbins et al., 2009) should be recognized, clarified and written (Blair-Loy et al., 2011). Blair-Loy et al. (2011) report that scholars have studied the impact of the mission statement on organisations' performance. However, the studies reached two different opinions, some of them finding an impact on performance while the others were sceptical. Accordingly, writing down the mission statement has a positive impact on organisations. Therefore, the following question is developed to explore this intention:

- Q1- How often does your department write down the mission statement of the organisation when you submit the required portfolio of projects to the Ministry of Finance?

4.2.5.2 Diagnosing stage

Diagnosing stage, this stage is composed of four concepts. The **first** is the external environment. The external environment of organisations imposes many threats and

opportunities that lead organisations to success or failure. In order to explore practices related to diagnosing the external environment, two variables are selected, increasing demand on the organisation's services and monitoring technological development (refer to Section 3.8.2).

- Q3- How often does the increasing demand on the organisation's services influence the increasing demand on physical assets?
- Q4- How often does your department forecast the demand on the organisation's services?
- Q6- How often does your department analyse the impact of future demand?
- Q8- How often do you use probability or a quantitative approach in analysing the impact of demand on services?
- Q10- How often do you monitor technological development that may affect physical asset operation?
- Q12- How often do you analyse the future impact of technological development on physical asset operation?
- Q14- To what extent do the following require your department to use probability or a quantitative approach in analysing the impact of technological development on physical asset operation?
 - Organisational policy
 - Professional standards
 - Experience
 - Others

The **second** concept in the diagnosing stage is to physical asset failure prediction. The underlying principle of this concept is to take into consideration the future failure of physical assets (refer to Section 3.8.1.1). The following question is dedicated to exploring the frequency of physical asset failure prediction practice.

- Q15- How often does your department forecast the future failure of physical assets in delivering the required services?

The **third** concept in the diagnosing stage is the present strategy. The underlying principle of this concept is to investigate the relationship between physical assets

and the organisation's mission. Therefore, four questions are developed. The first is intended to explore the frequency of the concept's purpose, while the remaining questions attempt to find the linkage between the assets and the organisation's mission by asking about various operational practices (refer to Section 3.8.1.2).

- Q17- How often do you investigate physical assets' contribution to the organisation's mission?
- Q19- How often do you calculate the minimum required physical assets in order to deliver your organisation's services?
- Q21- How often do you review the organisation's physical assets locations in order to know their effectiveness in delivering the organisation's mission?
- Q23- How often does your department attempt to reduce the reliance of the organisation's services on physical assets?

The **last** stage in the diagnosing stage is performance indicator practices. At this stage, this research will attempt to capture not only the existence of performance indicators, but also to identify whether they are followed or not (refer to Section 3.8.1.3). These questions explore both sides of the performance indicators concept.

- Q25- How often do you follow official written criteria when you diagnose the state of physical assets?
- Q27- To what extent do these criteria cover all aspects of physical asset performance?

4.2.5.3 Conceiving stage

The conceiving stage is broken down into two main stages; generating options for the strategic issue, and evaluating the selected option. In order to explore the former, two questions are developed. The first question attempts to explore the frequency of non-asset solution, because as is already established, AM departments consider physical assets to be a taken-for-granted solution. The second question is to explore activities related to disposing of assets solutions (refer to Section 3.10).

- Q28- When the need for new physical assets is confirmed, how often do you attempt to find a non-asset solution in order to achieve the organisation's mission?
- Q30- If a physical asset is surplus, how often do you contact other government organisations in order to benefit from excess assets?

The second component of the conceiving stage is to evaluate the developed option (refer to Section 3.10.1). These questions are developed according to the TAM guideline principles of evaluation. Some of these questions regard the disposal package. The questions attempt to explore evaluation AM practices in various subjects.

Disposal evaluation

- Q32- If a physical asset is surplus, how often do you weigh the benefits of disposing of the asset against retention of it?

Financial evaluation

- How often is the following calculated?
 - Q34- Net cash flow
 - Q36- Budgetary consideration
 - Q38- Funding sources with cost and revenues
 - Q40- Net present value
 - Q42- 70% of probability of estimated cost of the initial capital expenditures
 - Q44- 70 % probability of estimated cost of life cycle maintenance
 - Q46- 70 % probability of estimated cost of life cycle refurbishment
 - Q48- 70 % probability of estimated cost of the life cycle of operation
 - Q50- others

Economic evaluation

- Q52- How often do you calculate the economic cost and benefit of the required project?

Market sounding

- Q54- If the selected project has a new idea, how often does your department evaluate the market capability for implementing it?
- Q56- If the selected project is typical, how often does your department evaluate the market capability for implementing the project?

Legislative approval issue

- Q58- How often do you take into consideration the impact of the project on the environment?
- Q60- How often do you evaluate the impact of the project on planning issues?
- Q62- How often do you evaluate the impact of the project on cultural heritage issues?
- Q64- How often do you evaluate the impact of the project on native issues?

Evaluation of the whole-of-government policy issues

- Q66- How often do you evaluate the impact of the project on national employment security?
- Q68- How often do you evaluate the impact of the project on the organisation's employee structure?
- Q70- How often do you evaluate the impact of the project on the region?
- Q72- How often do you evaluate the impact of the project on social life?
- Q74- How often do you evaluate the impact of the project on staff training?
- Q76- How often do you evaluate the impact of the project on indirect flow-on effects on wages?
- Q78- How often do you evaluate the impact of the project on government regulation?

Public interest assessment

- Q80- How often do you evaluate the impact of the project's effectiveness on meeting service requirement?

- Q82- How often do you evaluate the impact of the project on stakeholders?
- Q84- How often do you take accountability into account?
- Q86- How often do you take transparency into account?
- Q88- How often do you take public access into account?
- Q90- How often do you take consumer rights into account?
- Q92- How often do you take public security into account?
- Q94- How often do you take public privacy into account?

4.2.5.4 Programme management

The MSP (Managing Successful Programmes) is one of the Office of Government Commerce guidelines in the UK. The guidelines define the programme as:

A temporary, flexible organisation created to coordinate, direct and oversee the implementation of a set of related projects and activities in order to deliver outcomes and benefits related to the organisation's strategic objective. A programme is likely to have a life that spans several years (OGC, 2007, p.4)

Another definition was also provided by the PMI (2006a, p.4) in which the programme is “a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually”. Therefore, the following questions are developed to capture the programme phenomenon. In addition, these questions are built based on what was found in Part 3. Therefore, reference to Part 3 is recommended here to understand the principles.

- Q98- How often do you bring together separate projects in order to reap benefits that are not available if projects were managed separately?
- Q96- How often does your department bring together separate projects under one contract for better management?
- To what extent are the following factors used for grouping different projects together in order to reap benefits from combining them?
 - Q102- Depending on each other
 - Q104- Shared specification
 - Q106- Cost reduction
 - Q108- Risk mitigation

- Q110- Contractor strength
- Q112- The same region
- Q114- Others
- Q100- How often do you make sure the benefit from grouping those projects is realized?

4.2.5.5 Portfolio management

PMI (2006b, p.4) defines a portfolio as:

A collection of projects (temporary endeavours undertaken to create a unique product, service, or result) and/or programs (a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually) and other work that are grouped together to facilitate the effective management of that work to meet strategic business objectives, Components of the portfolio are quantifiable; that is, they can be measured, ranked, and prioritized

Other standards such as the OGC (2008, p.5) defines a portfolio as the *totality of an organization's investment (or segment thereof) in the changes required to achieve its strategic objectives*. Therefore, the following questions are developed to capture this phenomenon (refer to Part 4).

- Q116- How often do you rank projects based on their priority in achieving the organisation's mission?
- Q122- How often do you select the required individual and grouped projects from the pool of evaluated individual and grouped projects to achieve the organisation's mission?
- Q118- How often do you categorize grouped and individual projects?
- Q120- How often do you evaluate grouped and individual projects?
- Q124- How often do you balance the list of the selected individual and grouped projects for the best benefit to the organisation?
- Q126- After getting approval for the implementation of the proposed portfolio, how often are some of these projects not needed anymore?

- Q128- After getting approval for the implementation of the proposed portfolio, how often do you make sure the resources are used sensibly?

Up to this point all the questions required to explore the SPS are developed. Prior to moving on to the next step, the following point should be clarified. Almost every previous question is associated with another question concerning the reason behind conducting a certain practice as shown below.

It is suspected that each practice is conducted by any or all several source; organisational policies, professional standard, experience or any other reason mentioned by the AM expertise.

To what extent do the following require your department to ?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standards					
experience					
Other (please specify below)					
1.					
2.					
3.					

The interview questionnaire is presented in Appendix B.

4.2.6 Structured interview for administration

The structured interview contains 67 items. These items, with their associated questions about sources of the conducted practices (factors influencing SAMP), are equal to 129 questions. In addition, the structured interview is administrated by using Arabic language due the lack of English language speakers in SPS. To simplify the administration, the interview was reorganised to imitate physical asset development practices. This organisation allows the discussion to be consistent with the logic of AM practices development and also keeps participants focused on how they do their work. The interview questionnaire is presented in Appendix B with English language.

4.2.7 Evaluation criteria in quantitative research

Quantitative research is evaluated by examining three criteria: replication, reliability and validity. In terms of replication, this criterion concerns researchers who intend

to replicate other researchers' findings. Replication criteria are not part of the work of this thesis because there is no similar previous research to replicate. However, it is intended at the same time to facilitate replication of findings by making the questions accessible to other researchers (Bryman, 2008).

In terms of validity, Bryman (2008) lists five types of validity: face validity, concurrent validity, predictive validity, construct validity, and convergent validity. Each one has its goal and purpose. However, Bryman (2008) claims that when the research is constrained by time, then, face validity evaluation is sufficient for the researcher to carry out the research. On the contrary, Oppenheim (1992, p.229) advises that if there is no chance of a validity check due to time and resources constraints *we should first and foremost strive for reliability*. However, Sapsford (2007, p.7) put considerable emphasis on the importance of structured questionnaire validity because the need is to make sure *the questions should measure what it is intended to measure*. In this sense, the face validity and reliability are conducted but with more emphasis on face validity.

Face validity requires researchers to make sure questions are really measuring the content of the concepts in questions. Bryman (2008, p.125) suggests that researchers might accomplish this requirement:

By asking other people whether the measure seems to be getting at the concept that is the focus of attention. In other words, people, possibly those with experience or expertise in a field, might be asked to act as judges to determine whether on the face of it the measure seems to reflect the concept concerned

Therefore, the researcher conducted a pilot study to test the face validity of the structured interview. The pilot study was conducted three times with Eng. Waleed Alharbi and once with Eng. Khalid Alsehly. At each meeting with Eng. Waleed the interview lasted three to four hours, in which the researcher was muddling through the structured interview, rewriting and editing the questions until the researcher reached satisfactory style and meaning. All these changes mainly originated from the cultural factors that dominated the terminology used currently in Saudi Arabia. Figures 4.6a, b and c show the evolution of the face validity test until the researcher reached the most acceptable form.

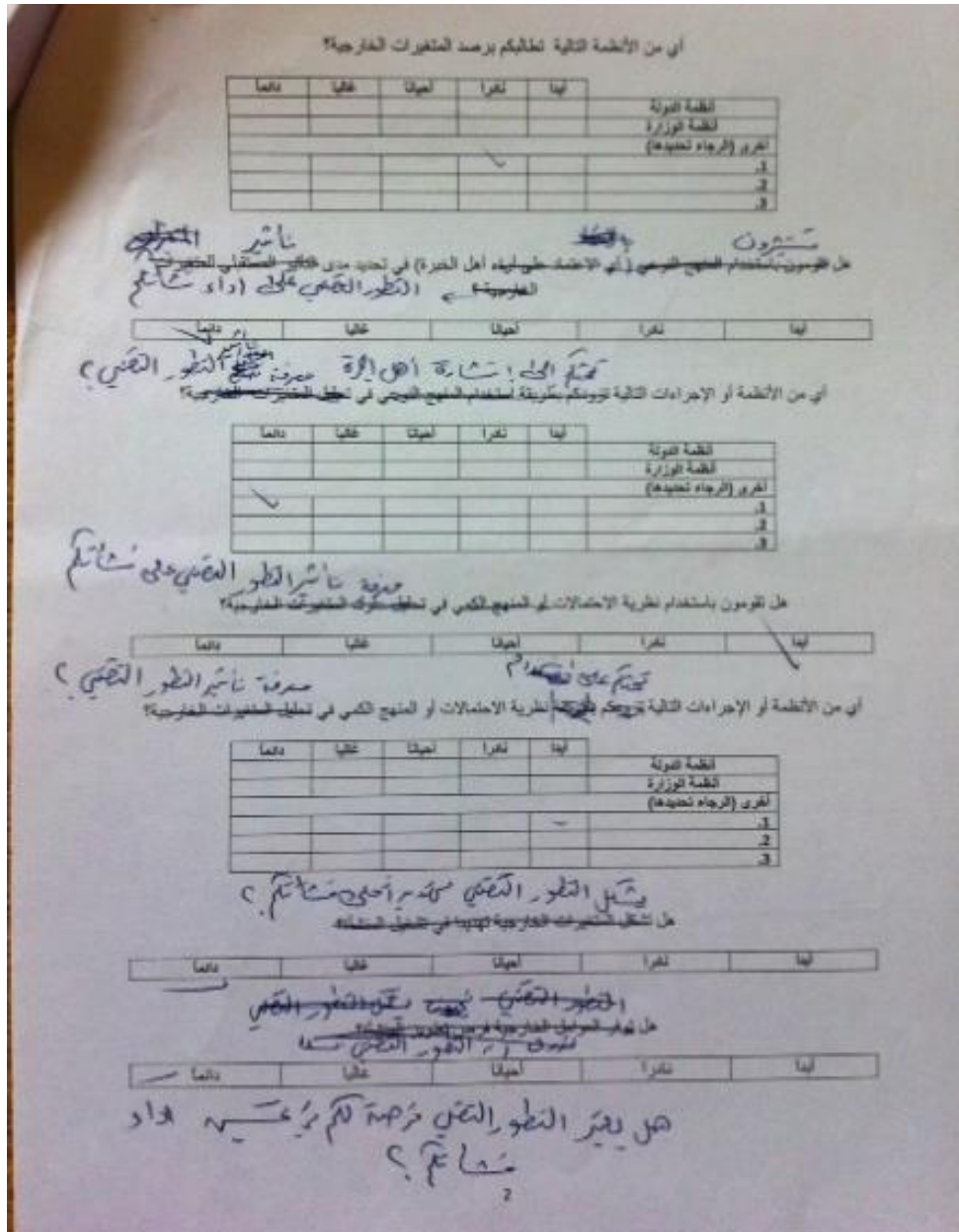


Figure 4.6a. First pilot study with Engineer Waleed Alharbi for face validity test.

In terms of reliability, reliability concerns how far questions are repeatable or not. This criterion can be addressed by measuring the consistency of questions with time (stability). Accordingly, the researcher administered pilot study with Eng. Khalid Alsehly and, later, after a short period of time (about one and half months), the researcher repeated the pilot study with the same person with the hope of obtaining the same answers or a close pattern of association in order to make sure stability is there (Bryman, 2008; Sapsford, 2007). Having discussed evaluation criteria of the

quantitative research the following argument is devoted to discuss the research methods.

بوجود سؤال تملكه سابقاً

هل تقومون برصد حجم الطلب على خدمات الوزارة ؟

أبداً	نظراً	أحياناً	غالباً	دائماً
-------	-------	---------	--------	--------

إلى أي مدى توجهكم الأداة والإجراءات بالوزارة أو أي مصادر أخرى تعتمدون عليها برصد أي زيادة أو نقص على خدمات الوزارة المقدمة ؟

أبداً	نظراً	أحياناً	غالباً	دائماً
أداة وإجراءات الوزارة				
أخرى (الرجاء تحديدها)				
1				
2				
3				

تقليل **زيادة مدى الاعتماد** **أبداً** **زيادة المشاركة**

هل تستشيرون أهل الخبرة في تصحيح التكرار المستقل للتعديل على تصنيف ~~التكرار~~ ؟

أبداً	نظراً	أحياناً	غالباً	دائماً
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إلى أي مدى توجهكم الأداة والإجراءات بالوزارة أو أي مصادر أخرى تعتمدون عليها بالمشاركة أهل الخبرة في تحديد التكرار المستقل للتعديل على تصنيف ~~التكرار~~ ؟

أبداً	نظراً	أحياناً	غالباً	دائماً
أداة وإجراءات الوزارة				
أخرى (الرجاء تحديدها)				
1				
2				
3				

هل تقومون باستخدام نظرية الاحتمالات أو المنهج الكمي في تحليل تأثير التعديل الكمي على تصنيف ~~التكرار~~ ؟

أبداً	نظراً	أحياناً	غالباً	دائماً
-------	-------	---------	--------	--------

إلى أي مدى توجهكم الأداة والإجراءات بالوزارة أو أي مصادر أخرى تعتمدون عليها بطريقة نظرية الاحتمالات أو المنهج الكمي في تحليل تأثير ~~التكرار~~ ؟

أبداً	نظراً	أحياناً	غالباً	دائماً
أداة وإجراءات الوزارة				
أخرى (الرجاء تحديدها)				
1				
2				
3				

هل يشكل التطور التقني تعديداً على تشغيل مثلثكم ؟

أبداً	نظراً	أحياناً	غالباً	دائماً
-------	-------	---------	--------	--------

هل يعتبر التطور التقني فرصة لكم في تحسين أداء مثلثكم ؟

Figure 4.6b. Second pilot study with Engineer Waleed Alharbi for face validity test.

إلى أي مدى ترونكم الأئمة والإجراءات بالوزارة أو أي مصادر أخرى تعتمدون عليها برصد زيادة الطلب ؟

أبداً	قليل	متوسط	كثير	أبداً

هل تستخدمون أهل الخبرة في تحليل التأثير المستقبلي لزيادة الطلب على الخدمات المقدمة من الوزارة ؟

أبداً	قليل	متوسط	كثير	أبداً

إلى أي مدى توجهكم الأئمة والإجراءات بالوزارة أو أي مصادر أخرى تعتمدون عليها باستشارة أهل الخبرة في تحديد التأثير المستقبلي ؟

أبداً	قليل	متوسط	كثير	أبداً

هل تقومون باستخدام نظرية الاحتمالات أو المذبح الكمي في تحليل تأثير زيادة الطلب على الخدمات المقدمة من الوزارة ؟

أبداً	قليل	متوسط	كثير	أبداً

إلى أي مدى توجهكم الأئمة والإجراءات بالوزارة أو أي مصادر أخرى تعتمدون عليها بطريقة نظرية الاحتمالات أو المذبح الكمي في تحليل تأثير زيادة الطلب ؟

أبداً	قليل	متوسط	كثير	أبداً

البيبة الداخلية
خطر فشل الأصول المالية (العمية)
الوزارة تستخدم المثلثات المالية بواسطة لإرسال خدماتها. إلى أي مدى تقومون بحساب كل كمية مطلوبة من المثلثات
للمنطقة لتعظيم مهام وأهداف الوزارة ؟

أبداً	قليل	متوسط	كثير	أبداً

Figure 4.6c. Third pilot study with Engineer Waleed Alharbi for face validity test.

4.2.8 Research methods

Research methods relate to ways of collecting research data. Bryman (2008) mentions five types of data sources: ethnography and participant observation, focus groups, language, document analysis and interviews. The following discussion is devoted to articulating the appropriate research method besides the reasons behind its acceptance.

4.2.8.1 Ethnography

Ethnography represents the approach of researchers who are, as claimed by Bryman (2008, p.402):

Participant observer/ethnographer immerses him- or herself in a group for an extended period of time, observing behaviour, listening to what is said in conversations both between others and with fieldworker, and asking questions

Basically, anthropologists started with studies of races and cultures based on observing reality, and later this approach was adopted by other researchers (Silverman, 2008; Fellows and Liu, 2003).

There are various barriers to conducting ethnographic research, such as the acceptability of the researcher to become part of a group, as well as time and representativeness issues. In addition, other problems might develop from the participation of the researcher with the targeted group emanating from researcher influence on group behaviours. Although the ethnographic style may appear appropriate for the researcher to study asset management practices in SPS, the previous barriers prevent the study from adopting this approach.

4.2.8.2 Focus group

Focus groups take place with more than one person, and the group usually consists of at least four interviewees. The aim of the focus group is varied; it might focus on specific topic but in depth, it might be carried out to save money and time, and it might take place to find how a certain issue is discussed or how people respond to each other and build up a view out of interaction within the group (Bryman, 2008). Based on these different aims of the focus group, the researcher is not interested in any of the focus group aims. However, the researcher might be compelled to undertake a focus group if the respondents wish to do that. In addition, the data pursued will not be affected because the interview is totally structured.

4.2.8.3 Language

Although language is used throughout almost all the research methods, the researcher who selects language as a research method does this due to their interest in language itself, which is the object of the study (Bryman, 2008). This type of research method is not part of the study's aim.

4.2.8.4 Document and content analysis

Study of documents is mainly for qualitative research, while content analysis is for quantitative research (Bryman, 2008). However, neither style of research forms part of the researcher's aim here.

4.2.8.5 Interview

Interview comes in multiple forms, ranging from unstructured to structured interviews. The latter is highly related to the quantitative approach, in which maximizing reliability and validity of measurements are key concepts. In addition, structured interviews lend itself to be codified which requires similar answers for all research's participants (Sapsford, 2007). Moreover, structured interview facilitates the concept of a deductive approach (Bryman, 2008). Thus, structured interview is the preferable approach for this thesis, because the intention of the researcher is to investigate how the public sector in Saudi Arabia manages physical assets in terms of SAMP model. In addition to reveal the AM practices variations between the SPS ministries besides other thesis's objectives.

4.2.9 Research site, sample and respondents

The research site can be deduced from the aim; to provide a framework and recommended actions for improving physical asset management practices across the Saudi public sector. The Saudi public sector is divided into two main parts. The first is the 24 governmental ministries, and the second is governmental agencies (MOE and P, 2012). The focus of the research is on Saudi ministries, because government agencies have different organisational rules and features. For instance, the government owns 70% of SABIC (Saudi Arabian Basic Industries Corporation) and the rest is owned by the private sector. Therefore, differences between these two groups could lead to an unrealistic or totally mistaken findings.

The government ministry population is not large and can be investigated. Therefore, probability sampling is excluded (Swetnam, 2004). In addition, this feature of small population assists the researcher to avoid sample issues of generalisation to the

population where the researcher, as claimed by Swetnam (2004), should make sure of the following:

- The sample is large enough to be significant
- It is as representative as possible
- Its defects are acknowledged
- A rationale for it is produced

The total visited ministries are 20 out of 24. However, only 15 ministries are included in the analysis because the remaining 5 have no portfolio of physical assets or basically have only one or two buildings. The following bullet points show the reasons behind excluding these ministries:

- The Ministries of Defence and Interior have been excluded due to security reasons. Those ministries are responsible for the external and internal security of the country.
- The researcher visited the General Presidency of Youth Welfare (GPYW) to ask for their participation in the study but, unfortunately, the director stated that they were busy and had no time to participate.
- Ministries that do not have a portfolio of physical asset are excluded due to the lack of assets management practices.

Table 4.2 below shows all Saudi public sector ministries with the type of physical assets. As shown in the table, the highlighted ministries are the excluded ministries. After presenting the included ministries, respondent or interviewee selection will be discussed.

To identify the respondents for the structured interview, the researcher followed a non-probability sampling method (Bryman, 2008), or in other terminology, the non-random sample selection (Walliman, 2005). This decision is taken based on the objective and scope of research (Maxwell, 1996). Basically, scholars such as Bryman (2008) and Walliman (2005) distinguish between various sampling procedures by using the requirement for generalization. Therefore, there are two

main groups of sampling; random and non-random or probability and non-probability sampling procedures.

Table 4.2. SPS Ministries.

Ministry	Physical assets
Ministry of Agriculture	Research building, Greenhouses, dams and Sanitation for agriculture
Ministry of the Civil Service	
Ministry of Commerce and Industry Commerce	Factories owned by government
Ministry of Communications and Information Technology	Electric power buildings and communication towers
Ministry of Culture and Information	TV buildings, Satellite towers
Ministry of Defence and Aviation	Military facilities, airports, air force bases
Ministry of Planning and National Economy	
Ministry of Education	Schools
Ministry of Finance	Treasure facilities, Money factories
Ministry of Foreign Affairs	
Ministry of Hajj	
Ministry of Health	Hospitals and small medical centres
Ministry of Higher Education	Universities
Ministry of The Interior	Prisons, police buildings, many public relations buildings such as passport issuing buildings
Ministry of Islamic Affairs, Endowment, Dawa and Guidance	Mosques
Ministry of Justice	Courts
Ministry of Labour	Public relations buildings
Ministry of Municipal and Rural Affairs	Recreation places, roads inside cities, open areas development
Ministry of Petroleum and Mineral Resources	Oil reservoirs and wheels, mining facilities, oil pipelines
Ministry of Social Affairs	Community centres
Ministry of Transport	Public relations buildings, roads outside cities, bridges, ports
Ministry of Water and Electricity	Water stations, water pipelines,
General Presidency of Youth Welfare (GPYW)	Youth houses, clubs
Ministry of Housing	New ministry, lunched in 2011

Non-probability sampling procedures cover a broad range of different types of sampling strategy: convenience, snowballing and purposive sampling. In convenience sampling, the research sample is available to the researcher on the basis of chance without predetermined categorisation. Snowballing sampling is to some extent similar to the convenience sampling but with slight twist. To clarify, the researcher starts with the first participant or group and then uses these participants to establish the next contacts with others. The last sampling approach is the purposive sampling. The researcher finds that purposive sampling is the most appropriate sampling strategy for the researcher because purposive sampling relies on establishing predetermined criteria upon which the category and number of people to be interviewed is decided upon (Bryman, 2008). The following paragraphs are devoted to discuss the predetermined criteria and the selected category and number of people.

First, based on the developed SAMP framework, physical assets go through multiple and various stages which start with identification practices and end with monitoring the implementation of the intended strategy practices. Therefore, the interviewer should interview all the employees who are responsible for the process of physical asset management development. The interviewees should be knowledgeable employees who are responsible for asset management practices. And usually the person who has this type of knowledge is the director of the department of asset management at each ministry based on the researcher's experience with the SPS.

Second, it is evident from the conceptual framework that controlling and monitoring of asset development is part of senior public servants' responsibility, as they are accountable and responsible for generating and implementing strategies in front of government (refer to Part 1). Therefore, the researcher attempted to interview directors of asset management departments who are responsible for delivering the needed assets to achieve ministries' goals and objectives. The total number of interviewees was 22 participants. This number was more than the expected number, 15, because some directors delegated the interview responsibility to other experts within their ministry. The delegated experts in some cases are more than one person. Therefore, the researcher interviewed all of them in order to gain the required

information. Having established all issues related to research site, sampling and respondents, the following argument is devoted to articulate how the collected data are analysed.

4.2.10 Data analysis

This section discusses how the collected data are analysed based on a deductive logic of knowledge development. Basically, there are two distinctive types of deductive analysis, qualitative and quantitative methods (Saunders et al., 2009). Both methods are adopted in the study as far as the collected data are eligible for both of them.

4.2.10.1 Deductive in qualitative logic

Yin (2009) claims that once researchers have made use of existing theories, then a deductive logic of data analysis becomes valid by building up theoretical propositions (hypotheses) that facilitate and direct data collection and analysis. Based on this line of thought, Yin (2009) proposes five analytical techniques to carry out a deductive logic of knowledge development; pattern matching, explanation building, time-series analysis, logic models and cross-cases synthesis. Each technique encompasses various types of data analysis. However, all these analytical techniques share common logic of analysis; researchers have to be prepared before collecting data. The preparation is translated by stipulating predict outcomes, whether the outcomes come in a form of variables that are independent, dependent or both. In some cases researchers cease at confirming or testing the predicted outcomes, while in other cases they might proceed to build a conclusion. Following this logic of inquiry, the study has made use of various techniques to accomplish its aim, and this can be recognised in the discussion section of Chapter 5. Having articulated the quantitative deductive approach that is used by the study, the following section is will explain the adopted deductive logic in terms of quantitative research.

4.2.10.2 Deductive in quantitative logic

Bryman (2009) mentions four types of quantitative analysis: univariate, biivariate, multivariate analysis and statistical significance. Similarly, Blaikie (2003) mentions four types of analysis, but with a twist, as the four types of analysis are univariate, bivariate, explanatory and inferential analysis. The explanatory analysis in Blaikie's categorization (2003) could encompass bivariate and multivariate analysis. For the aims of the current study, univariate (descriptive) analysis is adequate, allowing description of the data distribution by counting frequencies and measuring the central tendency (central tendency analysis is presented in a radar diagram in Chapter 5).

Prior to the measurement of central tendency, two clarifications should be discussed. First, because the five-point scale is a discrete measurement which makes the analysis difficult, there is therefore a need to establish the length of each interval of the five-point scale, as illustrated in figure 4.7. The range was firstly computed ($5-1 = 4$), and then divided by the number of cells of the scale, which are five, to obtain the proper length of the cell, which is ($4 / 5 = 0.8$). After that the resulting value was added to the lowest value in the scale to determine the maximum limit of this cell, and thus the length of the cells became as follows:

- From 1 to 1.8 Never
- From 1.81 to 2.6 Rarely
- From 2.61 to 3.4 Sometimes
- From 3.41 to 4.2 Often
- From 4.21 to 5 Always.

Having established the scale along which future scores will fall, the next step is to measure the central tendency of each practice with the purpose to record the frequency of an AM practice in SPS and, then, distinguish between ministries to articulate the variations. However, prior to discuss the central tendency calculation the following point needs to be articulated. The central tendency calculation partitioned the SPS ministries into two groups: majority and best response.

Therefore, the following argument is showing how the central tendency is calculated with respect to the effect of the outcome on the data.

With the purpose to measure the central tendency of the practices, three types of measurements are available; mean, median, and mode (Howell, 2013; Blaikie, 2007). However, all of them have their advantages and disadvantages. The following paragraph is devoted to discuss them.

The mode is the value of the highest frequency of the data. Based on this definition, the mode is not part of the study due to the absence of need. The next two techniques are the mean and median, and both techniques are useful to the current data, but each is being used in accordance with the nature of the distribution of each practice. If the data for a practice is not normally distributed, the median is to be used in order to represent the majority of the data. This decision has been taken because the mean will be biased in the case of extreme values (Howell, 2013; Blaikie, 2007). Normality tests are carried out and presented in Appendix H. However, in the case of large skewed data, normality test is not going to be used and the researcher will rely on qualitative decision.

Based on mean and median analysis, the median is the dominant pattern in the collected data. Therefore, the median is the best representative of the data, and partitions the data into 8 ministries against 7 ministries. This division paved the way for the concept of majority to be used, because 8 ministries are more than 50 % of the total size of the sample (the sample is 15 ministries). The second concept used in the study is the best response (BR), and is used to represent the highest score in the sample.

Having established both concepts (majority and best response), it is beneficial here to articulate the reasons behind not excluding outliers and, consequently, calculate the mean. Sweet and Grace-Martin (2012) claim that it is not acceptable to eliminate outliers due to their extremity, because these extreme outliers might be the most interesting data, besides their legitimate observation. However, Sweet and Grace-Martin (2012) cite other valid reasons for excluding outliers: due to incorrectly entered or measured data, outliers might affect results and/or assumptions; and

outliers might create significant association. Based on these exclusion criteria and on the justification for including extreme data, this study considers that all the data are important and significant, and therefore does not exclude any data.

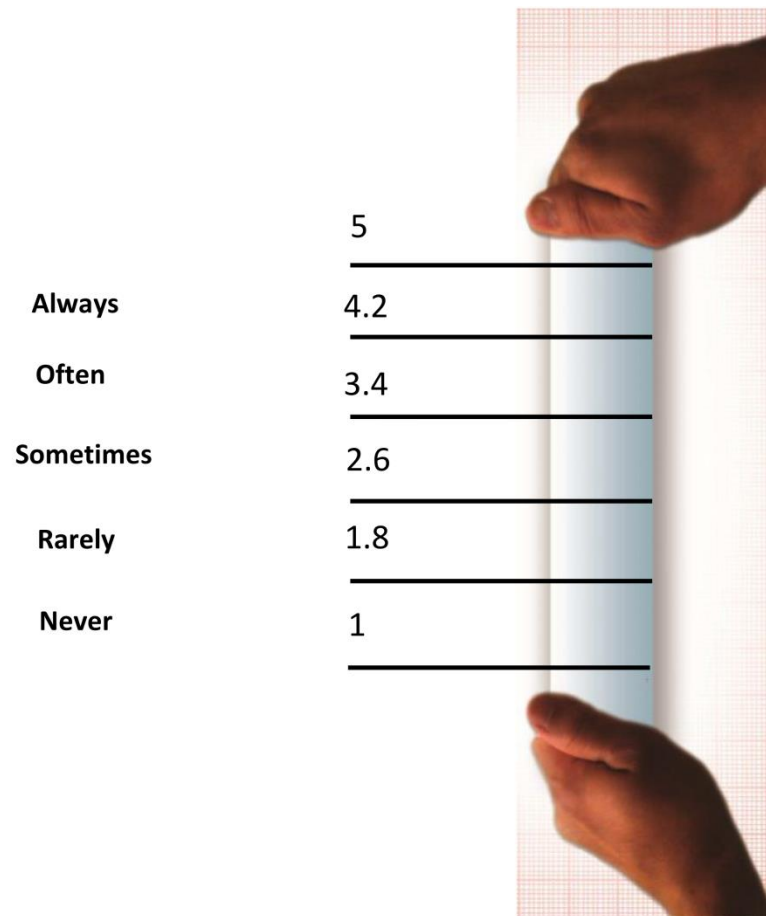


Figure 4.7. The Central tendency measurement.

4.3 Ethics of the research

Ethics in social research is a broad area and the debate about it has not been developed since the 1960s. However, the main matter for this thesis is to understand the ethical principles of social research, and later attempt to clarify how to tackle these principles. There are four main principles in social research (Bryman, 2008).

Firstly, harm to participants is one of the most significant ethical issues in social research. The researchers need to avoid *physical harm, harm to participants' development, loss of self-esteem, stress* (Bryman, 2008, p.320). Harm to participants can be avoided by maintaining the confidentiality of records. This type

of ethics in quantitative research can be easily tackled due to the ability of the researcher to keep results anonymous and present them in such a way as to make participants unidentifiable.

Secondly, a lack of informed consent from participants can be considered an ethical issue if the researcher has attempted to disguise or cover up the purpose of the research. Therefore, the researcher needs to inform participants about the intention of the research before starting to collect data (Bryman, 2008). The letter of permission, consent form, information provided to respondents, and university of Leeds ethical approval letter are displayed in Appendices C, D, E, and F respectively.

Thirdly, invasion of privacy of participants is highly sensitive in social research and any disclosure of private information is not accepted. This area is very much similar to informed consent, in which participants should obtain acceptance about the domain of the research (Bryman, 2008). Fourthly, deception in social research *occurs when the researchers represent their work as something other than what it is* (Bryman, 2008, p.320). This last point is considered in conducting the research.

4.4 Conclusion

This chapter has attempted to find the most suitable research methods and techniques to accomplish the aim of the research. The starting point to resolve the methodology dilemma is to articulate the strategic direction of the research. This was resolved by establishing the intended paradigms upon which the following stages can be facilitated. Within differing views of paradigms the researcher's paradigm was pragmatic due to the following; it provides freedom to the researcher to choose the methods, techniques and procedures; it facilitates the what and how questions; it considers both the dependent and independent nature of the external world.

In this line of argument besides the developed SAMP framework in Chapter 3, the researcher is inclined more to trade inductive methodology for deductive methodology. Because the researcher is interested to find out the variation between

ministries in terms of AM practices. This variation cannot be captured without constructing certain benchmarks upon which the required measurement can be established. The next step was to select the most appropriate research design for the research. Research design comprises five types of design; experiment design, longitudinal design, case study design, comparative design and cross-sectional design (survey).

The most appropriate approach for the study's aim is the cross-sectional design due to the following reasons. Firstly, the study is interested to reveal existing variations between public sector practices themselves and the gap with international AM approaches. Therefore, the structured interview leads to this aim. Secondly, the cross-sectional design occurs at a single point in time in which the researcher is able to collect data for the whole targeted sample. Third is the availability of quantifiable elements in which the researcher uses a systematic and standardised method to uncover the variations between the respondents. The fourth and last reason for selection of a cross-sectional design is the patterns of association in which the researcher can examine the relationships between variables if needed.

The following process of research design entails various procedures to develop the structured interview. Therefore, devise measure for the developed SAMP framework was necessary. These measures operationalized using the five points scale measurement for each concept in the SAMP framework. The last stage before conducting the research was to validate the developed measurement tool. This intention was satisfied by conducting four pilot studies. The first three was Eng. Waleed and the last one was with Eng. Khalid.

The last two stages are to conduct the research on the SPS and analysing the data. in case of the former, 20 out of 24 ministries in SPS are visited and only 15 ministries were found suitable for the research. The exclusion of the 9 ministries was due to either absence of physical assets or security and agreement criteria. In case of the latter, the data are analysed by using frequencies and central tendencies calculation. These analysed data presented in tables and radar diagram.

CHAPTER 5

ANALYSIS AND DISCUSSION

OF THE

EMPIRICAL DATA

This chapter is devoted to setting out the analysis and discussion of the collected data from SPS. Therefore, the first theme in the chapter sets out an analysis of all questions presented in Chapter 4. The next theme of this chapter focuses on discussion of the analysis of the data. Within this discussion are four main aims. The first concerns the confirmation of the underlying principles of the SAMP framework. The confirmation encompasses two subjects, the investigation of less and explicit reflected theories. The second aim covers context of AM practices in SPS. The third aim focuses on a discussion of the newly developed model regarding factors influencing the SAMP framework. This part discusses two main groups of factors; factors that are indirectly observed and factors that are directly observed. The last part of the discussion is devoted to presenting an integrated model that combines the developed SAMP and factors influencing the SAMP framework.

5.1 Analysis

5.1.1 Identifying stage

This stage is the first departure point for AM practices. It is found at Section 3.7 that several scholars such as Wit and Meyer (2010), Johnson et al. (2008), and Bryson (2004) require employees at this stage to identify and clarify the causes of existence for organizations by identifying the organisations' issues and problems. This awareness could eliminate a great deal of unnecessary conflict in organisations (Bryson, 2004), channel discussion and activity (Bryson, 2004), motivate employees to recognise where their business activities fall (Pearce and David, 1987) and support and enhance organisations to distinguish themselves from other organisations (Pearce and David, 1987) (refer to Section 3.7).

Findings of AM practices within SPS has shown that the need to submit a mission statement at the time of developing the asset portfolio has been totally overlooked by all SPS, as shown in Table 5.1-Q1. All AM departments, as shown in Table 5.1-Q2, mention that there is no policy, professional standard or other source that requires them to submit the organisation’s mission statement at the time of submitting the intended asset portfolio.

Table 5.1. Writing mission statement.

	Never		Rarely		Sometimes		Often		Always		
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	
1- How often does your department write down the mission statement of the organisation when you submit the required projects to the Ministry of Finance?	15	100									
2- To what extent do the following require your department to write down the mission statement of the organisation when you submit the required projects to the ministry of finance?											
Organisational policy	15	100									
Professional standard	15	100									
Experience	15	100									
Other	15	100									

5.1.2 Diagnosing stage

The asset management practices which follow the identifying stage work under the diagnosing stage of the conceptual framework. This stage consists of four components distributed over two main elements. The first is that of the diagnosing practices which are related to the external environment. The second is the internal environment of the organisation, which comprises three stages of the diagnosing stage. The former component is analysed first.

5.1.2.1 External environment

The questions attempt to uncover current AM practices as well as variation among them in SPS. These questions investigate two central points:

- 1- Demand for the organisation’s services, and
- 2- Technological development

The results are presented in Tables 5.2a and b and Tables 5.3a and b.

In case of the Demand for the organisation’s services, the majority of the AM departments (13 out of 15, or 86.7 %) agreed on the existence of a relationship between increasing demand for the organisation’s services and the need for physical assets as shown in Table 5.2a-Q3. This relationship, as shown in Table 5.2a-Q3, however varies among AM departments: 8 always, 3 often and 2 sometimes. Further, in spite of the existence of this relationship, a minority of AM departments (5 out of 15, or 33.3 %), as shown in Table 5.2a-Q4, have responsibility for forecasting the increasing demand on the organisation’s services.

Only one of these departments (1 out of 15, or 6.7 %), as shown in Table 5.2a-Q5, follows professional standards to forecast this demand, while the remaining departments rely on their experience (5 out of 15, or 33.3 %). This evidence has shown that AM departments have an awareness of the relationship between the external environment and the organisation’s services, but that the **delegation** of this relationship might not be managed carefully. In addition, the collective experience of AM departments is central to this practice.

Table 5.2a. External environment in case of demand on organisation’s services.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
Diagnosing external environment										
3- How often does the increasing demand on the organisation’s services influence the increasing demand on physical assets?	2	13.3			2	13.3	3	20	8	53.3
4- How often does your department forecast the demand on the organisation’s services?	10	66.7					3	20	2	13.3
5- To what extent do the following require your department to forecast the increased demand on the organisation’s services?										
Organisational policy	15	100								
Professional standard	14	93.3							1	6.7
Experience	10	66.7							5	33.3
Other	15	100								

When the interviewer asked those departments who have the responsibility to forecast the demand on organisation’s services how often they analyse the forecast, as shown in Table 5.2b-Q6, only minority of AM departments (4 out of 15, or 26.7 %) are analysing the impact of the forecast, while the total number from the previous question (Table 5.2a-Q4) was 5 departments. Table 5.2b-Q7 has shown that all departments rely on their experience (4 out of 15, or 26.7 %). However, only one department follows professional standards in their forecast analyses besides their experience. None of these departments are using quantitative approach to discover the impact of demand on services, as shown in Table 5.2b-Q8 and 9.

Table 5.2b. Continuing external environment in case of demand on organisation’s services.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
Analysing impact of external environment										
6- How often does your department analyse the impact of future demand on the organisation’s services?	11	73.3			1	6.7	1	6.7	2	13.3
7- To what extent do the following require your department to analyse the impact of future demand on the organisation’s services?										
Organisational policy	15	100								
Professional standard	14	93.3					1	6.7		
Experience	11	73.3					1	6.7	3	20
Other	15	100								
8- How often do you use probability or quantitative approach in analysing the impact of demand on services?										
	15	100								
9- To what extent do the following require your department to use probability or quantitative approach in analysing the impact of demand on services?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								

Because the linkage between the external environment and organisation’s departments depends on delegation (refer to Section 3.8.2), the study investigated another variable that has a direct impact on physical assets; technological development (Jones, 2002), as shown in Tables 5.3a and b. The minority of the AM

departments (5 out of 15, or 33.3 %), as shown in Table 5.3a-Q10, monitor technological developments that may affect physical assets operation. All the minority of AM departments (5 out of 15, or 33.3 %) do this practice according to their experience, as shown in Table 5.3a-Q11. However, only one AM department (1 out of 15, or 6.7 %) do this practice according to existing organisational policy or professional standards.

Those departments, (5 out of 15, or 33.3 %) shown in Table 5.3a-Q12, who monitor the technological development also analyse the impact of technological development on physical asset operation. Only 4 out of 15 (26.7 %), Q13, carry out this practice based on their experience, while 1 out of 15 (6.7 %) AM departments carry it out due to the requirements of organisational policy and 2 out of 15 (20 %) due to requirements from professional standards. None of these departments use quantitative analysis to discover the impact of these changes, as shown in Table 5.3b-Q14.

Table 5.3a. Continuing external environment in case of technological development.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
Diagnosing external environment										
10- How often do you monitor technological development that may affect physical assets' operation?	10	66.7	1	6.7	2	13.3			2	13.3
11- To what extent do the following require your department to monitor technological development that may affect physical assets' operation?										
Organisational policy	14	93.3			1	6.7				
Professional standard	14	93.3					1	6.7		
Experience	10	66.7			1	6.7			4	26.7
Others	15	100								
Analysing impact of the external environment										
12- How often do you analyse the future impact of technological development on physical asset operation?	10	66.7	1	6.7	2	13.3	1	6.7	1	6.7
13- To what extent do the following require your department to analyse the future impact of technological development on physical asset operation?										
Organisational policy	14	93.3			1	6.7				
Professional standard	12	80					1	6.7	2	13.3
Experience	11	73.3			1	6.7			3	20
Other	15	100								

Table 5.3b. Continuing external environment in case of technological development.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
14- To what extent do the following require your department to use probability or a quantitative approach in analysing the impact of technological development on physical asset operation?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								

Three issues can be deduced from the exploration of the relationship between the external environment and the organisation’s physical assets. First, Majority of AM departments admitted the existence of a relationship between ministries’ services and physical assets, but, unfortunately, the AM departments have no responsibility to forecast and analyse the impact of the demand on the need for physical assets, as shown in Tables 5.2a and b-Q3 to Q7.

Second, in spite of the the direct impact of the technological development on physical assets operation (Jones, 2002), majority of the AM departments in SPS do not monitor technological development that may affect physical assets operations, as shown in Table 5.3a-Q10. Third, AM departments’ awareness with quantitative approach usage is totally absent, as shown in Table 5.3b-Q14.

5.1.2.2 Predicting physical asset failure

The main message behind the physical asset failure stage is to motivate asset managers to pay attention to physical asset failure in the future. The study, as shown in table 5.4-Q15, has shown that a minority of AM departments (3 out of 15, or 20%) forecasts future physical assets failure impact on the required services. Two of these ministries undertake this practice sometimes and the third one often. Asset managers report that this practice is being undertaken due to their experience with AM practices, as shown in table 5.4-Q16.

Table 5.4. Predicting physical asset failure.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
15- How often does your department forecast the future failure of physical assets in delivering the required services?	12	80			2	13.3	1	6.7		
16- To what extent do the following require your department forecast the future failure of physical assets in delivering the required services?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	12	80					1	6.7	2	13.3
Other	15	100								

5.1.2.3 Present strategy

The findings in Tables 5.5a and b show that when the interviewer asked the participants to answer how often they investigate the contribution of the physical assets to the organisation’s mission, only one asset management department replied positively. On the other hand, when the interviewees are asked about specific related practices such as how often asset management departments calculate the minimum required assets or how often they review asset location against the organisation’s mission, the received responses become greater than the former, as shown in Tables 5.5a and b-Q17, 19 and 21. It is suspected that the differences between the former question and the latter two questions can be attributed to the following. The former question explored the overall dimension of the present strategy, while the latter explored certain practices. Therefore, it may be inferred that asset managers do not explicitly think about the overall aim of their practices in terms of improving physical assets’ contribution to the organisation’s services.

Returning to the last three questions in tables 5.5a and b-Q19, 21 and 23, the following is seen; the minority of AM departments (3 out of 15, or 20%) are paying attention to the minimum required assets in order to deliver the required services, as shown in Table 5.5a-Q19. In addition, less than half of the AM departments (6 out of 15, 40 %) review their assets’ location in order to know their effectiveness against the organisation’s mission, as shown in Table 5.5b-Q21. The last question, as shown in Table 5.5b-Q23, is to investigate how often AM departments attempt to reduce

the reliance of organisation's services on physical assets. The finding has shown that only one AM department (1 out of 15, 6.7 %) undertakes this practice.

All these practices (in Q19, 21 and 23) are initiated by a mixture of various factors. In case of the first practice (Q19), various sources such as professional standards, experience and special committees developed by the Ministry to investigate the minimum required assets are responsible for this practice, as shown in Table 5.5a-Q20. In terms of reviewing the suitability of asset location (Q21); experience, external governmental agencies and re-distributing the population of the country are the main reasons behind this practice, as shown in Table 5.5b-Q22. The final practice (Q23) is currently undertaken on the basis of the department's experience, as shown in Table 5.5b-Q24.

Table 5.5a. Present strategy.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
17- How often do you investigate the physical assets' contribution to the organisation's mission?	14	93.3			1	6.7				
18- To what extent do the following require your department to study physical assets contribution to the organisation's mission?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	14	93.3							1	6.7
Other	15	100								
19- How often do you calculate the minimum required physical asset in order to deliver your organisation's services?										
	12	80			1	6.7	1	6.7	1	6.7
20- To what extent do the following require organisation to calculate the minimum required physical assets to deliver organisation's services?										
Organisational policy	15	100								
Professional standard	14	93.3					1	6.7		
Experience	13	86.7					1	6.7	1	6.7
Other	14	93.3							1	6.7

Table 5.5b. Continuing present strategy.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
21- How often do you review the organisation's physical assets locations in order to know their effectiveness in delivering the organisation's mission?	9	60	2	13.3	4	26.7				
22- To what extent do the following require your department reviewing the organisation's physical assets locations in order to know their effectiveness in delivering the organisation's mission?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	10	66.7							5	33.3
Other	13	86.7					1	6.7	1	6.7
23- How often does your department attempt to reduce the reliance of the organisation's services on physical assets?										
	14	93.3			1	6.7				
24- To what extent do the following require your department to reduce the reliance of the organisation's services on physical assets?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	14	93.3					1	6.7		
Other	15	100								

5.1.2.4 Performance indicators

The minority of AM departments (3 out of 15, or 20%) follow written performance indicators at the time of diagnosing current organisational assets, as shown in Table 5.6-Q25. However, these indicators are not always followed, as shown by the variation in Table 5.6-Q25. To clarify, it is shown in Table 5.6-Q25 that only one of the AM departments often uses the performance indicators while the remaining departments use them sometimes. The reason behind not relying completely on written performance indicators is that these indicators do not cover all aspects of asset performance, as reported by all participants (3 out of 15, or 20%), shown in Table 5.6-Q27. These performance indicators are required by three sources; organisational policy, professional standards and experience, as shown in Table 5.6-Q26.

Table 5.6. Performance indicators.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
25- How often do you follow official written criteria when you diagnose the state of physical assets?	12	80			2	13.3	1	6.7		
26- To what extent do the following require your department to diagnose the state of physical assets using official written criteria?										
Organisational policy	13	86.7			1	6.7	1	6.7		
Professional standard	14	93.3					1	6.7		
Experience	14	93.3							1	6.7
Other	15	100								
27- To what extent do those criteria cover all aspects of physical asset performance?										
	12	80			3	20				

5.1.3 Conceiving stage

5.1.3.1 Generating options

At this time, participants are surrounded by the demand to create ideas, as well as give and take dialogue. The formulated strategy might be a form of discovering the organisation's pattern, or creating new and deliberate action (Bryson, 2004). In some cases a non-asset solution is considered, such as demand management (NSW, 2006a; IIMM, 2006). The existence of this thinking was investigated by looking into practices related to selecting a non-asset solution (Table 5.7-Q28) and when assets are surplus (Table 5.7-Q30).

In case of a non-asset solution, the findings show that a minority of asset management departments (1 out of 15, or 6.7%), as shown in table 5.7-Q28, thinks about non-asset solutions. This asset management department undertakes the practice based on their experience, as shown in table 5.7-Q29.

The second question, in table 5.7-Q30, is related to disposing of assets. Asset managers communicate other ministries in order to transfer the surplus asset to other ministries. The findings show that less than half of the departments (7 out of 15, or 46.7%) contact other ministries to benefit from their assets. In addition, less than half of these departments (7 out of 15, 46.7 %) rely on experience in association

with only one ministry relies on professional standards and requests from outside ministry to conduct this action, as shown in Table 5.7-Q31.

Table 5.7. Generating options.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
28- When the need for new physical assets is confirmed, how often do you attempt to find a non-asset solution in order to achieve the organisation's mission?	14	93.3			1	6.7				
29- To what extent do the following require your department to find a non-asset solution to achieve the required organisation's mission?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	14	93.3							1	6.7
Other	15	100								
30- If a physical asset is surplus, how often do you contact other government organisations in order to benefit from excess assets?										
	8	53.3	6	40					1	6.7
31- To what extent do the following require your department to contact other government's organisations in order to the benefit from excess assets?										
Organisational policy	15	100								
Professional standard	14	93.3			1	6.7				
Experience	8	53.3							7	46.7
Other	14	93.3			1	6.7				

5.1.3.2 Option evaluation

Evaluation of the selected option encompasses various criteria upon which options are evaluated and selected. This stage is divided into two main aspects; evaluating disposal decisions and evaluating new asset decisions. The former is discussed first, the latter encompasses several aspects; financial, economic, market sounding, legislative approval issues, evaluation of the whole-of-government policy issues and public interest assessment.

In case of disposal decisions practice, findings as shown in table 5.8-Q32 show that a majority of the AM departments (11 out of 15, or 73.3 %) re-evaluate benefits of their surplus assets when they find that assets are not useful anymore. The reason behind this practice is varied as shown in Table 5.8-Q33, all AM departments who

carry out this practice (11 out of 15, or 73.3 %) rely on their experience. One of these departments (1 out of 15, or 6.7 %) follows a professional standard to undertake this practice.

Table 5.8. Benefit of asset retention.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
32- If a physical asset is surplus, how often do you weigh the benefit of disposing asset against retention of it?	4	26.7	3	20	2	13.3	4	26.7	2	13.3
33- To what extent do the following require your department to evaluate the benefit of disposing asset against retention of it?										
Organisational policy	15	100								
Professional standard	14	93.3					1	6.7		
Experience	4	26.7					1	6.7	10	66.7
Other	15	100								

Regarding financial evaluation practices, as shown in tables 5.9a and b, the study has attempted to explore current variations among ministries in the light of eight distinct financial evaluation analysis practices. Only three out of eight aspects of the financial evaluation are being considered in SPS, as shown in Tables 5.9a and b. Therefore, the following analysis discusses them independently.

The first is to evaluate projects based on net cash flow as shown in table 5.9a-Q34 and 35. The findings have shown that only one asset management department (1 out of 15, or 6.7 %) conducts this practice on the basis of professional standard. The second aspect of the financial evaluation is to take into consideration budget consideration as shown in table 5.9a-Q36. This practice is undertaken by all asset management departments (15 out of 15, or 100 %) and required by two sources; organisational policy (13 out of 15, or 86.7 %) and experience (15 out of 15, or 100 %), as shown in Table 5.9a-Q37.

The third and last practice of the financial evaluation aspect is to calculate 70 % probability of the project initial capital expenditure, as shown in Table 5.9b-Q42. This practice was undertaken by all AM departments but with different emphases. All AM departments (15 out of 15, or 100 %), as shown in Table 5.9a-Q43, rely on

their experience to carry out this practice. In addition, majority of these AM departments (13 out of 15, or 86.7 %) report that the practices are also required by organisational policy.

Table 5.9a. Financial evaluation.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
How often is the following calculated?										
34- Net cash flow	14	93.3							1	6.7
35- Who require it										
Organisational policy	15	100								
Professional standard	14	93.3							1	6.7
Experience	15	100								
Other	15	100								
36- Budgetary consideration									15	100
37- Who require it										
Organisational policy	2	13.3							13	86.7
Professional standard	15	100								
Experience									15	100
Other	15	100								
38- Funding sources with cost and revenues	15	100								
39- Who require it										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
40- Net present value	15	100								
41- Who require it										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
42- 70% probability of estimated cost of the initial capital expenditure					1	6.7	1	6.7	13	86.7
43- Who require it										
Organisational policy	2	13.3							13	86.7
Professional standard	15	100								
Experience									15	100
Other	15	100								

Table 5.9b. Continuing financial evaluation.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
How often is the following calculated?										
44- 70% probability of estimated cost of the life cycle maintenance	15	100								
45- Who require it										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
46- 70% probability of estimated cost of the life cycle refurbishment	15	100								
47- Who require it										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
48- 70% probability of estimated cost of the life cycle of operation	15	100								
49- Who require it										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Others	15	100								
50- Other	15	100								
51- Who require it										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								

The next aspect of the evaluation stage, as shown in Table 5.10-Q52 and 53, is the economic evaluation of cost and benefit of projects. The findings have shown that this practice was not found within any ministry.

Table 5.10. Economic evaluation.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
52- How often do you calculate the economic cost and benefit of required project?	15	100								
53- To what extent do the following require your department to calculate the economic cost and benefit of the required projects?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								

The following evaluation practice is to make sure that the market is capable of implementing ministries' projects, as shown in table 5.11a-Q54. The findings show that a minority of AM departments (5 out of 15, or 33.3 %), as shown in Table 5.11a-Q54, investigate the market capability to implement their projects which contain new ideas, while only 2 departments investigate market capability to implement typical projects, as shown in Table 5.11b-Q56. Both practices are taken based on AM departments' experience, as shown in Table 5.11a and b-Q55 and 57.

Table 5.11a. Market sounding.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
54- If the selected project contains a new idea, how often do your department evaluate the market capability for implementing it?	10	66.7	1	6.7			2	13.3	2	13.3
55- If the selected project contains a new idea, to what extent do the following require your department to calculate market capability to implement the required projects?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	10	66.7							5	33.3
Other	15	100								

Table 5.11b. Continuing market sounding.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
56- If the selected project is typical, how often do your department evaluate the market capability for implementing the project?	13	86.7							2	13.3
57- If the selected project is typical, to what extent do the following require your department to calculate market capability to implement the required projects?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	13	86.7							2	13.3
Other	15	100								

The discussion which follows is devoted to legislative approval issues. The legislative approval issue requires asset managers to investigate the impact of the projects based on four aspects: environment, national planning, cultural heritage and native.

The findings, as shown in Tables 5.12a and b, have shown that all the four aspects of the legislative approval issues are carried out. Minority of the AM departments (6 out of 15, or 40 %) investigate the project impact on environment, as shown in Table 5.12a-Q58. Five of these departments (5 out of 15, or 33.4%) carry out this practice based on their experience, as shown in Table 5.12a-Q59. Four of them (4 out of 15, or 26.7%) have professional standard to carry out this practice. And one department (1 out of 15, or 6.7%) carries out this practice due to external entities.

The second aspect of the evaluation of the legislative approval issues is to investigate project impact on planning issues, majority of AM departments (12 out of 15, or 80 %) carry out this practice, as shown in Table 5.12a-Q60. Eleven of them (11 out of 15, or 33.3 %) carry out this practice based on their experience, as shown in Table 5.12a-Q61. Six of these departments (6 out of 15, 46.7 %) carry out this practice due to coordination with other public agencies, and following the five years plan of the SPS. Three of the AM departments (3 out of 15, 20 %) have also organisational policy. None of these departments (15 out of 15, or 100 %) have professional standards.

The third aspect of the evaluation of the legislative approval issues is to investigate projects impact on cultural heritage issues. Minority of AM departments (3 out of 15, or 20 %) carries out this practice, as shown in Table 5.12a-Q62. All of them (3 out of 15, or 20 %) rely on their experience and only one of them has an organisational policy, as shown in Table 5.12a-Q63.

Table 5.12a. Legislative approval issues.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
58- How often do you take into consideration the impact of the project on the environment?	9	60	2	13.3			3	20	1	6.7
59- To what extent do the following require your department to evaluate the impact of the project on environment?										
Organisational policy	15	100								
Professional standard	11	73.3					1	6.7	3	20
Experience	10	66.7					1	6.7	4	26.7
Other	14	93.3							1	6.7
60- How often do you evaluate the impact of the project on planning issues?										
61- To what extent do the following require your department to evaluate the impact of the project on planning issues?										
Organisational policy	12	80	1	6.7					2	13.3
Professional standard	15	100								
Experience	4	26.7					1	6.7	10	66.7
Other	8	53.3					1	6.7	6	40
62- How often do you evaluate the impact of the project on cultural heritage issues?										
63- To what extent do the following require your department to evaluate the impact of the project on cultural heritage issues?										
Organisational policy	15	100								
Professional standard	14	93.3					1	6.7		
Experience	12	80							3	20
Other	15	100								

The last aspect of the legislative approval issues is to investigate projects impact on native issues. Majority of the AM departments (10 out of 15, or 66.7 %) carries out this practice, as show in Table 5.12b-Q64. All of them (10 out of 15, or 66.7 %) rely on their experience, however, only on department carries out this practice according

to request from other departments in the ministry or external request from outside the ministry.

Table 5.12b. Continuing legislative approval issues.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
64- How often do you evaluate the impact of the project on native issues?	5	33.3	3	20	4	26.7	1	6.7	2	13.3
65- To what extent do the following require your department to evaluate the impact of the project on native issues?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	5	33.3							10	66.7
Other	14	93.3					1	6.7		

In evaluating the whole of government policies, seven aspect are investigated; national employment security, organisations' employee structure, region, social life, staff training, indirect flow-on effect on wages and government regulation. The findings, as shown in tables 5.13a and b, have shown that only five out of seven aspects are carried out in SPS.

In case of evaluating project impact on national employment security, one AM department (1 out of 15, or 6.7 %) carries out this practice, as shown in Table 5.13a-Q66. This practice was carried out according to professional standards, as shown in Table 5.13a-Q67.

In case of evaluating project impact on the region, majority of AM departments (8 out of 15, or 53.3 %) carries out this practice, as shown in Table 5.13a-Q70. Only experience of all these departments (8 out of 15, or 53.3 %) is the main source of this practice, as shown in Table 5.13a-Q71.

In case of evaluating project impact on social life, less than half of the AM departments (7 out of 15, or 46.7 %) carries out this practice, as shown in Table 5.13a-Q72. All of these departments (7 out of 15, or 46.7 %) conduct this practice based on their experience, as shown in Table 5.13a-Q73. One of these departments (1 out of 15, or 6.7 %) has professional standards for this practice. In addition, one

of these departments (1 out of 15, or 6.7 %) does this practice due to request from other departments in the ministry.

Table 5.13a. Whole of government policies.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
66- How often do you evaluate the impact of the project on national employment security?	14	93.3							1	6.7
67- To what extent do the following require your department to evaluate the impact of the project on national employment security?										
Organisational policy	14	93.3							1	6.7
Professional standard	15	100								
Experience	14	93.3							1	6.7
Other	15	100								
68- How often do you evaluate the impact of the project on the organisation's employee structure?										
69- To what extent do the following require your department to evaluate the impact of the project on organisation's employees' structure?	15	100								
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
70- How often do you evaluate the impact of the project on the region?										
71- To what extent do the following require your department to evaluate the impact of the project on the region?	7	46.7	2	13.3	2	13.3	1	6.7	3	20
Organisational policy	15	100								
Professional standard	15	100								
Experience	7	46.7							8	53.3
Other	15	100								
72- How often do you evaluate the impact of the project on social life?										
73- To what extent do the following require your department to evaluate the impact of the project on social life?	8	53.3	4	26.7	1	6.7			2	13.3
Organisational policy	15	100								
Professional standard	14	93.3							1	6.7
Experience	8	53.3							7	46.7
Other	14	93.3							1	6.7

In case of evaluating project impact on staff training, only one AM department (1 out of 15, or 6.7 %) carries out this practice, as shown in Table 5.13b,Q74. This sole department (1 out of 15, or 6.7 %) carries out this practice based on their experience, as shown in Table 5.13b-Q75. In case of evaluating projects impact on government regulations, majority of the AM departments (8 out of 15, or 53.3 %) carries out this practice, as shown in Table 5.13b-Q78. All of these departments (8 out of 15, or 53.3 %) rely on their experience, as shown in Table 5.13b-Q79. Three of these AM departments do this practice according to other departments. One of AM departments (1 out of 15, or 6.7 %) has professional standards.

Table 5.13b. Continuing whole of government policies.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
74- How often do you evaluate the impact of the project on staff training?	14	93.3	1	6.7						
75- To what extent do the following require your department to evaluate the impact of the project on staff training?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	14	93.3							1	6.7
Other	15	100								
76- How often do you evaluate the impact of the project on indirect flow-on effects on wages?										
77- To what extent do the following require your department to evaluate the impact of the project on indirect flow-on effects on wages?	15	100								
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
78- How often do you evaluate the impact of the project on government regulation?										
79- To what extent do the following require the organisation to evaluate the impact of the project on government regulation?	7	46.7	4	26.7	2	13.3			2	13.3
Organisational policy	15	100								
Professional standard	14	93.3					1	6.7		
Experience	7	46.7					1	6.7	7	46.7
Other	12	80							3	20

In terms of evaluating public interest, eight aspects are investigated; project effectiveness, stakeholders' relations, transparency, public accessibility, consumer rights, public security and public privacy. The findings have shown that only six out of eight aspects are taking place in SPS, with varying emphasis, as shown in table 5.14a, b and c.

In case of evaluating projects' effectiveness, a minority of AM departments (2 out of 15, or 13.3 %) carries out this practice, as shown in Table 5.14a-Q80. These departments (2 out of 15, or 13.3 %) rely on their experience to conduct this practices, as shown in Table 5.14a-Q81.

Table 5.14a. Public interest evaluation.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
80- How often do you evaluate the impact of the project's effectiveness based on meeting service requirements?	13	86.7	1	6.7	1	6.7				
81- To what extent do the following require your department to evaluate the impact of the project's effectiveness on meeting service requirement?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	13	86.7							2	13.3
Other	15	100								
82- How often do you evaluate the impact of the project on stakeholders?										
	6	40	5	33.3	3	20	1	6.7		
83- To what extent do the following require your department to evaluate the impact of the project on stakeholders?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	6	40							9	60
Other	13	86.7							2	13.3
84- How often do you take accountability into account?										
	10	66.7	1	6.7	1	6.7	2	13.3	2	13.3
85- To what extent do the following require your department to take accountability into account?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	10	66.7							5	33.3
Other	15	100								

In case of evaluating projects impact on stakeholders, a majority of AM departments (8 out of 15, or 60 %) carries out this practices, as shown in Table 5.14a-Q82. All these departments (8 out of 15, or 60 %) rely on their experience, as shown in Table 5.14a-Q83. Two of these departments (2 out of 15, or 13.3 %) have other resources for this practice. The other sources responsible for undertaking the practice are communication with other ministries and committees formed by the ministry.

In case of taking accountability into account, a minority of AM departments (5 out of 10, 33.3 %) carries out this practice, as shown in Table 5.14a-Q84. All these AM departments (5 out of 10, 33.3 %) rely on their experience for this practice, as shown in Tale 5.14a-Q85.

In case of taking transparency into account, a majority of AM departments (14 out of 15, 93.3 %) considers this practice, as shown in Table 5.14b-Q86. Majority of these departments (13out of 15, or 86.7 %) carries out this practice according to the organisation policy, as shown in Table 5.14b-Q87. Minority of these departments (4 out of 15, or 26.7 %) considers experience is part of the reason behind this practice.

Table 5.14b. Continuing public interest evaluation.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
86- How often do you take transparency into account?	1	6.7	2	13.3			6	40	6	40
87- To what extent do the following require your department to take transparency into account?										
Organisational policy	2	13.3							13	86.7
Professional standard	15	100								
Experience	11	73.3					1	6.7	3	20
Other	15	100								
88- How often do you take public access into account?										
88- How often do you take public access into account?	7	46.7	1	6.7	1	6.7	3	20	3	20
89- To what extent do the following require your department to take public access into account?										
Organisational policy	15	100								
Professional standard	9	60			1	6.7	3	20	2	13.3
Experience	7	46.7					2	13.3	6	40
Other	15	100								

In case of taking public access into account, a majority of AM departments (8 out of 15, or 60 %) considers this practice, as shown in Table 5.14b-Q88. All these

departments (8 out of 15, or 60 %) considers their experience is the main reason behind this practice, as shown in Table 5.14b-Q89. Six of these departments (6 out of 15, or 40 %) consider professional standards are part of the reasons behind this practice. None of these departments have organisational policy or any other reasons to conduct this practice.

In case of taking public privacy into account, minority of the AM departments (2 out of 15, or 13.3 %) takes public into account into their account, as shown in Table 5.14c-Q94. These two AM departments (2 out of 15, 13.3 %) considers their experience is the only driver behind this practices, as shown in Table 5.14c-Q95.

Table 5.14c. Continuing public interest evaluation.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
90- How often do you take consumer rights into account?	15	100								
91- To what extent do the following require your department to take consumer rights into account?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
92- How often do you take public security into account?										
93- To what extent do the following require your department to take public security into account?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
94- How often do you take public privacy into account?										
95- To what extent do the following require your department to take public privacy into account?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	13	86.7							2	13.3
Other	15	100								

5.1.4 Programme management

Programme management is meant to connect two or more separate projects together in order to reap benefits or obtain better control. The findings in Table 5.15a-Q96 show that the majority of asset management departments (11 out of 15, or 73.3 %) bring together separate projects in a single bid. In addition, less than half of asset management departments (7 out of 15, or 46.7 %) bring together separate projects in order to obtain benefits that are not available if projects are managed independently, as shown in Table 5.15a-Q98. However, the benefits behind the linkage are traced back by only one department (1 out of 15, or 6.7 %) in order to make sure that those benefits are realised, as shown in Table 5.15a-Q100. All these practices are being conducted on the sole basis of experience of asset management departments, as shown in Table 5.15a-Q97, 99 and 101.

The findings in Table 5.15c-Q113 show that a large majority of asset management departments (13 out of 15, or 86.7 %) report that a common region is the most important reason behind putting together separate projects in order to reap benefit. All these departments (13 out of 15, or 86.7 %) carry out this practice according to their experience, as shown in Table 5.15c-Q113.

The next central reason is the contractor strength, a majority of asset management departments (10 out of 15, or 66.7 %) also cite this reason as the main second reason behind bringing separate projects together, as shown in Table 5.15b-Q110. All these departments (10 out of 15, or 66.7) carry out this practice according to their experience, as shown in Table 5.15b-Q111.

The remaining reasons given for bringing separate projects together are scattered among a minority of the asset management departments, as shown in Tables 5.15b and c. In addition, new reasons behind bringing separate projects together emerged from the interview that were not considered by literature, including: Ministry of Finance pressure; need to increase the bid size; the wish to obtain better quality; to serve a particular client; projects which were available in the same period; and to

motivate contractors. All of these practices are being carried out based on the asset management departments' experience.

Table 5.15a. Programme management.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
96- How often does your department put separate projects together in one contract?	4	26.7	4	26.7	7	46.7				
97- To what extent the following require your department to put together separate projects in one contract?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	4	26.7							11	73.3
Other	15	100								
98- How often do you link separate projects together in order to reap benefits that are not available if projects are managed independently?										
	8	53.3	1	6.7	3	20	1	6.7	2	13.3
99- To what extent do the following require the department to link separate projects together in order to reap benefits that are not available if projects are managed separately?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	8	53.3							7	46.7
Other	15	100								
100- How often do you make sure the benefit from grouping projects has been realized?										
	14	93.3					1	6.7		
101- To what extent do the following require the organisation to make sure the benefit from grouping separate projects together has been realized?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	14	93.3							1	6.7
Other	15	100								

Table 5.15b. Continuing Programme management.

	Never		Rarely		Sometimes		Often		Always		
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	
To what extent does the following factors are used for linking separate projects together in order to reap benefit from combining them?											
102- Project dependencies	12	80	1	6.7	1	6.7			1	6.7	
103- Who require it											
Organisational policy	15	100									
Professional standard	15	100									
Experience	12	80							3	100	
Other	15	100									
104- Common specification	11	73.3			1	6.7	1	6.7	2	13.3	
105- Who require it											
Organisational policy	15	100									
Professional standard	15	100									
Experience	11	73.3							4	26.7	
Other	15	100									
106- Cost reduction	13	86.7					1	6.7	1	6.7	
107- Who require it											
Organisational policy	15	100									
Professional standard	15	100									
Experience	13	86.7							2	13.3	
Other	15	100									
108- Risk mitigation	13	86.7	1	6.7	1	6.7					
109- Who require it											
Organisational policy	15	100									
Professional standard	15	100									
Experience	13	86.7							2	13.3	
Other	15	100									
110- Contractor strength	5	33.3	1	6.7	6	40	2	13.3	1	6.7	
111- Who require it											
Organisational policy	15	100									
Professional standard	15	100									
Experience	5	33.3							10	66.7	
Other	15	100									

Table 5.15c. Continuing programme management.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
To what extent does the following factors are used for linking separate projects together in order to reap benefit from combining them?										
112- Common region	2	13.3			6	40	5	33.3	2	13.3
113- Who require it										
Organisational policy	15	100								
Professional standard	15	100								
Experience	2	13.3							13	86.7
Other	15	100								
114- Other causes	8	53.3	1	6.7	3	20	1	6.7	2	13.3
115- Who require it										
Organisational policy	15	100								
Professional standard	15	100								
Experience	8	53.3							7	46.7
Other	15	100								

Based on the previous evidence, benefit is thought about before linking separate projects together, but this benefit is not tested, traced or measured, except in the case of one department. This evidence supports the claim of this thesis regarding the partial existence of programme management thinking at this level of practice, but with less reflection on AM standards and guidelines.

5.1.5 Portfolio management

Portfolio management emerged to formalize and guide practitioners in this field. Portfolios of projects and programmes should go through various processes and procedures related to portfolio management thinking. It is clear from the findings, as shown in tables 5.16a, b and c, that most portfolio alignment management practices are not conducted by all ministries, as only two out of five practices are found in the SPS; reordering projects based on the organisation’s mission and categorizing the portfolio. The findings have shown that, a majority of AM departments (14 out of 15, or 93.3 %), in table 5.16a-Q116, rank their projects against the organisation’s mission. This practice is initiated by various sources; the individual experience of departments, organisational policy and coordination with other departments (other), as shown in Table 5.16a-Q117.

Table 5.16a. Portfolio management.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
Alignment process group										
116- How often do you rank projects based on their priority in achieving the organisation's mission?	1	6.7							14	93.3
117- To what extent do the following require your department to rank projects based on their priority to achieve the organisation's mission?										
Organisational policy	13	86.7			1	6.7			1	6.7
Professional standard	15	100								
Experience	1	6.7							14	93.3
Other	13	86.7			1	6.7			1	6.7
118- How often do you categorize grouped and individual projects?										
119- To what extent do the following require your department to categorize grouped and individual projects?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	12	80							3	20
Other	15	100								
120- How often do you evaluate grouped and individual projects?										
121- To what extent do the following require your department to evaluate grouped and individual projects?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								
122- How often do you select the required individual and grouped projects from the pool of evaluated individual and grouped projects to achieve the organisation mission?										
123- To what extent do the following require the organisation to select the required individual and grouped projects from pole of evaluated individual and grouped projects to achieve the organisation mission?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								

The individual experience of departments, as shown in Table 5.16a-Q117, recorded the highest score among the three practice sources in which majority of AM departments (14 out of 15, 93.3 %) considers their experience play a considerable role in this practice. However, only two departments are using organisational policy and other sources (coordinating with other departments in the ministry) with their experience.

The next practice is to categorize the portfolio. A minority of AM departments (3 out of 15, or 20 %), as shown in Table 5.16a-Q118, categorize their portfolio of projects. This practice is carried out based on the AM departments' experience, as shown in table 5.16a-Q119.

Table 5.16b. Continuing portfolio management.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
124- How often do you balance the list of the selected individual and grouped projects for the best benefit to the organisation?	15	100								
125- To what extent do the following require the organisation to balancing the list of the selected individual and grouped projects for the best benefit to the organisation?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								

In case of monitoring the implementation of the intended strategy in AM practices, Table 5.16c-Q126-129 below shows that majority of AM departments in SPS (10 out of 15, or 66.7 %) discards the intended projects after gaining approval from the government. Interestingly, the decision to discard unrequired projects is generally taken without formal process or procedures to lead to this type of action. However, one ministry is an exception to this as shown in table 5.16c-Q127 in terms of organisational policy besides other AM department takes this decision based on coordination between other departments in the ministry. The practice of discarding projects after gaining approval is rare within all AM departments in SPS.

Table 5.16c. Continuing portfolio management.

	Never		Rarely		Sometimes		Often		Always	
	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.	Fr.	P.
Monitoring process group										
126- After gaining approval for implementing the proposed portfolio, how often are some of those projects not needed anymore?	5	33.3	10	66.7						
127- After getting approval for the implementation the proposed portfolio, to what extent do the following require your department to monitor the persist need for projects and programmes?										
Organisational policy	14	93.3					1	6.7		
Professional standard	15	100								
Experience	5	33.3							10	66.7
Other	14	93.3			1	6.7				
128- After gaining approval for implementing a portfolio, how often do you make sure the resources are used sensibly?										
129- To what extent do the following require your department to make sure the resources are used sensibly?										
Organisational policy	15	100								
Professional standard	15	100								
Experience	15	100								
Other	15	100								

5.2 Discussion

The analysis presented above aimed to explore current AM practices in SPS. This analysis has paved the way for a discussion of various points related to AM practices. The first part of the discussion regards confirmation of the basic principles of the AM practices. The second discusses the context of AM practices in SPS. The third concerns introduction of a new model for factors influencing systematic AM practices (SAMP), and finally the fourth is to discuss the holistic framework for SAMP.

5.2.1 Confirmation of the basic principles of SAMP

Existing theories of strategic planning/reasoning process, portfolio and programme management thinking constituted the underlying principles of international AM

standards and guidelines, besides the realities of AM practices in the SPS. All these theories were brought together in a process form to explain the development of AM practice. These theories fall between theories that are less reflected in both AM standards and guidelines and empirical findings, and theories that are explicit and considered intensively in international AM standards and guidelines and empirical findings.

The finding is that programme management thinking is the less reflected theory. This conclusion is based on a thematic analysis of the international AM standards and guidelines presented in Table 3.4 and in the empirical findings. The remaining theories (reasoning/planning process and portfolio management thinking) can be explicitly found in AM standards and guidelines and the empirical findings. Therefore, the following evidence is presented in the attempt to confirm these theories as found in various management literature, international AM standards and guidelines, and empirical findings derived from SPS.

5.2.1.1 Less reflected theories

Although programme management is covered by two prominent guidelines (PMI and OGC), little reflection of programme management thinking exists within the AM standards and guidelines (refer to Section 3.16) and empirical findings in SPS. Based on the reviewed characteristics of programme management thinking, two main criteria should exist. First, benefits reaped from linking two or more separate projects together should be explicitly articulated from the outset (formulated). The second criterion is to monitor benefit delivery (OGC, 2007; PMI, 2006a; and Turner and Speiser, 1992) (see Section 3.14).

The reviewed AM standards and guidelines in Section 3.16 have shown that programme formulation in international AM standards and guidelines is either totally overlooked by these approaches, such as in the case of the FHWA guidelines, or partially mentioned such as in the case of the TAM, RICS and PAS 55 standards and guidelines (refer to Table 3.4). However, even when programme formulation practices were required by these standards and guidelines, practices regarding monitoring the benefits were not provided.

Collected evidence from SPS has clearly shown that 7 out of 15 AM departments link two or more separate projects together in order to reap benefit (refer to Q98). In addition, AM departments are clearly aware of their intention, as evidenced by the fact that the majority of the AM departments have mentioned the reasons behind their action, such as a common region and contractor strength (refer to Tables 5.15b and c - Q110 and 113). Therefore, benefits and reasons are explicitly articulated, but, unfortunately, programme management behaviour is not totally captured in SPS due the near absence of benefit monitoring practice in all AM departments in SPS (refer to Q100).

Based on the empirical findings, the following conclusions are reached. First, programme management thinking should be adopted as part of AM practices because it is a unique practice in the process of AM. However, the intention is not to include all programme management thinking as existing in the PMI or OGC guidelines. Instead, the claim is that programme management needs to be modified to suit the AM context. Secondly, neglecting programme management formulation has had a negative impact on portfolio AM practices, because the portfolio becomes a portfolio of projects only. Having discussed the less reflected theories in the confirmation argument, the following subheading is devoted to discuss the confirmation of explicit theories.

5.2.1.2 Explicit theories

The empirical findings of this research have confirmed the logic of the process behind AM practices, including the strategic reasoning process, portfolio, and programme management theories. Therefore, the following arguments start by the first stage in the strategic planning/reasoning process and, later, end with the portfolio monitoring stage as shown in Figure 5.1 below.

The identification stage, as identified by Pearce and David (1987), is the beginning of the AM process. In this stage, identification of issues (Wit and Meyer, 2010; Johnson et al., 2008; Bryson, 2004) or problems (Robbins et al., 2009) should be recognized, clarified and written (Blair-Loy et al., 2011) (refer to the discussion in Section 3.7). Johnson et al. (2009) suggest that at this stage strategists should seek to

understand governance structure, social responsibilities and ethics and stakeholder expectations. In addition, Bryson (2004) at this stage requires strategists or people working in organisations to identify and understand various requirements, restrictions, expectations, pressures, legislation, policies, ordinances, charters, articles and contracts. Moreover, the identifying stage is central to all AM standards and guidelines.

The empirical findings have confirmed that several practices are required by organisational policy (see for instance Q11, 13, 26, 37, 43 and 61). On the other hand, even when practices are not required by organisational policy, the empirical findings have confirmed that there are considerable number of practices initiated on the basis of asset managers' experience (this evidence is almost dominant in the SPS, refer to any table in Section 5.1). Obviously, these practices might be launched based on asset managers' understanding of ministries' informal and/or formal mandates.

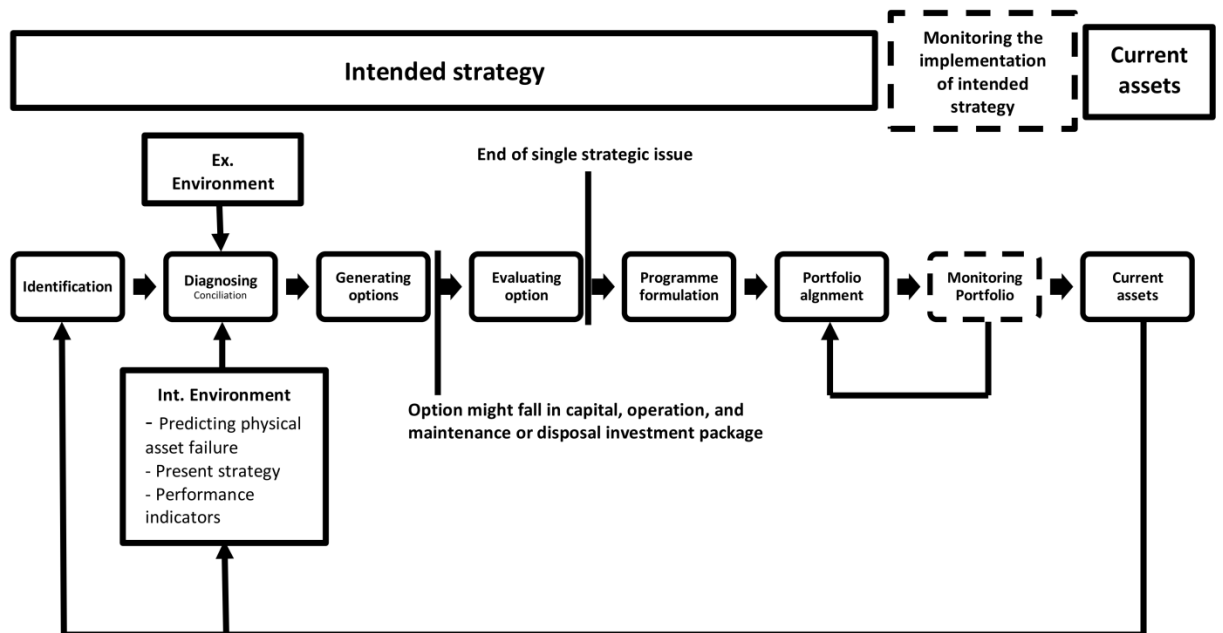


Figure 5.1. SAMP framework.

However, empirical findings have shown that no AM departments in SPS write a mission statement when they submit the required projects to the Ministry of Finance (refer to Table 5.1), this result supports Campbell and Young's claim (2004; 1991)

that there is a considerable discussion missing within the management literature regarding the importance of a mission statement for organisations, and this deficiency was also reflected in the practices and activities of real management practices.

The diagnosing stage was advocated by many scholars (Wit and Meyer, 2010; Johnson et al., 2008; Robbins et al., 2009; Barney, 1991; Bryson, 1988; Christensen et al., 1987) as a cornerstone of the strategic planning/reasoning process (discussed in Section 3.8). At this stage, conciliation between both the internal and external contexts of the organisation is pursuant to obtaining results that can be highly effective and hence create public value. Based on the underlying principles of the SAMP (shown in Figure 3.20), four sources of AM practices are identified: diagnosing external environment, predicting physical asset failure, diagnosing present strategy and performance indicators. The following paragraphs discuss each aspect individually.

The external environment of organisations imposes many threats and opportunities that lead organisations to success or failure. Scholars proposed different sources of threats and opportunities existing in the external environment; PESTEL, industry or sector, and competitors and markets (Laue et al., 2012; Wit and Meyer, 2010; Grant, 2008; Parthasarthy, 2007; Thompson and Martin, 2005; Row et al., 1994; Christensen et al., 1987) (discussed in Section 3.8.2). For instance, the TAM and IIMM (NSW, 2006a; IIMM, 2006, respectively) guidelines require asset managers to diagnose demand trends, while the RICS (2012) guideline requires property managers to diagnose changes in external operating environment and strategy and actions of partners (discussed in Section 3.8.2). Based on the empirical data, diagnosing external environment practice is confirmed by several asset managers in SPS. The practitioners confirmed that demand on a ministry's services does increase the demand on physical assets (see Tables 5.2a and b and Tables 5.3a and b).

In case of predicting physical asset failure practice, asset managers are required to take into consideration predictive maintenance practices in order to develop the optimum equipment life (Mobley, 2004). Predicting physical asset failure is also

found in AM standards and guidelines (BSI, 2008; FHWA, 2007; NSW, 2006a; IIMM, 2006; OECD, 2001; FHWA, 1999) (discussed in Section 3.8.1.1). This practice was also confirmed by several of the SPS asset managers as part of their AM practices (see Table 5.4).

In the case of present strategy practice, asset managers need to discern and reveal to what extent physical assets contribute to the organisation's mission and services (discussed in Section 3.8.1.2). Within the TAM (2006a, p.8) guidelines, asset managers are required to undertake the following: "the asset portfolio developed by the agency should represent the asset response to its service requirements" (discussed in Section 3.8.1.2). The empirical findings confirmed this type of practice in terms of the minimum required assets to achieve organisation's services and reviewing the current location to fulfil the organisation's mission (see Table 5.5).

Regarding performance indicators, the advent of performance measurements for monitoring, controlling and measuring the progress of organisations has been significant in businesses progress (Kellen, 2003) (discussed in Section 3.8.1.3). Therefore, performance indicators are central in all AM approaches (discussed in Section 3.8.1.3). The empirical findings have confirmed that performance indicators are part of AM practices in a minority of the SPS (see Table 5.6).

In the case of generating option practice, the main purpose of the generating option is to create solutions for the strategic issue. At this time, participants are surrounded by the demand for creating ideas, as well as give and take dialogue (discussed in Section 3.10). In some cases a non-asset solution is considered, such as demand management (NSW, 2006a; IIMM, 2006). The empirical findings confirmed this practice as part of the AM practices in SPS (see Table 5.7).

Concerning evaluating options, this practice is well recognized in all AM standards and guidelines (discussion in Section 3.10.1). The empirical findings confirmed the existence of the evaluation practices (see all Tables from 5.8 to 5.14). However, although there are considerable numbers of practices in the evaluation stage, in the AM practices in SPS these are missing. The main message of this stage is to confirm the existence of evaluation practices.

In the case of portfolio alignment practice, the underlying principle behind portfolio alignment practices is to align programmes and projects objectives with the organisation's strategic objectives before taking decisions and categorizing (Moore, 2010; OGC, 2007; PMI, 2006b) (discussed in Section 3.20). Interestingly, the empirical findings have confirmed the existence of these two practices within the AM practices in SPS. The majority of AM departments in SPS rank their projects against the organisation mission (see Table 5.16a-Q116). In addition, a minority of AM departments in SPS categorize their portfolio of projects (see Table 5.16a-Q119). This evidence clearly confirms the existence of alignment portfolio thinking in the process of AM practices.

In the case of monitoring the implementation of the portfolio, this stage is theoretically composed of monitoring the implementation of projects and programmes to achieve the intended strategy from the physical assets (Moore, 2010; OGC, 2007; PMI, 2006b) (discussed in Part 4). The underlying principles that need to be managed in the portfolio monitoring practices are to control deliberate, unrealised and emerged projects and programmes. Mintzberg and Waters (1985) claim that some of the decisions taken can in some situations turn out not to be applicable or not aligned with the organisation's objectives and mission. Therefore, it can be asserted that the Saudi public sector is not an exception to this phenomenon. Based on the data collected from SPS participants, a majority of AM departments in SPS discard intended projects after gaining approval for implementation. In addition, evidence in Table 5.16c-Q126 shows that discarding projects after gaining approval is rare, and this evidence is compatible with Mintzberg's (1979, p.75) claim:

An organisation may find itself in a stable environment for years, sometimes for decades, with no need to reassess and appropriate strategy. Then, suddenly, the environment can become so turbulent that even the very best planning techniques are of no use because the impossibility of predicting the kind of stability that will eventually emerge.

In summary, the empirical findings have confirmed that the underlying principles of the SAMP framework are embedded in three theories; strategic planning/reasoning

process, portfolio, and programme management. These theories constitute the building blocks of the SAMP framework starting from the identification stage and passing through diagnosing, generating option, evaluation option, programme formulation, portfolio alignment, and monitoring the portfolio implementation stages. All these stages are linked back to the three basic stages of systematic asset management practices in Part 1 (Figure 3.4) and in turn found embedded in AM practices in SPS. Therefore, the claim is that the developed SAMP framework, presented in Figure 5.1 above, can be used to explain and understand the AM practices phenomenon. The next section discusses the contextual characteristics of AM practices in SPS.

5.2.2 Context of AM practices (SAMP) in SPS

This section attempts to answer several questions about characteristics of AM practices in SPS; Are AM practices in SPS systematic? If not, what stages are missing? What is the number of conducted AM practices in SPS against the international AM standards and guidelines? What are the characteristics of individual AM practices in SPS? What is the current state of AM practices in terms of organisational policy, professional standards and experience? All these questions need to be answered in order to develop the current context of AM practices in SPS. The study introduces the contextual characteristics of SPS in three main themes; SAMP in SPS, characteristics of individual AM practices in SPS, and current state of organisational policy, professional standards, and experience of the AM departments. In order to achieve the aim, parts of the previous questions in the analysis section are reused but with a different presentation. The questions are reproduced in Appendix G (Tables G1 and 2) with a central of tendency calculation. Regarding the presentation of the data, a radar diagram is used. The subsequent sections are devoted to this aim.

5.2.2.1 Systematic AM practices in SPS

Part 5 indicated that AM practices will be considered systematic if they match the basic level of systematic asset management practices of the international AM standards and guidelines. In this sense, the OMB USA guidelines represent the basic

the lower level of the SAMP framework. The identified stages in the OMB USA guidelines are; identification, performance indicators, evaluating option.

However, prior to discussing the empirical findings, it is beneficial here to illustrate how the results in Tables 1 and 2 in Appendix G are understood and interpreted, besides their linkage to the radar diagram (figure 5.2). Therefore, the following illustrative example is introduced, and is applicable to all results in Tables 1 and 2 in Appendix G.

Illustrative example. Table G1a below gives three rows from the original Table G1a in Appendix G, as an example. Three practices are displayed: Practices no. 2, 7 and 10. This illustrative example should be read with reference to the radar diagram in order to build the linkage. In addition, Section 4.2.10.2 forms part of this discussion and may usefully be consulted by the reader to gain awareness of the analysis involved.

Practice No. 2 in table G1a below asks about forecasting the demand on organisational services, and the results as shown in the table below are skewed toward never following this type of practice. Based on central tendency analysis, the median is 1, because 10 out of 15 ministries are not conducting this practice. On the other hand, the BR (best response) is 5, because 2 ministries scored always. Therefore, these results can be translated into the radar diagram in Figure 5.2 as the following. BR's score is 5 and the majority (refer to Section 4.2.10.2 for more clarification about the majority concept) of SPS is 1.

These results are drawn in the radar diagram, Figure 5.2, with a solid line which represents the majority of the SPS (median of the sample) and a dashed line for the best response (BR). The same logic of analysis and interpretation is applicable to the whole of Tables G1 and G2 in Appendix G. Practice no. 7 and 10 have the same interpretation in terms of the results in Table G1a below and the drawing in Figure 5.2. However, the median in Practice no. 10 is taken instead of the mean. This decision is taken in order to be consistent with the analysis. Having illustrated how the reader can understand and interpret the data in tables G and the radar diagram,

the following discussion will address the extent to which the study has accomplished its objectives.

Table: Partial copy of table G1a in Appendix G, Practice analysis.

Practice No.	STAGE	Question	Never 1	Rare 2	Sometimes 3	Often 4	Always 5	median	mean	BR
2	External environment	How often does your department forecast the demand on organisation's the services?	10			3	2	1		5
			⋮			⋮				⋮
7	Performance indicators	How often do you follow written official criteria when you diagnose the state of physical assets?	12		2	1		1		4
			⋮			⋮				⋮
10	Evaluation practices	If a physical asset is surplus, how often do you weigh benefit of disposing asset against retention of it?	4	3	2	4	2	3	2.8*	5

Figure 5.2. Partial copy of table G1a in Appendix G for practice analysis.

Based on the empirical findings shown in the radar diagram in Figure 5.3a, majority of AM departments in SPS are unsystematic. In addition, AM practices are significantly lagging behind international AM standards and guidelines. However, the BR indicated the existence of systematic behaviour in few of the ministries. In this sense, three comments can be drawn from the investigation of SAMP in SPS.

First, the findings have shown that majority of AM departments overlooked the identification and diagnosing stages of the strategic planning/reasoning process. These two stages are central in the SAMP framework due to their dominance in theory and practices. Without these two stages, conciliation between external and internal environments may not take place. Consequently, a deviation of physical assets from a ministry's orientation might take place, according to strategic management theories (Wit and Meyer, 2010; Robbins et al., 2009; Johnson et al., 2008; Barney, 1991; Bryson, 1988; Christensen et al., 1987). In addition, this evidence goes against Drion et al. (2012) and Too and Too (2010) in their claim that physical assets are becoming central to the organisation's core business processes. However, this claim is supported in the case of the BR (best response) ministry in SPS.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage
10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage.
———— Majority of AM practices
----- BR of AM practices

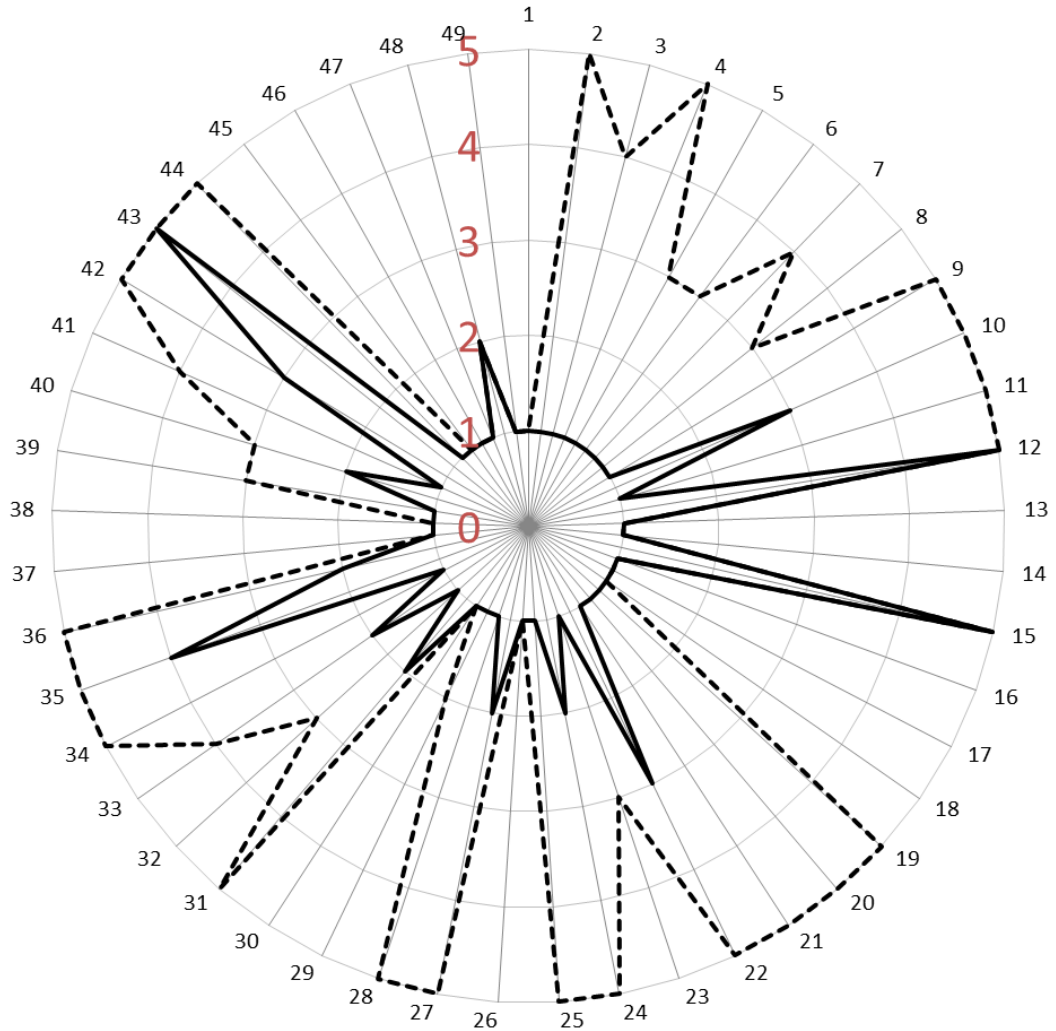


Figure 5.3a. Understanding SAMP in the SPS.

Second, this shortcoming of diagnosing stage absence in the AM practices can be explained according to the absence of experienced staff for planning formulation in the majority of SPS ministries, as claimed by Daghistani (1991), who found that the shortage of experienced staff for planning formulation in Ministry of Municipal and Rural Affairs was the reason behind the lack of strategic formulation in the ministry. Therefore, this shortcoming might be prevalent in the majority of the SPS ministries.

Third, in the BR of AM practices in SPS, the AM practices in this ministry are systematic irrespective of the missing practices in identification and in some of the AM practices in the evaluation stages. To justify this claim, in case of the former, the missing practices at the identification stage do not totally indicate absence of knowledge itself, but are an indicator of potential shortcomings (refer to Section 3.7). In the case of the latter, missing practices in the evaluation stage do not represent the whole evaluation stage because practices themselves are optional according to existing variation between AM standards and guidelines. Therefore, a few practices can provide a sense of the evaluation stage's existence.

The previous discussion focused on two main points; the best response and median. This kind of calculation does not provide a complete picture about which ministry represents the best response. However, the following discussion focuses on investigating the fifteen ministries with the purpose to answer the following question: do the best response's scores reside in one single ministry or distributed over several ministries?

The five figures below (Figures 5.3b, c, d, e and f) illustrate the results of the analysis of each ministry against the median (with the black colour). Based on the analysis, it seems that the best responses do not reside in one single ministry but, instead the best responses are distributed over several ministries. Therefore, the Saudi's government needs to undertake collective action to pave the way for learning between ministries.

To sum up the empirical findings in section 5.2.2.1, the following statement can be made:

- The AM practices in majority of SPS are unsystematic. However, few of the SPS are systematic.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage 10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage.

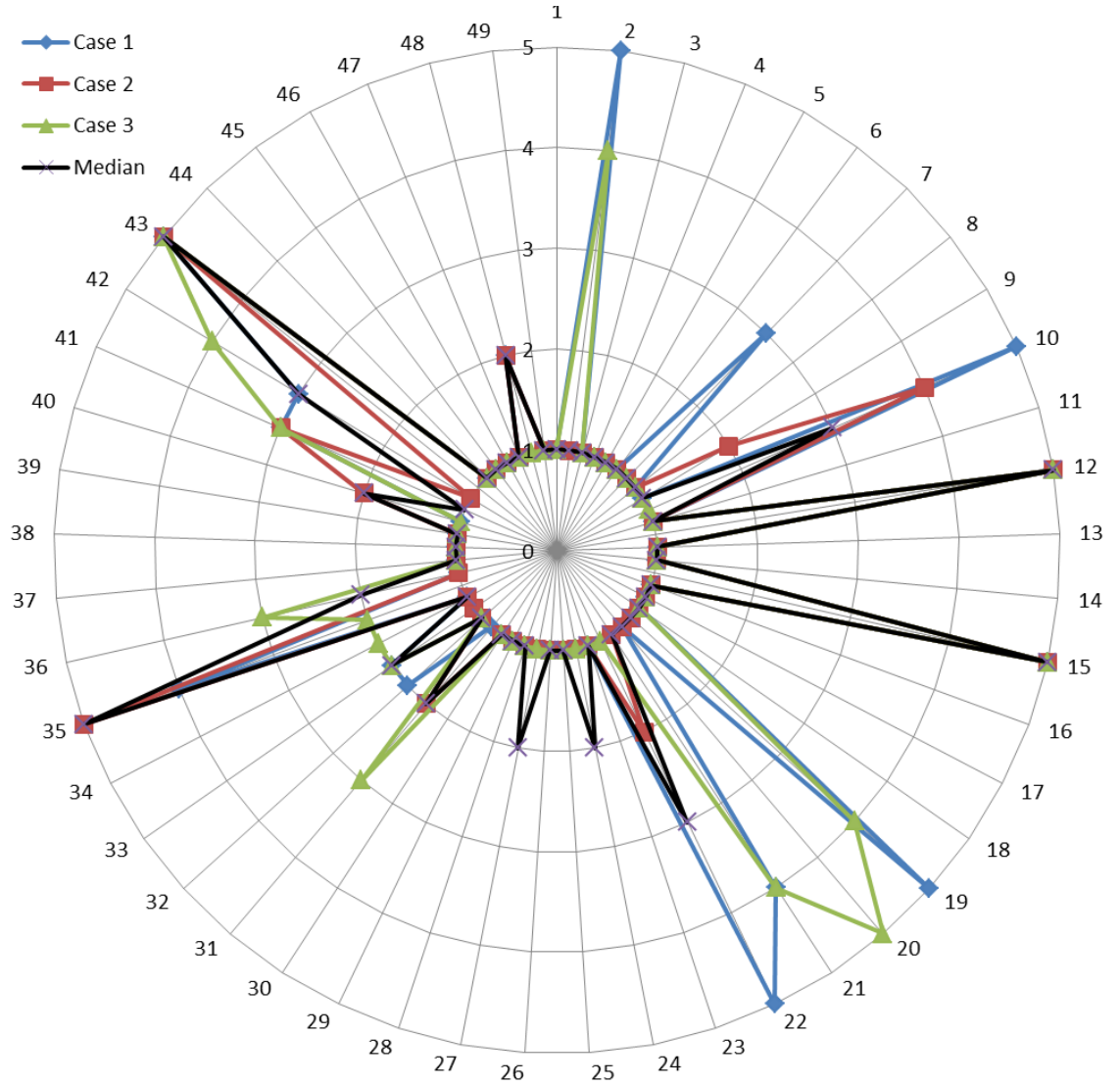


Figure 5.3b. Mapping cases no. 1, 2 and 3 against the median.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage 10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage.

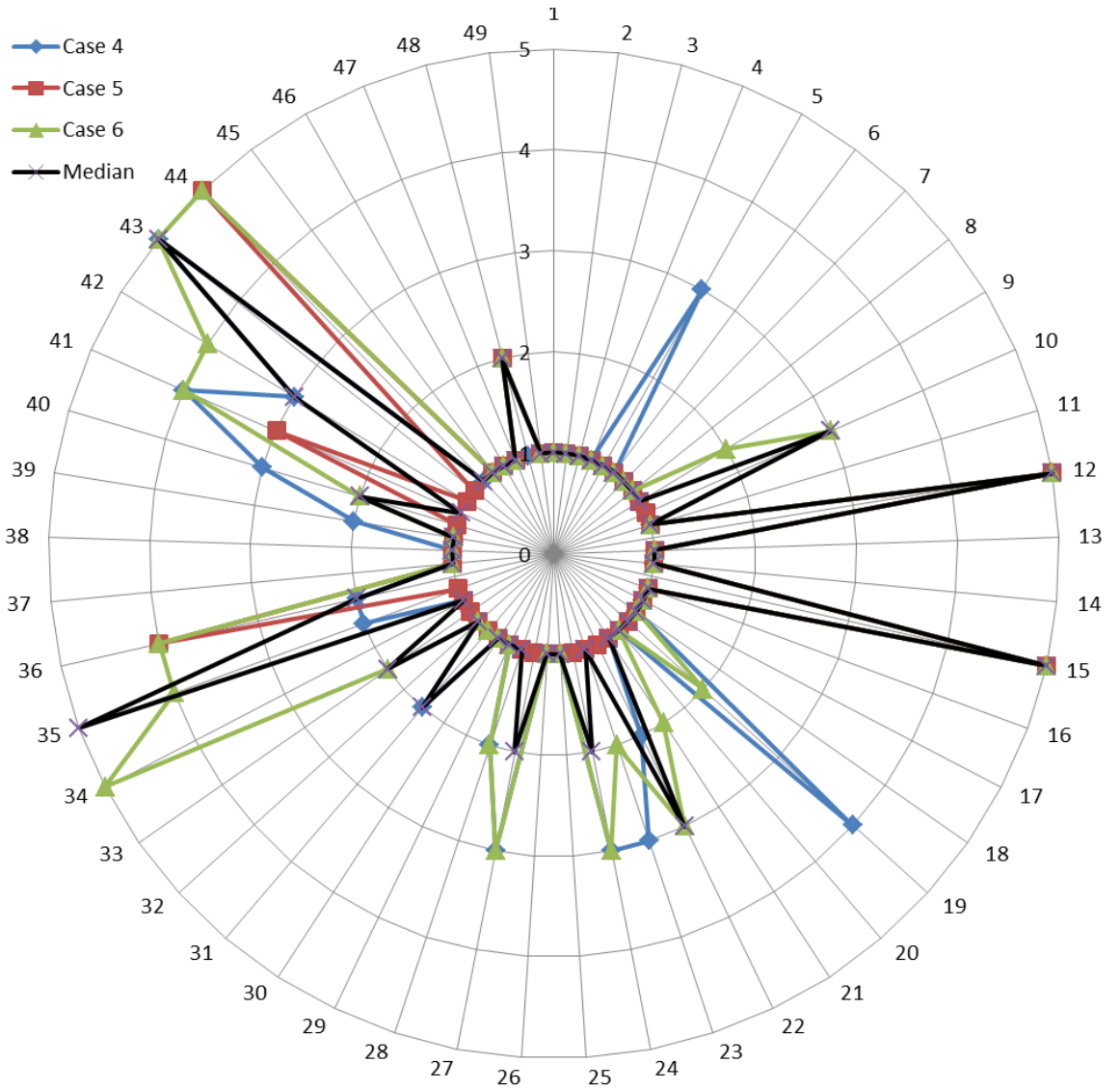


Figure 5.3c. Mapping cases no. 4, 5 and 6 against the median.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage 10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage.

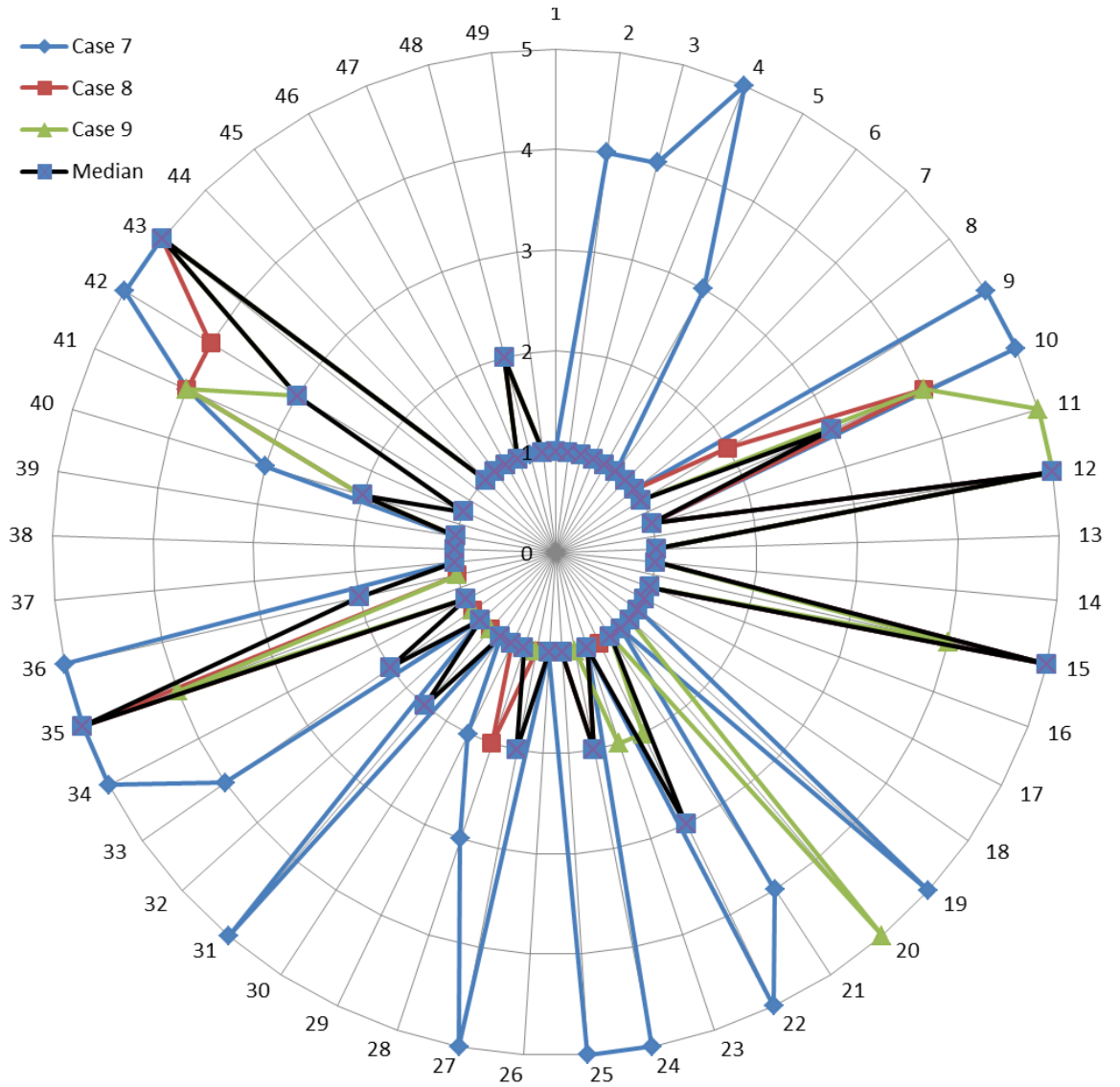


Figure 5.3d. Mapping cases no. 7, 8 and 9 against the median.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage, 10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage.

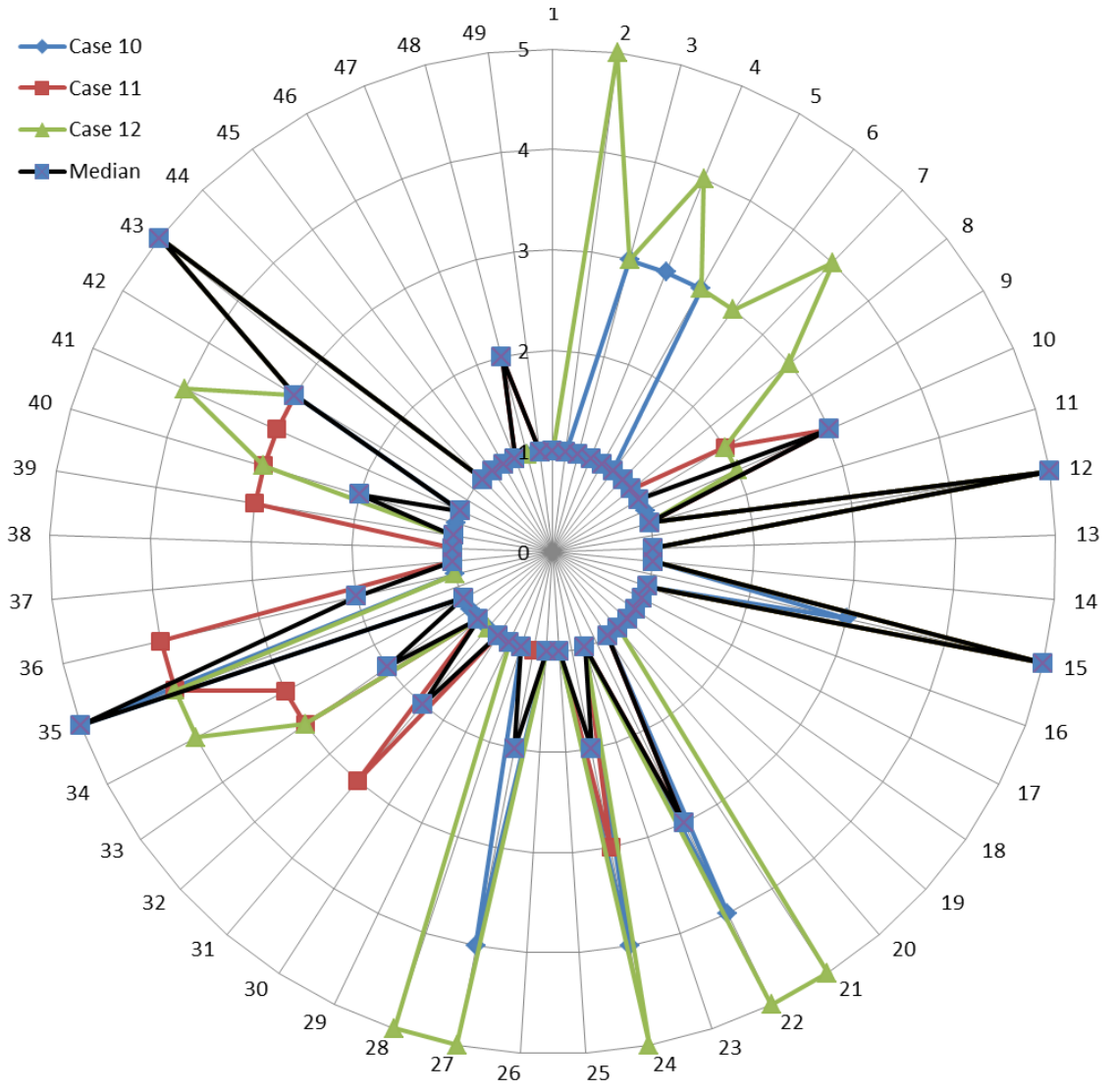


Figure 5.3e. Mapping cases no. 10, 11 and 12 against the median.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage, 10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage.

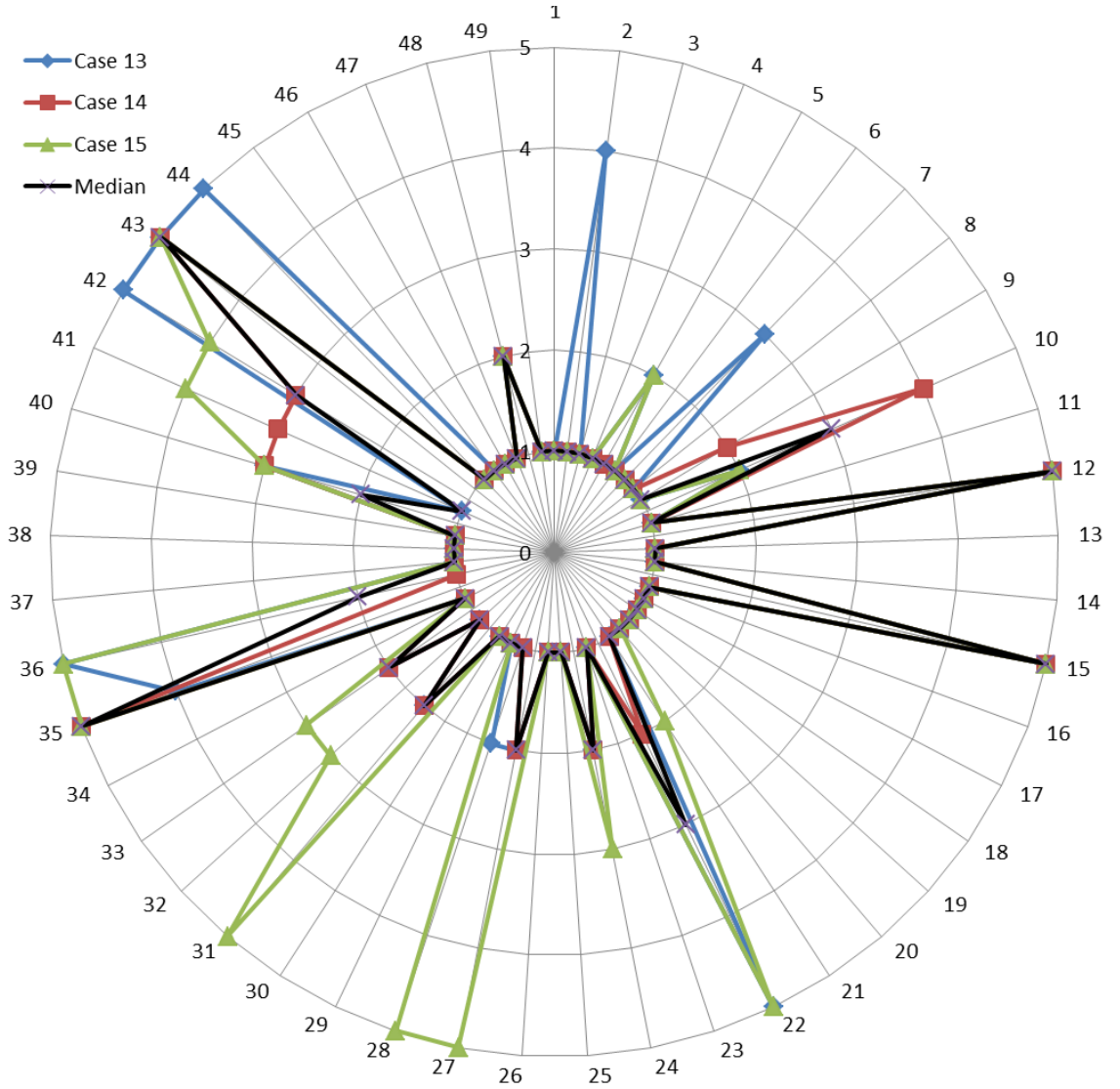


Figure 5.3f. Mapping cases no. 13, 14 and 15 against the median.

5.2.2.2 Current characteristics of individual AM practices in SPS

The empirical findings in the previous radar diagram in Figure 5.3 and analysis in Section 5.1 indicate three issues about AM practices characteristics in SPS. First, the number of AM practices being carried out in the majority of SPS, from the evaluation stage to the last stage of the AM practices, is 14 out of 49, while the best response of AM practices carries out 34 practices. This indication of the weak number of practices in majority of SPS shows that the gap between practices in developed countries and Saudi Arabia is large. Therefore, this gap would motivate the government to develop AM practices.

The need to develop the current AM practices of SPS was articulated by several studies. Most of these practices tend to be in the evaluation stages. For instance, Al-Hammad et al. (1996b) pointed out that due to the lack of paying attention to the maintainability of new assets, several problems are found in maintaining assets in the future. In addition, Assaf et al. (1995) investigated the effect of 35 faulty construction works on building maintenance, and then suggested that causes of faulty construction works should be taken into account before tendering projects. Moreover, several researchers such as Assaf and Al-Hejji (2006) and Al-Khalil and Al-Ghafly (1999) investigated causes of delay in public sector and found that most of these causes could be avoided if they were taken into account before tendering projects.

In the same line of argument of the gap between developed countries and SPS the following is discussed. In spite of most of the AM practices in SPS are in the evaluation stage, however, the SPS still suffers from considerable deficiencies in this stage. For instance, financial evaluation practices for the intended projects are almost absent from all of the public sector. Some of these financial evaluations are related to the calculation of the estimated cost of the life cycle of assets such as maintenance, refurbishment, and operation (Q44, 46 and 48). In addition, estimation of the economic cost and benefit of intended projects is totally absent from all of the public sector (Q52). Moreover, evaluating the market capability for typical projects to deliver the required public projects is almost absent (Q56). Evaluating the impact

of public projects on national employment security is nearly absent in the public sector (Q66). On the other hand, the three most important AM practices as carried out by almost all AM departments in the public sector are; ranking projects based on their priority of achieving the organisation's mission (Q116), taking transparency into account (Q86), and an attempt to reap benefit from connecting several projects together that belong to the same region (Q112). On the other hand, eighteen AM practices are never carried out by any AM department in SPS.

The second issue is that performance indicators are central in all AM standards and guidelines. In addition, they are either the only source of the required diagnosing stage analysis, such as in the Asset Management Primer of the U.S. Department of Transportation, or part of it, such as in the TAM guidelines. Unfortunately, only very few ministries in SPS have performance indicators. Even these ministries who have performance indicators for managing their physical assets do not always follow their performance indicators (refer to Section 5.1.2.4). Based on this evidence, it is perceived that ministries in SPS should establish realistic and comprehensive performance indicators for their physical assets and consider this a central element in the AM practices in SPS, because all AM standards and guidelines consider the performance indicators element a central part of their AM standards and guidelines (refer to Section 3.8.1.3).

The final issue found is that when the study explored the overall dimensions of the present strategy stage, only one asset management department replied positively, but when the study asked about specific related practices such as how often AM departments calculate the minimum required assets or how often they review asset location against the organisation's mission, the received responses become greater than the former, as shown in Table 5.5-Q17, 19 and 21. It is suspected that asset managers do not explicitly think about the overall aim of their practices in terms of improving physical assets' contribution to the organisation's services because the differences between the former question and the latter two questions can be attributed to overall dimension of the AM practices. Therefore, the study can conclude that increasing asset managers' awareness might improve AM practices, as awareness improvement is a part of AM enablers in PAS 55 (BSI, 2008a)

standard. Further evidence of an issue with awareness is the following: AM departments' awareness with quantitative approach usage is totally absent, as shown in Table 5.3-Q14.

Based on the previous argument, the following claims can be introduced:

- The gap in AM practices between the developed countries and Saudi Arabia is significant, in which AM practices in the majority of the SPS are lagging considerably behind the developed countries; the majority of SPS ministries carry out 14 out of 49 practices that found in the international AM standards and guidelines.
- AM practices are non-comprehensive and to some extent unrealistic
- The majority of AM departments in SPS are unaware of the relation between their AM practices and the AM practices' effectiveness to the organisation's mission.

5.2.2.3 Current state of policy, standards and experience

This section attempts to answer the following question: what is the current state of AM practices in terms of organisational policy, professional standards and experience? Four observations are found in the subsequent empirical findings.

The first observation, as is known from the previous analysis (see Sections 5.2.2.1 and 5.2.2.2), is that the BR of AM practices is in a good position in terms of both reasoning process activities and number of practices. Based on this knowledge, it is expected that the BR is in a better position regarding organisational policy, professional standards and experience than the majority group. Basically, these expectations are met, as shown in the radar diagrams in Figures 5.4a, b, c and d (see Tables G2a-2L in Appendix G, for all questions and associated central tendency calculations). However, what is new is the finding that the majority of AM department groups completely lack professional standards and other factors (other factors will be explained later under external factors in Section 5.2.3.2), as shown in the radar diagrams in Figures 5.4b and d. This result is unexpected because of the following question; why is the majority group, which has lower AM characteristics,

also lacking these two sources of practices? However, the answer to this question is beyond the scope of this thesis.

The next observation is that although all ministries in SPS evaluate the impact of the project on planning issues and also rank their projects based on their priority in achieving the organisation's mission (practices no. 22 and 43 in the radar diagram in Figure 5.4), only little ministries have organisational policy for these practices while others (the majority) do not. Interestingly, these practices are being carried out by all ministries in SPS but with different organisational policies, where some ministries have it and others do not.

The third observation is that although the majority of AM departments admitted the relationship between physical assets and ministries' services (as shown in Table 5.2a-Q3), unfortunately, the study found a complete absence of any organisational policy or professional standards to encourage AM departments to predict the impact of future failure of physical assets on the delivered ministries' services, as shown in Table 5.4-Q16.

In the fourth observation, by comparing Figure 5.3 (AM practices) with Figure 5.4c (experience of AM departments associated with each practice) the following is found; experience was absent in only one practice (practice no. 11 in the radar diagram, Figures 5.3 and 5.4c) and otherwise all the remaining AM practices depend on the department's experience as the main driver of practice or in some cases share part of other AM drivers for the practice. This evidence confirms that AM practices in SPS rely heavily on AM department's experience as the main source of AM practices.

To sum up Section 5.2.2.3 and empirical findings, the following three statements can be made:

- The majority of AM departments in SPS completely lack professional standards and other drivers for AM practices.
- The majority of SPS ministries have less organisational policy than the BR.

- Experience of AM departments is the main source of AM practices in all ministries.

Having discussed the implications of AM practices in SPS, the subsequent section is devoted to discussing the new framework for factors influencing the SAMP.

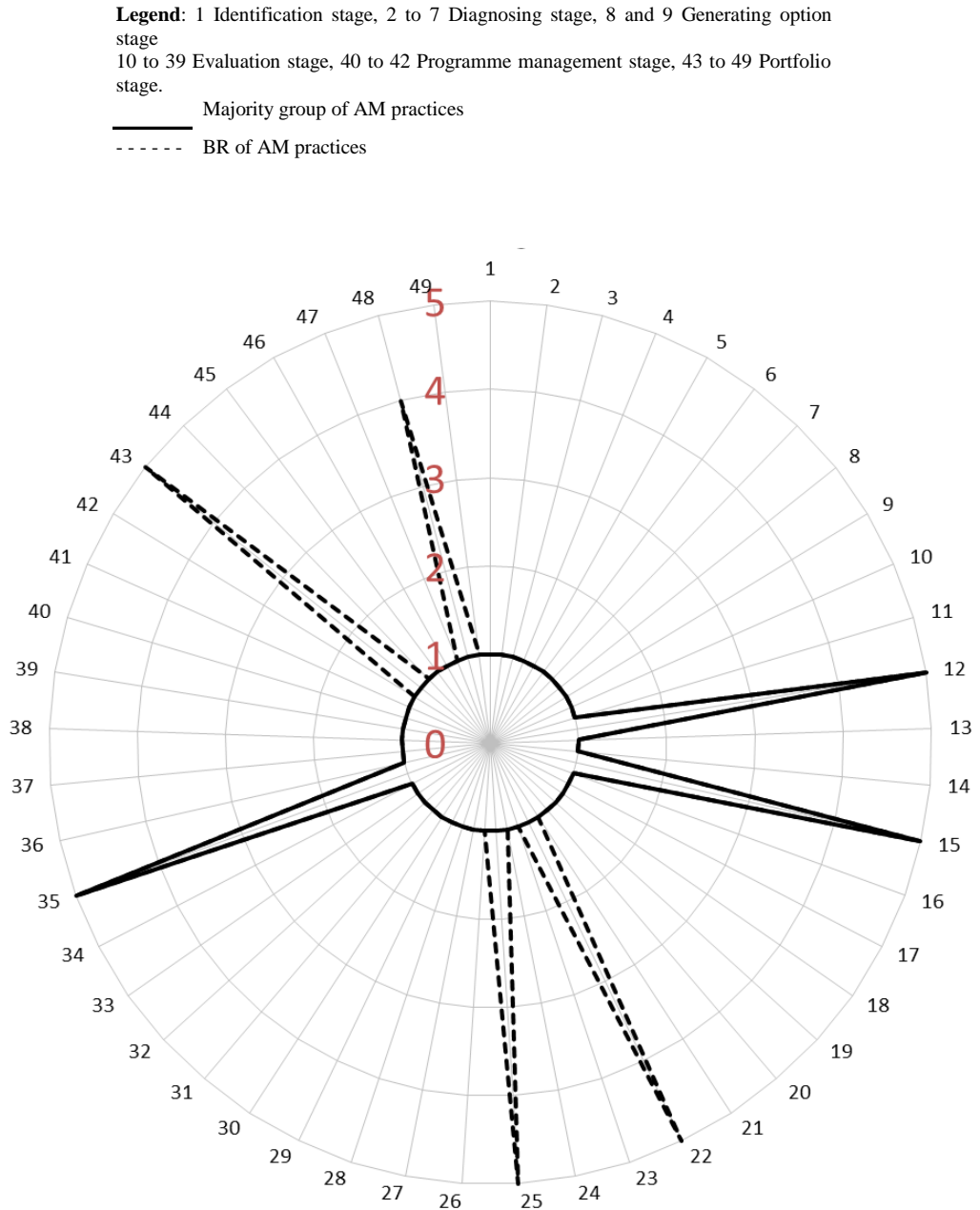


Figure 5.4a. Organisation Policy as a practice driver in the AM practices of SPS.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage
10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage.
———— Majority of AM practices
----- BR of AM practices

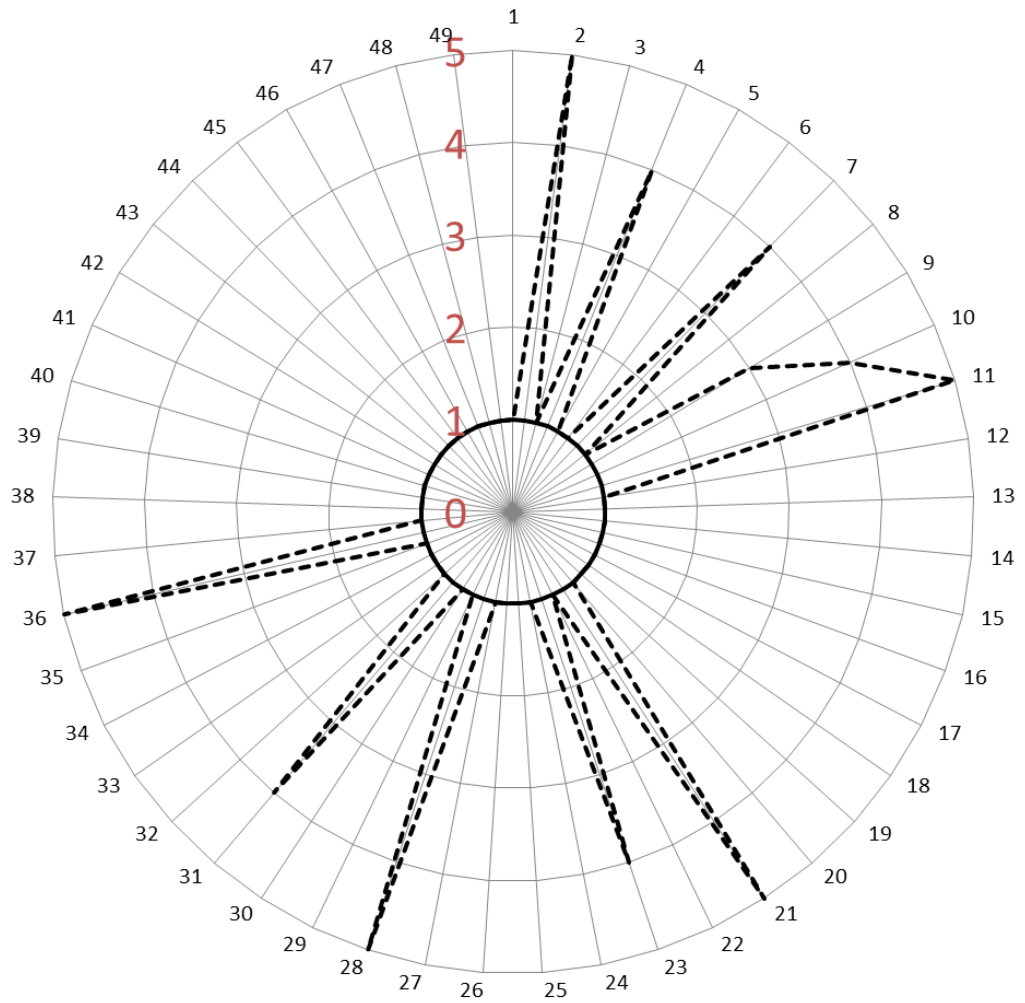


Figure 5.4b. Professional standards as a practice driver in the AM practices of SPS.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage
10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage
———— Majority of AM practices
----- BR of AM practices

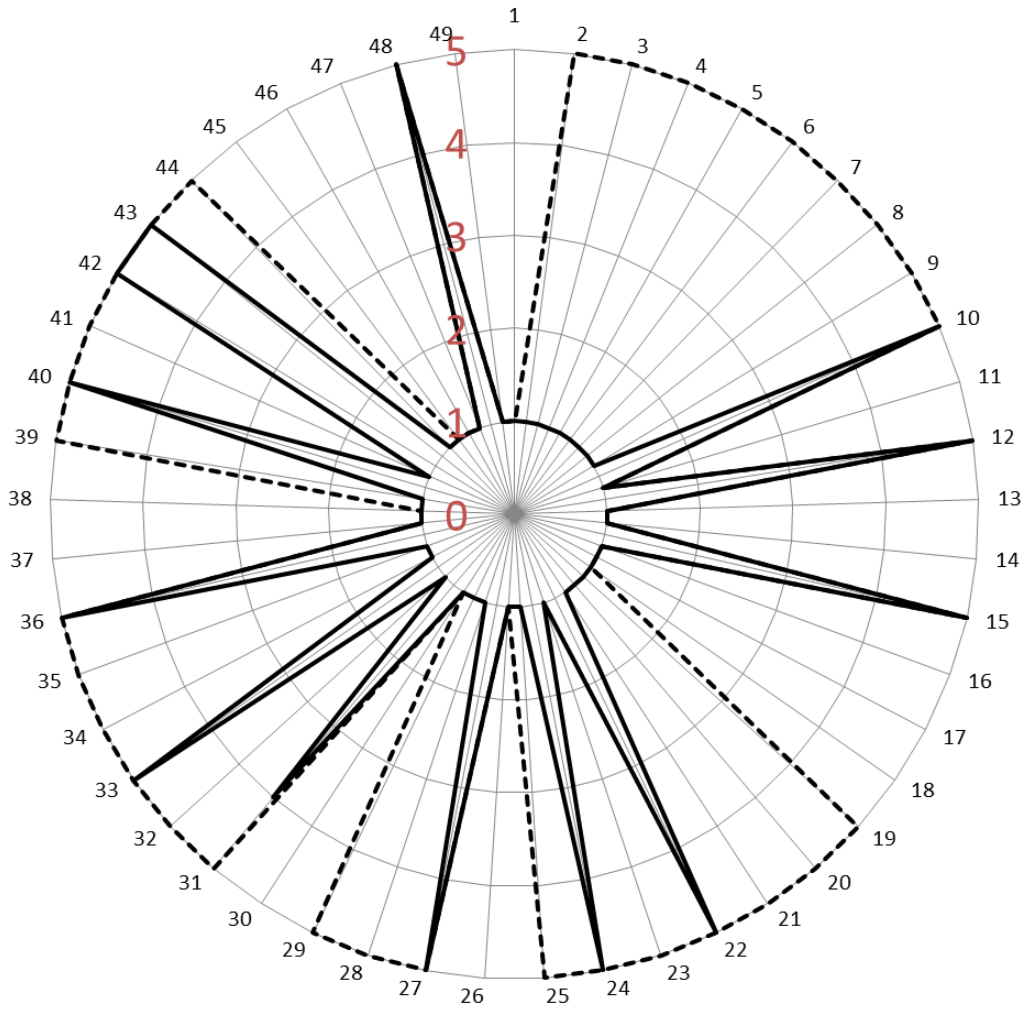


Figure 5.4c. Experience as a practice driver in the AM practices of SPS.

Legend: 1 Identification stage, 2 to 7 Diagnosing stage, 8 and 9 Generating option stage
10 to 39 Evaluation stage, 40 to 42 Programme management stage, 43 to 49 Portfolio stage
———— Majority group of AM practices
- - - - - BR of AM practices

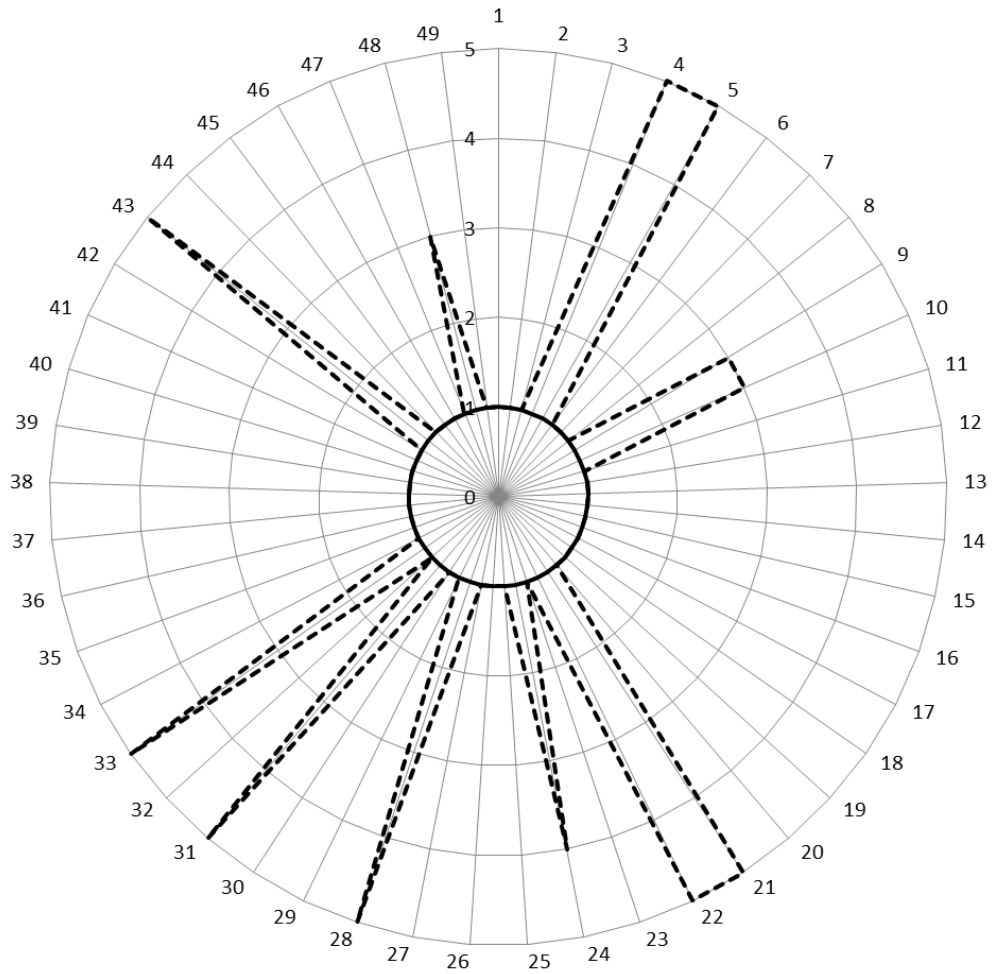


Figure 5.4d. Others as a practice driver in the AM practices of SPS.

5.2.3 New model for factors influencing SAMP

Practice (activity) is central to SAMP, and has varying characteristics according to the practice's place within the SAMP. For instance, asset managers at the diagnosing external environment stage, which is mentioned in some guidelines and ignored in others, should diagnose and analyse the impact of external factors on organisation's assets, while practices in the evaluation stage have a different purpose (discussed in Parts 2, 3, and 4). In this sense, the following discussion focuses on what the factors influencing systematic asset management practices (SAMP) are. This focus is taken because the need is to understand the reasons behind practices' inclusion and exclusion. This understanding paves the way to proposing recommended actions to improve SPS.

Scholars such as Van De Ven (1995) perceive practice from various angles. Van De Ven (1995), for instance, views practice as a solid entity influenced by external environmental and internal organisation constraints. Other scholars such as Sun et al. (2013) perceive practice from two different perspectives: people who are likely to be involved in the AM process modelling and factors likely to be involved in AM process modelling. In the former, Sun et al. (2013) enumerate twelve different people: logistics officers, technical engineers, financial officers, IT engineers, business managers/planners, process modellers, operators, consultants, users/customers, regulators/legal workers/policy makers and asset manufacturers/dealers. In the latter perspective, Sun et al. (2013) mention ten factors: human resources, operations requirements, data/information, data flow, business objectives/goals, inventory, technical manuals/drawings, finance, AM policies/regulations/ standards and models/methods.

However, while Sun et al. (2013) have touched on part of the aim and interest of the current thesis, their work does not address the study's question which focuses on what are the factors influencing SAMP. In this line of argument, there is an attempt here, through all the previous 129 questions (analysed in Section 5.1), to determine which factors influence SAMP in the SPS context. With every practice question,

another question was asked to reveal why departments carry out the particular practice. These questions start either with; to what extent...? Or who requires it?

The subsequent two sections aim to reveal these factors. These factors are divided into two main groups; factors that are directly observed and factors that are indirectly observed but their existence articulated on the basis of current evidence extracted from literature and empirical findings. The subsequent sections are devoted to discussing these factors, with the latter considered first.

5.2.3.1 Outcomes of combined literature and questions

Based on the empirical findings and literature review, two factors have been indirectly observed as influencing practices in existence in SAMP; delegation and validity. The reason behind not directly observing these two factors stems from the adopted research methodology, which necessitates trading in depth for shallow exploration of the reality. Therefore, the following argument intends to present the empirical findings reinforced by evidence from literature.

Delegation of practices is one of the reasons (the remaining factors are discussed in the following Section 5.2.3.2) behind the existence of some AM practices. The meaning of delegation as defined by Bass (2008, p.362) is that “one has been empowered by one’s superior to take responsibility for certain activities”. To clarify this factor, the empirical findings have shown that the majority of AM departments agree on the existence of a relationship between the increasing demand for the organisation’s services and the need for physical assets (discussed in Section 5.1.2. and shown in Table 5.2a-Q3). In spite of the existence of this relationship, this majority of AM departments have no responsibility for forecasting the increasing demand on an organisation’s services while the minority have (shown in Table 5.2a-Q4).

The evidence has shown that AM departments have an awareness of the relationship between the external environment and the organisation’s services, but, unfortunately, the delegation of taking responsibility for diagnosing and analysing the impact of external environment factors on physical assets is not managed carefully.

The study supports this claims because evidences in literature could provide credibility to this inference. For instance, Hambrick and Mason (1984) claim that top management is responsible for the selection of which factors should be delegated to managers' responsibilities and which should not. In addition, Carver (2006) claims that governing bodies have the formal responsibility for the relation between the organisation and the external organisation's environment (refer to Section 3.8.2). Based on this accumulated evidences, delegation of some practices is one of the other factors influencing SAMP.

The second factor is validity of practices; what is meant by this concept is that not all AM practices are applicable for all physical asset life cycle stages: creation, maintenance, operation, and disposal. For instance, in Table 5.8-Q32 the question was related to weighing benefit of disposing assets against retention of them. Obviously, this practice is totally related to current assets in operation and not related to the creation of new physical assets. Therefore, validity of practice is a part of factors influencing inclusion and exclusion of practices within SAMP. More evidence comes from the RICS (2012) guidelines. The RICS (2012) guidelines have approved validity of practices in AM practices. This claim is based on the point that the guidelines delegate the responsibility to modify, add to or cancel some of the guidelines practices to property managers (discussed in Section 2.3.7). Accordingly, validity of practices influences the systematic AM practices (SAMP).

In light of this argument, delegation and validity can be considered as factors responsible for including and excluding AM practices. The subsequent section discusses directly observed factors influencing SAMP.

5.2.3.2 Factors directly observed

From the empirical findings, factors influencing practices in SAMP were investigated during the structured interview. The findings have shown that there are six factors influencing practices in SAMP in the SPS context. These factors are; delegation, validity, organisation policy, professional standards, experience, and external factors. The following discussion is dedicated to cover the last four factors (directly observed factors).

First, organisational policy is one of the influential factors in AM practices. Based on the empirical data, organisational policy is responsible for, or shares responsibility for, 10 out of 64 practices (refer to Q11, 13, 26, 37, 43, 61, 67, 87, 117, and 127).

The second factor is the professional standard; this is found to be one of the influential factors for practices in SPS. Based on empirical data, the professional standard is responsible for or shares responsibility for 14 out of 64 practices (refer to Q5, 7, 11, 13, 20, 26, 31, 33, 35, 59, 63, 73, 79, and 89).

Third, experience is the most frequent factor influencing practices in SPS. Based on empirical data, experience is responsible for or has shared responsibility for 44 out of 64 practices. This finding not only confirms the existence of experience as an influential factor but also indicates the strength of experience as the main factors for practices in SAMP in the SPS context (evidence is prevalent in all questions).

Fourth, there are many reasons behind several of the practices in SPS. These reasons are covered in the open ended questions associated with all 64 questions, in terms of “other”. These reasons are; special committees developed by the ministry, external governmental agencies, redistributing the population of the country, the five-year plan of the SPS, internal request from other departments in the ministry, and committees formed by the ministry. There is a shared factor among all these factors, and which can encapsulate all these factors; factors external to the AM departments. All practices (in Q20, 22, 31, 59, 61, 65, 73, 79, 83, 117, and 127) are completely or partially launched by entities external to the AM departments. Therefore, the claim is that external factors can be an influential factor to SAMP.

To sum up, six influential factors, as shown in Figure 5.5 below, are responsible for the existence of AM practices in the SPS context. One of the factors’ characteristics, as found in the empirical findings, is that each factor can emerge in some cases and disappear in others. Moreover, in some cases a combination of various factors with different intensities are found. It is suspected that the model can be used as part of a holistic framework for SAMP because the practice is a central ingredient of the SAMP framework. This holistic framework is discussed in the following paragraph.

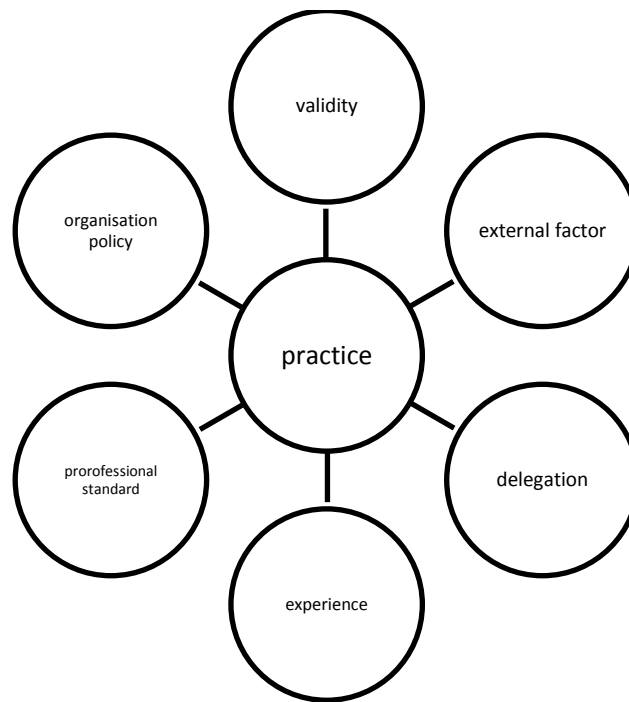


Figure 5.5. Factors influencing practices in SAMP.

5.2.4 A holistic framework for SAMP

From the beginning, there has been an emphasis on two focal concepts. The first focus is on the process of AM and the second is on the practices that constitute the process. These two concepts have been jointly dealt with since the second chapter. Therefore, at this point, all the required information to disentangle both concepts is available to develop a holistic framework for SAMP. Figure 5.6 below shows these two frameworks in one holistic framework. The holistic SAMP framework is composed of SAMP presented in Figure 5.1, and factors influencing practices in SAMP presented in Figure 5.5. The holistic SAMP framework is the essence of AM practices. This holistic framework provides a clear view on various aspects of AM. These various aspects enhance our understanding of the AM phenomenon.

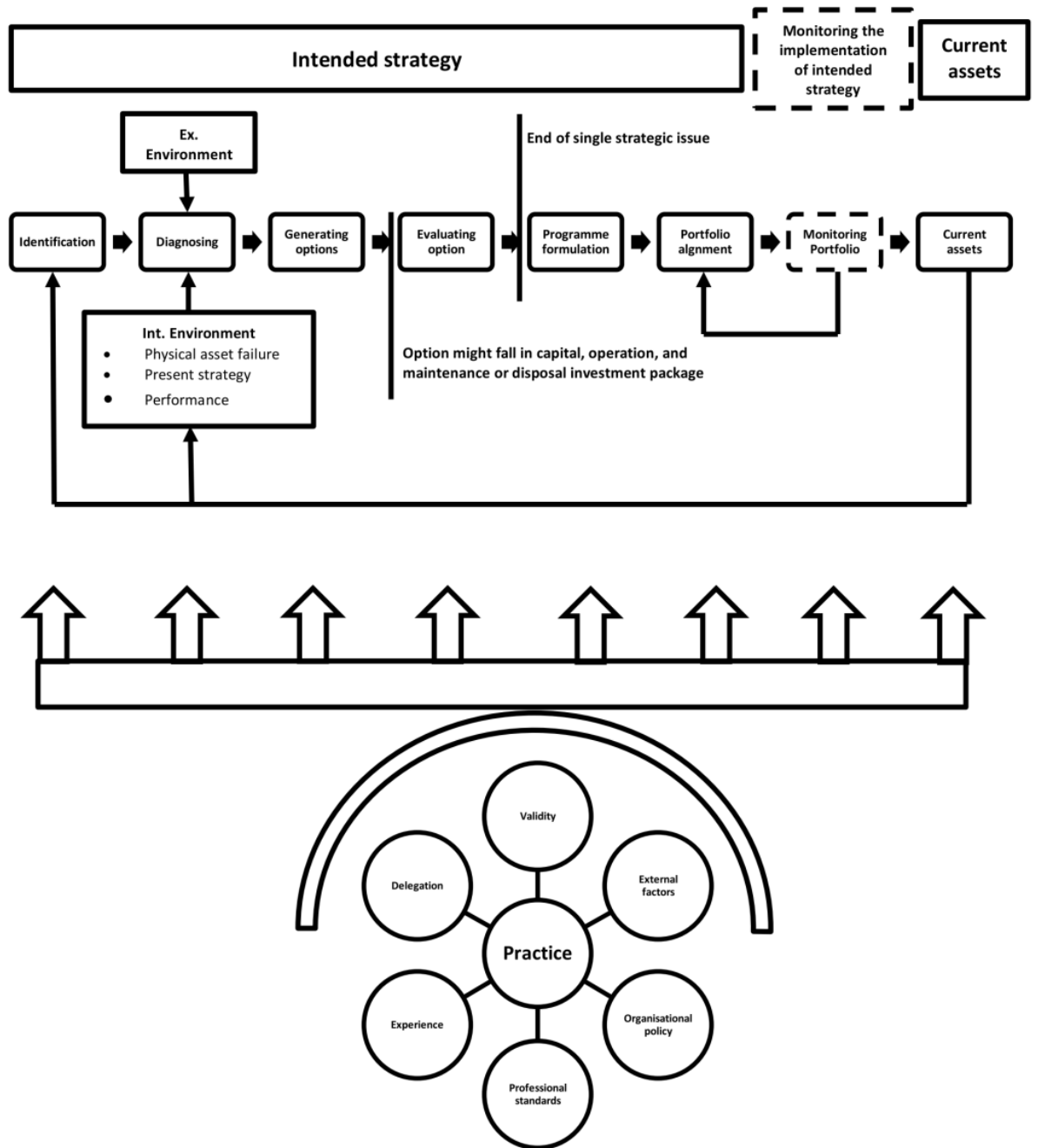


Figure 5.6. Holistic SAMP framework.

These aspects are:

- From the developed holistic framework, typologies of practices can now be created. For instance, these can identify if the practice is a diagnosing practice or an evaluation practice.
- From the developed holistic framework for factors influencing practices in

SAMP, it is possible to know how a practice can be developed and become part of the AM process. Therefore, controlling future practices become possible.

- From the developed holistic framework, it is possible to identify whether organisations can be characterised by the reasoning process in managing the physical assets.

The following discussion is devoted to discussion of these aspects. However, explanation of the SAMP framework's mechanism is discussed in Part 5. Therefore, this discussion will not be repeated in this section.

In Chapter 2 it was found that the international AM standards and guidelines are organised differently even when these approaches are developed for the same type of physical asset. For instance, in the transportation AM approaches, while the FHWA's guidelines do not include an alternative options stage, the OECD guidelines include this as an essential stage. Therefore, without rigorous evidence to support the choice of what to include and where, it becomes hard to judge the importance of the inclusion and exclusion of certain stages of practice. Fortunately, the developed holistic SAMP framework provided these criteria upon which decisions to consider what type of practices are is facilitated on the basis of well-known theories in reasoning process, portfolio and programme management and influencing factors on SAMP.

The next aspect is the ability to know how practices in AM develop and become part of the process. These drivers (factors influencing SAMP) are responsible for the AM practices in SPS. Therefore, these drivers can explain some of the indirect practices observed in some of the international AM standards and guidelines. For instance, the PAS 55 (BSI, 2008a) standard requires asset managers to develop several different plans such as training, awareness and competence of employees. And these plans are part of improving practitioners' experience and capability, as claimed by Horskan (2013). Obviously, these plans have relation to the systematic asset management practices (SAMP).

The last aspect of the framework was previously covered in Part 2 of Chapter 3. The strategic planning/reasoning process is the underlying principle of the AM practices in all international AM standards and guidelines. Therefore, carrying out of AM practices on this basis is necessary to fill the gap between SPS and developed countries.

In summary, the developed holistic SAMP framework is useful and embraces our understanding of AM practices. In addition, the developed holistic SAMP framework constitutes ingredients of the recommended actions in Chapter 6 that will assist the Saudi government to improve SPS.

5.3 Conclusion

This chapter focused on analysis and discussion of the data collected from the SPS. The results are diverse and beneficial. The analysis has demonstrated four main themes; confirming the basic principles of SAMP framework, context of AM practices in SPS, developing a new framework for factors influencing SAMP framework, and finally introducing a holistic framework for SAMP.

The first theme is concerned with confirming the basic principles of the SAMP framework. These principles cover an array of management thinking; strategic planning/reasoning process, portfolio and programme management. The findings have shown that programme management thinking is part of the natural process of asset management practices, but with less attention to or complete ignorance of the benefit from conducting the principle of programme management, such as the loss of awareness behind bringing two or more separate projects. The remaining basic stages in the process of asset management practices were found explicit in international asset management standards and guidelines besides the empirical findings; reasoning/planning process and portfolio management thinking.

The second theme of this chapter discussed the context of asset management practices in the SPS. Three main themes were developed to describe the context; systematic practices of asset management practices in SPS, current characteristics of

individual asset management practices in SPS, and finally current state of organisational policy, professional standards and experience of asset management practices in SPS. The findings have shown that asset management departments in SPS suffer from several deficiencies; the asset management practices in the majority of asset management departments in SPS are unsystematic, there is a considerable gap in asset management practices between the developed countries and Saudi Arabia, some practices are unrealistic and non-comprehensive, the majority of asset management departments lack clear awareness about the benefit from conducting some asset management practices, the majority of asset management departments completely lack professional standards and external factors, the majority of asset management departments have less organisational policy than the minority of asset management departments in SPS, and finally, experience is the main driver of the asset management practices in SPS.

The third theme of the chapter concerned investigation of the factors influencing the SAMP framework in the context of the Saudi public sector. Six factors were found to influence the SAMP framework. These factors are divided into two main groups; a group that is directly observed and a group that is inferred on the basis of literature and empirical findings. The directly observed group of factors include four factors influencing the SAMP framework; organisational policy, professional standards, experience, and external factors. The latter, indirectly observed group, includes two factors; delegation and validity.

The final part of this chapter discussed the holistic framework of SAMP. The holistic framework integrates the SAMP and the factors influencing the SAMP into one holistic framework. This holistic SAMP assists the study to understand the nature of asset management practices phenomenon and paves the way to developing recommended actions for the SPS.

CHAPTER 6

POLICY DEVELOPMENT

This chapter sets out issues influencing the SPS and recommended actions for improving physical asset management practices across the SPS. The issues aim to give an executive summary of what found in SPS and, then introduces recommended actions. The first part of this chapter provides a brief background to policy makers about various aspects in asset management practices besides the expected benefits. The next main section presents current characteristics of asset management practices in the SPS. These characteristics are covered under five issues. The section which follows introduces the recommended actions to improve current asset management practices in the SPS. The recommended actions are composed of three main stages: establishing the vision, the holistic systematic asset management practices (SAMP) framework, and reviewing and auditing the public sector improvement process.

6.1 Background

Physical assets are not only one part of an organisation's assets but are central to them. Physical assets continuously interact with other assets (British Standards Institute, 2008). Management of physical assets is developed in order to reap benefits from physical assets and avoid future failures. Drivers for asset management implementation are varied and numerous, such as an increasing system demand for maintenance, reconstruction, performance and management (FHWA, 1999, 2007; RICS, 2012), accountability to the public sector (FHWA, 1999, 2007; APCC, 2001; Kaganova et al., 2006; RICS, 2012), best value for the public spend (OECD, 2001; NCHRP, 2002, AAMCoG, 2011), enhancing credibility and accountability (NCHRP, 2002), and better communication at internal and external levels of the organisation (OECD, 2001; APCC, 2001; Audit NZ, 2010; AAMCoG, 2011; RICS, 2012).

Considering these drivers and benefits, a large global scale movement has started toward formal asset management. The governments of Australia, New Zealand, the United Kingdom, France and the United States are the first movers into this domain. These countries have designed and implemented significant reforms in management of assets, whether property or infrastructure (Remenyte-Prescott and Andrews, 2013; Kaganova et al., 2006). From the research conducted on AM practices in SPS, a large gap was found between AM practices in the SPS and developed countries. This gap is presented in terms of the following issues which need to be tackled in order to improve the AM practices in SPS.

6.2 Issues around AM practices in SPS

6.2.1 Issue 1: the need for an independent entity for AM practices

Many developed countries have developed and delegated the development of asset management practices to an independent entity. The following discussion presents examples of these countries with the developed entities' aim and objectives.

In the USA, the Asset Management Primer guidelines did not exist until the Office of Asset Management at the Federal Highway Administration (FHWA, 2014) was created in 1998. The mission of the office is to

Provide leadership and expertise in the systematic management of highway infrastructure assets with three key responsibilities; provide national leadership in asset management principles for highway programme administration, develop asset management policies for management of physical assets and system preservation, and partner with the American association of State Highway and Transportation Officials, the Transportation Research Board, other FHWA offices, and others to conduct nationwide programmes

In Australia, the Australian Government set up the Australian Asset Management Collaborative Group (AAMCoG) due to a feeling of the need to integrate and align all built assets for the whole country in one direction (AAMCG, 2011). The aim of the AAMCoG is *to collaborate nationally on asset management strategies between all asset management groups* (AAMCoG, 2011, p.1). To achieve this aim the

AAMCoG focuses on three major objectives; *to identify and address priority issues, acknowledge leadership, and facilitate sharing of knowledge and practices* (AAMCoG, 2014).

In the UK, the Office of Government Commerce (OGC, 2010) is a part of the Cabinet Office and provides

Policy standards and guidance on best practices in estate management and monitors and challenges Departments' performance against these standards, grounded in an evidence base of information and assurance

Based on the previous evidence, it is recommended to the Saudi government to establish a new entity that is responsible for improving and developing AM practices across SPS.

6.2.2 Issue 2: Physical assets are not managed strategically

Due to the centrality of physical assets among other assets, physical assets need to be involved and integrated in the strategic planning phase of ministries. The findings have shown that at this stage, asset managers are attempting to link both the internal and external contexts of the organisation to resolve the strategic issue or problem. Once the connection between both contexts is fulfilled, the results can be highly effective and hence create public value (refer to Section 3.8). Strategic planning is central in all international AM standards and guidelines (refer to Table 3.4). Unfortunately, the research has found that the majority of SPS ministries do not manage physical assets strategically with the purpose of supporting the ministries' mission and objectives. However, a very few ministries have shown an element of advancement in their strategic practices for physical assets (see Section 5.2.3.1).

6.2.3 Issue 3: weak asset management practices

Practice in asset management is the central element of all international asset management standards and guidelines. Based on this line of argument, asset management practices in SPS have been investigated and four issues have been found. First, the gap in asset management practices between the developed countries and Saudi Arabia is significantly large, in which asset management practices in the

majority of the SPS are considerably lagging behind the developed countries. The findings have shown that only 14 out of 49 asset management practices were being carried out in SPS. This shortfall in number of practices indicates how far asset management practices are lagging behind the developed countries. These practices cover various aspects of physical assets life cycle stages (see Section 5.2.2.2). For instance, the SPS suffers from considerable deficiencies in evaluation practices. Financial evaluation practices of the intended projects, as an example, are all but absent from all of the public sector. Some of these financial evaluations are related to the calculation of the estimated cost of the life cycle of assets such as maintenance, refurbishment, and operation (Q44, 46 and 48). Other examples are estimating economic cost and benefit of intended projects, which are totally absent from all of the Saudi public sector (Q52). Moreover, evaluating the market capability for delivering the required public projects is almost absent (Q56). Evaluation of the impact of public projects on national employment security is nearly absent in the public sector (Q66). All these findings and more are showing how far asset management practices in SPS are lagging behind the developed countries.

The second issue is that asset management practices are incomprehensive and unrealistic. For instance, performance indicators are central in all asset management standards and guidelines. In addition, they are either the only source of the required diagnosing stage analysis, such as in the Asset Management Primer of the U.S. Department of Transportation, or part of it, such as in the TAM guidelines. Unfortunately, only very few ministries in SPS have performance indicators, and even those ministries which do have performance indicators for managing their physical assets do not always follow their performance indicators (refer to Section 5.1.2.4). Based on this evidence, it is perceived that ministries in SPS should establish realistic and comprehensive performance indicators for their physical assets and consider this central to the AM practices in the SPS; this is vital as all AM standards and guidelines consider performance indicators a central part of their AM standards and guidelines (refer to Section 3.8.1.3).

Thirdly, the majority of asset management departments in the SPS are unaware regarding the relation between their asset management practices and the asset management practices effectiveness to the ministries' mission. Therefore, increasing asset managers' awareness might improve asset management practices, as awareness improvement is part of asset management enablers in PAS 55 (BSI, 2008a) standard.

Lastly, although few ministries have good AM practices in relation to the developed countries but these practices are not concentrated in one single ministry. Based on this implication, the Saudi's ministries need to share their experiences with each other in order to improve the overall practices of AM.

6.2.4 Issue 4: weak organisational policy and professional standards

All international asset management standards and guidelines provide asset managers with clear written requirements related to various aspects of asset management practices in the public sector, such as determining the core activities of asset management and which activities can be contracted out (refer to Section 2.3). Here, the findings have shown up two issues. The first is that the majority of ministries in SPS have fewer policies regarding asset management than a minority of SPS ministries. This fact could raise a question mark regarding the general management practices of physical assets in the public sector, due to the existence of discrepancies between government ministries. The second issue is that the majority of asset management practices in the SPS completely lack professional standards (refer to Section 5.2.2.3).

6.2.5 Issue 5: reliance on experience

Human experience is central to and also strongly required in asset management practices, but not as the sole driver of asset management practices in the public sector. The findings have shown that there is a considerable reliance on human experience for almost all asset management practices in the SPS (see Section 5.2.2.3). Based on these five issues the following argument is devoted to providing the recommended actions to tackle these issues and achieve the expected benefits

from improving asset management practices. The benefits from improving asset management practices were presented in Section 6.1.

6.3 Recommended actions

Based on current deficiencies in asset management practices in SPS, several reviewed international asset management standards and guidelines, and the holistic systematic asset management practices frameworks developed by the study, the following recommended actions to improve current asset management practices in SPS are introduced. This improvement, as previously derived from the experience of international asset management standards and guidelines (refer to Section 6.1), will improve physical assets contributions to ministries' mission and objectives, and the country's direction in turn. The recommended actions encompass three components: establishing a vision, implementing and adopting the holistic SAMP model, and reviewing and auditing the improvement process. The following discussion starts with the establishment of a vision.

6.3.1 Stage 1- Vision

According to the dominant methodology that is followed by all international asset management standards and guidelines, the following vision is developed to guide the improvement intervention of SPS:

Managing physical assets systematically

To pursue this vision the following holistic SAMP framework is provided to assist the Saudi government to overcome the previous issues besides closing the gap between the developed countries and SPS.

6.3.2 Stage 2 – Holistic SAMP framework

Based on international asset management standards and guidelines, empirical findings of the research, and existing theories in management, the following holistic SAMP framework, as illustrated in Figure 6.1, is developed to systematize the asset management practices of the SPS. The central element in this holistic framework is

SAMP (systematic asset management practices). SAMP is a framework which requires considerable attention in systematising the SPS. The SAMP is influenced by several factors; delegation of practices, validity of practices, organisational policy, professional standards, external factors, and experience. The subsequent subheadings discuss SAMP first and later, discuss each factor influencing SAMP independently.

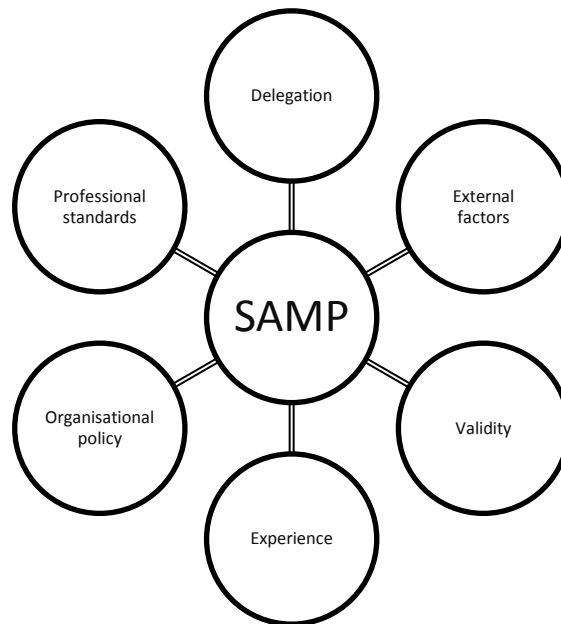


Figure 6.1. Holistic SAMP framework for improving AM practices in SPS.

6.3.2.1 The SAMP framework

This element is central in the improvement stages of SPS. The SAMP, as illustrated in Figure 6.2 below, sets out the process of systematic asset management practices (SAMP). This process constitutes the very basic stages for asset management practices. These stages are built on the principles of existing theories in management, international asset management standards and guidelines, and empirical findings derived from the SPS context.

The SAMP is divided into three main stages. The first is the intended strategy. The output of this part is for the required future projects and programmes for each ministry. A future plan might fall among three types of packages: capital investment plans, maintenance plans and operation plans. This categorization is derived from

the international asset management standards and guidelines. However, other types of plans can be developed according to public sector requirements. The second stage is the implementation stage. This encapsulates required activities for monitoring implementation of asset management plans. The last main part of the process is the current physical asset state. This stage is connected to the intended strategy in which asset managers are responsible for managing physical assets strategically. Having discussed the main three stages of the asset management process, the remainder of this section is devoted to describing the required asset management practices at each stage in detail. Accordingly, the first stage of the SAMP framework is the identification stage, as discussed in the following subheading.

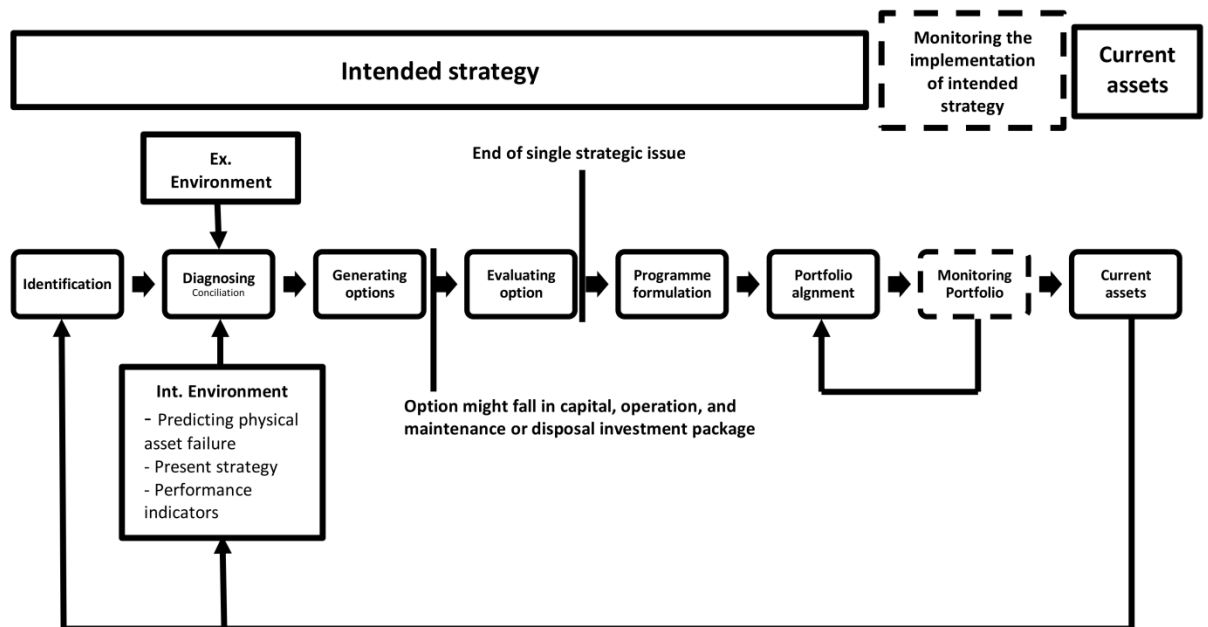


Figure 6.2 SAMP's framework.

Identification stage

In this first stage, asset managers should recognise issues or problems in their ministry. Problems and issues exist in various sources in ministries. Asset managers should understand; asset management policies, governance structure, social responsibilities, ethics, stakeholder expectations, the gap between what we want and what we have, organisational policies, restrictions, expectations, pressures, legislation, ordinances, charters, articles, contracts, deadlines, financial crises,

competitor actions, customer complaints, expectations from bosses and upcoming performance evaluation. Once asset managers understand these various issues and problems, asset managers are then required to clarify the organisation's mission and value. This action is beneficial to ministries due to the following; an effective mission statement supports and enhances employees to distinguish their organisation from other organisations, can eliminate conflicts and channel discussion and activity (refer to Section 3.7).

Diagnosing stage

At this stage, asset managers attempt to link both the internal and external contexts of the ministries to resolve the strategic issue or problem. Once the connection between both contexts is fulfilled, the results can be highly effective and hence create public value.

The external context (environment) brings ongoing changes, upon which a mismatch between the organisation and its environment can occur and lead potentially to organisational failure. External factors that affect organisations are varied; especially between private and public sector and physical assets. However, international asset management standards and guidelines have identified several factors: demand trends, community or customer needs, expectations and interfaces, changes in government policies, environmental factors, industrial action, population growth, changes in external operating environment and strategy and actions of partners. Therefore, the developed entity and employees who are responsible for diagnosing the impact of the external environment on physical assets need to identify what factors are influencing the physical assets that belong to each ministry (refer to Section 3.8.2).

In the internal environment of organisations, physical assets are processed for delivering the required outputs. At the time of processing physical assets, three main practices objectives should be undertaken: predicting failure of physical assets, investigating the alignment of physical assets with the ministry's strategy and country in turn, and monitoring performance indicators that are established for physical assets. Based on the three main elements, the created entity and experts in

physical assets should develop the required guidelines and indicators for the purpose of these objectives (refer to Section 3.8.1).

Generating options

The main purpose of the generating options stage (strategic formulation) is to create solutions to the strategic issue. At this time, participants are surrounded by the demand for creating ideas, as well as give and take dialogue. The generated option (formulated strategy) might be in the form of discovering the organisation's pattern, or creating new and deliberate action. In some cases a non-asset solution is considered, such as demand management. In some of the international asset management standards and guidelines, options are suggested to asset managers. Therefore, the created entity and experts in physical assets are recommended to lead the public sector at this stage. However, total guidance may be unattainable. Consequently, those who are responsible for the process of AM practices might have discretion at this stage to generate options relevant to each ministry's mission and objectives (refer to Section 3.10).

Evaluating options

This stage takes place after generating several options to resolve the strategic issue, and those generated options should be evaluated by means of appropriate criteria. There are several evaluation criteria in the international asset management standards and guidelines, and accordingly, it is recommended that suitable evaluation criteria are developed for the SPS (refer to Section 3.10.1).

Programme formulation

In this stage, asset managers have a considerable number of projects distributed over various forms of physical assets projects, such as new assets, maintenance or any other form of projects. Therefore, asset managers in some cases need to connect two or more separate projects together. This connection is developed on the basis of two distinct aims: benefits and/or control. Asset managers need to be explicit regarding the aim of connecting two or more separate projects together, whether to reap

benefit or to control them. There are several reasons behind connecting separate projects together such as project dependencies, common specification or cost reduction. Therefore, the created entity and experts in the physical assets domain should set out future guidelines and recommendations for this type of practice (refer to Part 3).

Portfolio alignment

In this stage, a portfolio of several connected and unconnected projects (programmes and projects, respectively) are considered the ingredients of the portfolio. However, prior to implementing the required portfolio, several practices are required in order to check the portfolio's alignment with the ministry's mission and objectives. The created entity and experts in physical assets are required to develop what is required in this stage in order to align the portfolio with the ministry's direction and in turn the country's direction (refer to Part 4).

Portfolio monitoring

The last stage is managing and reviewing the portfolio implementation to realign programmes and projects with the strategic objectives. Monitoring the portfolio entails an ongoing update to the required programmes and projects. This ongoing monitoring is to ensure that the portfolio incorporates, as practicable, changes to the service strategy and resource availability. Completed programmes and projects should be reviewed and the results compared to the intended strategy (refer to Part 4). After this stage, asset managers should be involved in monitoring current assets in order to connect the physical assets with the strategic ministry's direction. Consequently, this stage is the last stage of the SAMP model. Therefore, the following paragraphs will articulate factors influencing SAMP.

However, prior to discuss factors influencing SAMP in the SPS, certain points need to be clarified. The SAMP framework is the central element of the recommended actions and all efforts should be paid to determine how the government can establish the process in order to bring various disconnected practices together and fulfil the systematic consideration of robust asset management practices. However, the

establishment of robust systematic asset management practices in SPS is governed by various influencing factors. Therefore, the subsequent subheadings are devoted to discussing these factors.

6.3.2.2 Experience of staff

Human experience is beneficial. Therefore, management is responsible for removing barriers to its use. Horskan (2013) enumerates various barriers to evolution of experience in asset management practices; unclear roles and responsibilities, lack of data availability integrity, missing consistent ways of working across various functions and unsupportive behaviours and culture. However, removing barriers is not the only source for accessing experience, as Horskan (2013) states that empowering people to ask good asset management questions, learning from lessons, engaging people with the work, communicating with other organisations and knowing what employees are good at are also factors which improve employees' experience (refer to Section 5.2.3).

6.3.2.3 Organisational policy and professional standards

Ministries' employees in association with the future developed entity, and experts who have relations to physical assets are required to discover and develop ministries' and country's policies and professional standards related to physical assets. The policies and standards are one of the ministries drivers to conduct asset management practices. They constitute the required guidelines for the central element of the SAMP framework. Therefore, policies should describe how the process of SAMP should be established, what practices need to be included and other issues related to organisational policy and standards (refer to Section 5.2.3).

6.3.2.4 External factors

Inclusion and exclusion of some of the asset management practices in some instances is governed by external factors such as communication and relationship between ministries, communication between ministries and people who are responsible for the process of asset management practices. Therefore, practices

related to external factors should be streamlined and coded in the intended SAMP framework (refer to Section 5.2.3).

6.3.2.5 Validity of practices

The developed entity in association with the employees who are responsible for the AM practices should make sure that practices in the process are valid for physical asset life cycle stages. However, discretion to modify, change or delete practices in the SAMP can be delegated to employees who are responsible for SAMP. This claim is based on findings in the international asset management guidelines (refer to Section 5.2.3).

6.3.2.6 Delegation

The SAMP covers a considerable number of practices. Therefore, some of these practices might need to be delegated or at least integrated with the process of asset management practices, and especially in case of external environment practices. Yukl (1998) states several reasons behind delegation: the practice can be done better, the practice might have low priority and not be urgent, the practice attempts to improve employees' careers, the practice is not central to top management roles. In addition, Bass (2008) mentions other reasons for delegation: lack of time to handle the problem directly, in exchange for subordinates' support, to develop practitioners, competency and motivation to handle the problem, participant consensus, to avoid blame for possible failure. Accordingly, these reasons need to be taken into consideration in order to develop and improve current AM practices in SPS (refer to Section 5.2.3).

6.3.3 Stage 3 - Review and Audit

The nature of asset management practices is subject to ongoing changes and development. Therefore, this stage sets out how the improvement model is audited and reviewed continuously. The developed entity should: scrutinise ministries asset management practices performance, present performance trends through an annual national report to the government for current situation and future improvement, and report current impediments against the improvement plans.

In summary, these actions are expected to lead the SPS to fill the gap between the developed countries and Saudi Arabia and in turn tackle the current deficiencies found by the study. In addition to this, the recommended actions assist the government to reap the benefit from such practices as mentioned in the background of this executive report.

6.4 Conclusion

This chapter has brought together various arguments developed in the previous chapters. The experience of several international asset management practices is combined with the current situation of asset management practices in the SPS in order to facilitate asset management improvement in Saudi Arabia. The current asset management practices in the SPS are characterised by five issues: first, the need for an independent entity for asset management practices; second, absence of strategic management of physical assets; third, weak asset management practices; fourth, weak organisational policy and professional standards; and fifth, reliance on experience. The final part of this chapter was devoted to suggesting recommended actions to facilitate future government development. Three stages were found necessary to begin future improvement; creating vision for asset management practices in SPS, using the holistic SAMP framework, and finally, auditing and reviewing the whole improvement process. This final section presented ways in which the government can use the holistic SAMP framework to fill the gap and tackle current deficiencies in SPS as well as future progress.

CHAPTER 7

CONCLUSION

The overarching aim is to assessing current asset management practices across the Saudi public sector and, then, provides recommended actions based on the assessment outcomes. This aim was achieved by adopting logical thinking. However, when it is claimed that this work can be thought of in a logical way, this does not mean that the work is devoid of any contribution to knowledge. Instead, as will be seen later in the discussion of the study's contribution to knowledge, the work has contributed to various aspects of knowledge and society. This chapter is divided into three main sections. First, it will address the research questions of the three major objectives of the study, as presented in Chapter 1. The next section of this chapter discusses the research contribution to knowledge and society. Finally, the chapter turns to further related research which is recommended as beneficial to the future development of knowledge in the field.

7.1 Addressing the research questions

The subsequent subsections are devoted to answering the questions related to the three main objectives.

7.1.1 Objective A

To explore leading AM standards and guidelines and their recent development trends:

This objective has been accomplished by answering the following six questions.

7.1.1.1 Research question A1

What are the variations between leading AM standards and guidelines?

Asset management initiatives started at least fifteen years ago, and during these fifteen years, various AM standards and guidelines have been developed and

updated. For instance, the Asset Management Primer of the U.S. was initiated in 1998 and updated in 2007. Therefore, the study investigated the first movers into the field of AM practices. This action was the first point of departure of the study. Basically, the investigated AM standards and guidelines claim that systematic, coordinated, methodological asset management practices will increase physical assets' value to organisations. Therefore, the need to reveal the characteristics of the systematic, coordinated, and methodological asset management practices mentioned in these standards and guidelines forms the motivation for the work carried out in Chapter 2.

Based on this intention, Chapter 2 was written to present various leading and popular asset management standards and guidelines. Through this chapter, the study reviewed seven leading AM standards and guidelines: TAM, IIMM, the Asset Management Primer of the U.S. Department of Transportation, OECD, property asset management in the USA, property asset management in the UK the RICS, and PAS 55 and during this revision three variations are found.

First, some of these standards and guidelines are created to manage certain types of assets, such as with the RICS guidelines, which are developed to manage physical property assets, while others are developed for managing any kind of physical asset, such as with the IIMM guidelines.

Secondly, all AM standards and guidelines are typified by the same logical thinking and in some cases use the same terminology. The logic that constitutes the underlying principles of the AM standards and guidelines is the process form. However, discerning the process logic in some of these standards and guidelines is challenging due to three reasons: implications of the vertical connections between stages; missing horizontal sequences between stages; and finally the interaction between different practices for the physical asset life cycle stages.

Third, practices and their numbers are varied between AM standards and guidelines. The findings in Chapter 3 Table 3.4 have shown that there are certain types of practices existing in all AM standards and guidelines; identification, performance indicators, and evaluating options stages. Other practices in AM standards and

guidelines however are varied, ranging from total absence of practices such as physical asset failure prediction in case of the OMB USA and the RICS guidelines or practices mentioned implicitly within the standards and guidelines, discussion such as generating options practices.

7.1.1.2 Research question A2

What does systematic mean to the leading AM standards and guidelines?

The aim of Chapter 2 was to reveal what systematic asset management practices mean to international AM standards and guidelines. Accordingly, within the Chapter a general pattern was found imposed over all international AM standards and guidelines, which is the process form of practices. There is no exception to this phenomenon and all AM standards and guidelines are following process form in their AM practices; especially in case of a high level of abstraction. Accordingly, at the end of Chapter 2 the definition for SAMP is developed: *“systematic asset management practices are certain practices which are dedicated to capturing the life-cycle of physical assets. These practices are connected with each other in a process form”*.

Discussions in Part 5 revealed the boundary of the required SAMP in international AM standards and guidelines. The findings have shown that two levels of systematic approaches can be identified. The lower level is represented by the OMB USA (property asset management in the USA) and the upper level of the systematic asset management practices is represented by the TAM and ISAM guidelines. In the case of the former, only four types of practices are required: identification, performance indicators, generating options, and evaluating options stages. In the latter meanwhile, all the basic types of practices are required; identification, external environment, physical assets failure prediction, present strategy, performance indicators, generating options, evaluating options, programme formulation, portfolio alignment and portfolio monitoring stages.

Therefore, this thesis has added more understanding to the meaning of systematic asset management practices from the leading international AM standards and guidelines. This understanding is articulated in the following. Systematic approaches

are different in terms of types and numbers of the required practices among all the standards and guidelines, and the only common element between all of them is the rational reasoning process that underpins all these standards and guidelines.

7.1.1.3 Research question A3

What existing theories in process, strategic, portfolio and programme thinking management would provide an avenue to explain AM practices in leading AM standards and guidelines?

Section 2.3.9 of Chapter 2 discussed four barriers that impede the study in accomplishing the aim. These barriers are: first, that although asset management approaches provided by various organisations are to some extent similar, there are also considerable differences in the way they are organised, even when these approaches are developed for the same type of physical asset. Second, the reviewed asset management practices are not always presented in a single process. Third, there is an absence of information regarding how AM standards and guidelines have been developed, especially in case of indirect AM practices. Fourth, the criteria upon which inclusion and exclusion of different stages of AM practices is decided are not clear.

These barriers consequently motivated the researcher to reconstruct the reality of asset management practices based on existing theories of process, strategic, portfolio, and programme management. The constructed reality of the AM practices, was approached in Chapter 3 by referring back to the international AM standards and guidelines in order to contextualize the practices. Therefore, the developed conceptual framework (SAMP) was established to explain AM practices in leading AM standards and guidelines. The process of explanation is articulated in the subsequent paragraphs.

Chapter 3 was devoted to tackling the hurdles uncovered in Chapter 2. Part 1 of Chapter 3 focused on the underlying principles of the process theory, besides the foundation of the strategic planning/reasoning process. In the case of the former, the process theory introduced by Van de Ven and Poole (1995) constituted the essence

of the study's point of departure, upon which the SAMP (systematic asset management practices) framework was created. The AM standard and guidelines were found following the teleological process theory due to emergent characteristics of AM planning activities.

Based on this theory, the practice was perceived as a single emergent entity that undergoes a continuous purposeful enactment. This viewpoint is also supported by Mintzberg (1978), who claims that decisions can be broken down into five strategic concepts; intended, deliberate, non-realized, emergent and finally realized strategies. These five concepts constituted the basic building blocks of the developed SAMP framework.

The second Part of Chapter 3 elaborated on the intended strategy in order to avoid vagueness at a high level of abstraction of the intended strategy concept and, later, to operationalize the concepts as well. The intended strategy is a broad concept that represents several schools of thought. Mintzberg et al. (2009), for instance, claim that there are ten schools of thoughts in the intended strategy domain. Fortunately, this dilemma of the existence of several schools of thought was resolved in Chapter 3 by identifying which schools of thought underpinned international AM standards and guidelines and the public sector context.

After investigating the characteristics of the relevant schools of thought, it was found that the strategic planning school was the most suitable and relevant to the standards and guidelines and the public sector context. However, identifying the relevant school of thought is not the final aim of the second Part of Chapter 3 because the strategic planning school of thought is composed of several models that represent the school. Therefore, the following procedure in in Part 2 was carried out until the basis of the strategic planning process was uncovered and fused with the strategic reasoning process.

The basic practices in the strategic planning/reasoning processes were contextualized with various AM standards and guidelines discussed in Chapter 2. The findings from the contextualization were compelling due to the high compatibility between the AM standards and guidelines and the developed

preliminary conceptual framework for the SAMP. Although contextualizing was successful however, some practices in the AM standards and guidelines remained unexplained. This dilemma catalysed the researcher to find an interpretation for the remaining practices, which later led to Parts 3 and 4 of Chapter 3.

In Parts 3 and 4, discussion was made of the required unexplained practices existing in various AM standards and guidelines. These practices related to projects already identified by the asset managers to satisfy the organisation's needs, irrespective of which physical asset life cycle stage projects fell within. At this time, the asset managers are required to pay attention to the relationship between various physical asset life cycle stages. This attention led to the development of the programme formulation stage, upon which a new concept has been introduced, for the first time, to the field of AM practices. This new concept is entitled the end of single strategic issue.

Although the connecting together of separate projects was a concept found in several AM standards and guidelines and in the empirical data, unfortunately a separate stage dedicated for this practice was not found in the AM standards and guidelines. However, there are two prominent guidelines giving considerable attention not only to programme formulation practice but also to wider aspects of the programme formulation, bringing in the domain of programme management thinking. The subsequent part of Chapter 3 was dedicated to explaining the last practices in the AM standards and guidelines left without explanation. These practices have been included under portfolio thinking.

Once asset managers carry out the explained process within the developed conceptual framework of the SAMP, they reach a stage where a portfolio of projects and programmes are created and need to be dealt with via certain kinds of practices. Several practices related to portfolio management practices were found in the AM standards and guidelines and in other general standards and guidelines, such as those of the OGC and PMI. However, AM standards and guidelines have paid varied attention to portfolio management practices. This variation can be depicted as a continuum of adoption of the portfolio management concept.

On one end, the TAM guidelines have paid considerable attention to portfolio management practices by developing a separate stage for portfolio thinking in terms of aligning and monitoring project implementation. On the other side of the continuum meanwhile, the FHWA guidelines have completely failed to give a clear idea of portfolio management thinking. Portfolio management thinking however forms the last stage in both the AM standards and guidelines and the SAMP framework.

7.1.1.4 Research question A4

How these theories constitute the underlying principles of the developed conceptual framework (systematic asset management practices, SAMP) to explain AM practices in leading AM standards and guidelines?

A general pattern can be discerned in the way in which theories in management were brought together. However, the finding during the conceptual SAMP framework development in Chapter 3 is that AM practices have their root in management thinking. These managerial activities can be uncovered by tracking how practices in AM are unfolded. Consequently, following process theory thinking has brought together various managerial theories to explain and understand how AM practices in international AM standards and guidelines can be developed and improved.

7.1.1.5 Research question A5

What is the gap between theory and AM practice?

During theoretical development of the SAMP framework in Chapter 3 and the empirical findings, the gap between theory and AM practices was evident. This gap ranges from the complete absence of some stages or thinking to implicitly mentioning some practices. For instance, although the generating options stage is vital for AM practices, unfortunately, all AM standards and guidelines have mentioned this stage only implicitly. Theory in this regard pays considerable attention to this stage because here participants should formulate the strategic action of the organisation. In addition, participants are surrounded by the demand for creating ideas, as well as give and take dialogue. The formulated strategy might be

in the form of discovering the organisation's pattern, or creating new and deliberate action.

The next gap was found between programme management thinking and the AM practices. Programme management thinking was absent in four of the international AM approaches; IIMM, Asset Management Primer of the U.S. Department of Transportation, OECD, and property asset management in the USA. In fact, only the RICS, TAM and PAS 55 guidelines have paid attention even to a part of programme management thinking. This partial treatment is noted in that neither of the guidelines have articulated the benefits explicitly, which in turn affects the implementation of programme management thinking. In terms of current SPS practices, programme management thinking was found in the reality of their practices but with no emphasis on monitoring the benefit behind their practices.

7.1.1.6 Research question A6.

What is the relation between the empirical findings and the developed conceptual framework for the underlying principles of the systematic AM practices (SAMP)?

In Chapter 5, the researcher confirmed the very basic principles of the AM standards and guidelines practices. This confirmation was carried out in fifteen ministries of the SPS. The findings have shown that the very basic principles of the AM practices are embedded in the reality and driven in some cases by experience or with help of other factors.

7.1.2 Objective B

To explore current characteristics of AM practices in Saudi public sector with the purpose of developing an understanding of the gap between the developed countries and Saudi public sector.

This objective has been accomplished by answering the following three questions.

7.1.2.1 Research question B1

What are the characteristics of individual AM practices in SPS?

Based on this intention, Chapter 2 attempted to uncover characteristics of AM practices in SPS based on published material regarding the current situation in SPS. These studies partially discuss some aspects of AM practices, but the whole scene about the current situation and characteristics of AM practices in SPS are almost overlooked. For instance, Studies conducted by several researchers such as Daghistani (1991), Almohawis and Al-sultan (1994) and Al-Hammad et al. (1996b) have raised issues about the absence of systems or procedures in AM practices in SPS. However, these studies have several issues which impede them from giving a complete picture of the current AM practices in SPS. for instance, some of these studies are limited to a certain ministry, while others focus on certain practices in AM, such as the evaluation stage.

Based on the previous shortcomings, in Chapter 5, the researcher gave a complete picture of the current characteristics of AM practices in SPS. These findings can be encapsulated in four main themes. First, in spite of the absence of identification and diagnosing stages of the AM practices in SPS, the AM practices suffer from considerable deficiencies in a number of undertaken practices. The research has found that a majority of ministries in SPS are far behind the existing number of practices in the international AM standards and guidelines. This evidence supports findings in other studies about the failure of ministries in some aspects of physical asset life cycle.

The second issue is related to performance indicators. Although performance indicators are central to all AM standards and guidelines, they are totally absent in the majority of SPS ministries. Even within those minorities who have performance indicators, these performance indicators are not always followed. The third issue is related to the need for awareness improvement towards some aspects of AM practices such as awareness of the linkage between AM practices, and the benefit behind delivering these. Lastly, the findings have shown that the best AM practices

can not be found in one single ministry but instead the best practices are distributed over several ministries.

7.1.2.2 Research question B2

What is the current state of AM practices in terms of organisational policy, professional standards and experience?

The findings in Chapter 5 have revealed a considerable gap in organisational policy and professional standards in SPS against international AM standards and guidelines. This evidence indicates absence of process, procedure and systems in managing physical assets. In addition, this finding reflect the opposite aspect of the AM practices in SPS in which AM practices in the SPS are relying on employees' experience in managing the physical asset life cycle.

7.1.2.3 Research question B3

Are AM practices in SPS systematic? If not, what stages are missing?

The findings in Chapter 5 have shown that the majority of SPS ministries are not managing their physical assets strategically. To clarify, diagnosing stages in the majority of the SPS are overlooked, with the findings showing a complete absence of this crucial stage. As discussed in Part 2 of Chapter 3, AM practices in the diagnosing stage are responsible for conciliating the external environment with the internal environment and therefore the absence of AM practices could result in disconnection between the organisation's strategic direction and its physical asset resources.

7.1.3 Objective C

To explore factors influencing systematic AM practices (SAMP).

This objective has been accomplished by answering the following question:

7.1.3.1 Research question C1

What are the factors influencing systematic asset management practices (SAMP)?

The empirical findings in Chapter 5 have shown that factors influencing systematic asset management practices in the SPS context are six; organisational policy, professional standards, experience, external factors, validity of the practice and finally delegation. Experience was the most frequent and influential factor to affect the systematic asset management practices. Finally, based on answering this last question the following discussion is devoted to articulating how the objectives achieved the study's aim.

7.1.4 Achieving the aim

Chapter 6 was created with the purpose of achieving the overarching aim o. The researcher sets out in Chapter 6 a framework and recommended actions for improving asset management practices across the SPS. The framework consisted of five issues which need to be tackled by the Saudi government. The five issues are: the need for an independent entity who is responsible for improving AM practices in SPS: that physical assets are not managed strategically; weak asset management practices; weak organisational policy and professional standards; and reliance on experience.

The remedies for tackling these five issues, and for closing the gap between the developed countries and the SPS, were introduced in the recommended actions of the second part of Chapter 6. The recommended actions consisted of three main stages. The first stage focused on articulating the vital role of adopting a vision for improving asset management practices in the SPS. The vision was deduced from the international asset management standards and guidelines in terms of managing physical assets systematically. The systematization of asset management practices in the SPS is perceived as the remedy to the current deficiencies. Accordingly, the second stage of the recommend actions was devoted to discussing the holistic SAMP framework. In this stage, the basic stages of the SAMP framework are discussed which improve the systematization of asset management practices in SPS. Later, the researcher argued that SAMP can be achieved by paying attention to six factors; organisational policy, professional standards, experience, validity, external factors,

and delegation. The last stage of the recommended actions is devoted to articulating the vital role of reviewing and auditing the systematisation process of the SPS.

7.2 Contribution to knowledge

This research contributes to knowledge and society by claiming four issues. In terms of the societal contribution, the recommended actions for the Saudi government may be considered, because their impact focuses on improving current AM practices in ministries and these ministries in turn provide services to the country. This initiative has not been taken before, in spite of the long duration of asset management practices in the SPS.

The next contribution is related to knowledge. Contribution to knowledge can be broken down into three different aspects of knowledge advancement. First, it is well documented, as shown in Chapter 2, that the number of AM standards and guidelines is large and each standard or guideline is considered unique where there are even slight differences. Based on this reality, the researcher attempted to find a shared pattern among all AM standards and guidelines. In this sense, process logic was perceived as imposed over all AM standards and guidelines. Following the process of logical thought, the SAMP framework was constructed and introduced. The SAMP has contributed to the knowledge by addressing several issues. First, theories that constitutes the underlying principles of the SAMP model have re-organised the AM practices in the leading international standards and guidelines and, hence, improve understanding of AM practices.

The second issue is that the process theory is the glue that brings together all the remaining three theories: strategic planning/reasoning process, portfolio and programme management. To clarify, by following the logic of the teleological process theory, the very basic stages of the AM practices are articulated and later confirmed. The basic stages of the strategic planning/reasoning process, portfolio and programme management are: identification, diagnosing, generating option, evaluating option, programme formulation, portfolio alignment and portfolio monitoring. These stages explain the AM practices phenomenon. In this line of

argument, the SAMP can assist users of the international AM standards and guidelines to distinguish between them and to understand and explain the meaning of systematic AM practices.

The third issue is that within the SAMP, two new concepts are brought forward. These concepts facilitate understanding of AM practices. One of these concepts is programme formulation. The programme formulation concept is absent in some of the international AM standards and guidelines, and implicitly found in others. However, programme formulation is found embedded in both standards and guidelines, and in the empirical data as well. Therefore, the SAMP framework has brought this theory into the domain of the AM practices as a significant and valid practice.

The second concept is that of single and multiple strategic issues. In spite of the vital role of this concept for understanding the AM practices phenomenon, the concept is completely absent from all AM standards and guidelines. This concept increases understanding of AM practices in reality by explaining how asset managers go through several cycles of the reasoning process until they produce the programme formulation stage.

The third contribution to knowledge advancement is achieved by developing a model for factors influencing systematic asset management practices (SAMP). Here, as far as the current researcher can establish, existing models in the AM domain do not clearly show factors influencing asset management practices within one single model, let alone revealing factors influencing the SAMP framework. However, some of these models provide factors which need to be taken into consideration in terms of developing asset management plans, such as in PAS 55. However, the main idea from investigating factors influencing the systematic asset management practices (SAMP) is to visualize and reveal these factors in a single model. Therefore, the researcher can claim that the factors influencing SAMP are considered a contribution to knowledge because these factors assist in understanding what factors are influencing systematic practices.

The last contribution to knowledge advancement is to reveal the current asset management characteristics of the SPS. These characteristics can be broken down into three elements. The first of these is that of revealing the current situation of the strategic planning/reasoning practices. This type of investigation has not been studied before in the SPS. Second, the number of currently conducted AM practices in the SPS against international AM practices is also uncovered. Finally, obtaining knowledge on the current characteristics of organisational policy, professional standards and experience of the AM practices in SPS is also new to the field.

7.3 Further research

Further research is needed regarding various aspects of the SAMP framework. These aspects are linked to the model at each stage, starting from the identification stage and up to the portfolio management thinking stage. The paragraphs which follow articulate the further research which needs to be done in order to develop a detailed model for the public sector.

Based on the absence of a written mission statement within the asset management departments of the SPS, it might be necessary to investigate claims made by various researchers regarding this. These claims are that: organisations suffer from the experience and various negative impacts of conflict in organisations (Bryson, 2004); mission statements channel discussion and activity (Bryson, 2004); they motivate employees to recognise where their business activities fall (Pearce and David, 1987); and that the mission statement supports and enhances organisations to distinguish themselves from other organisations (Pearce and David, 1987).

Studies investigating the relationship between the external environment of ministries and physical assets are needed to answer the following questions: do the external variables of ministries differ in relation to the physical assets? What is the current situation of the physical assets of the SPS in terms of various variables such as demand trends (NSW, 2006a; IIMM, 2006); community or customer needs, expectations and interfaces (AAMCG, 2011; NSW, 2006a; RICS, 2012); changes in government policies (AAMCG, 2011; RICS, 2012); environmental factors

(AAMCG, 2011; RICS, 2012); industrial action (NSW, 2006a); population growth (NSW, 2006a); changes in external operating environment; and strategy and actions of partners (RICS, 2012)?

No studies are found regarding the impact of the gap within the SPS concerning predicting the future failure of physical assets on the organisation's services. Therefore, studies are needed to investigate the impact of not predicting physical asset failure on the organisation's service, and to explore how widespread is the sudden failure of physical assets.

More investigation is needed to develop knowledge regarding how current asset management departments in the SPS are matching current assets with organisational services. This recommendation requires future inductive research in order to satisfy this need.

Studies focusing on the current performance of physical assets from various aspects are needed due to the lack of such studies in the SPS. In addition, there is no study which can show researchers the current performance of physical assets in terms of economic, aesthetic and operational levels.

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List of Abbreviations

Administrator of General Services	GSA
asset management plan	AMP
Australian Asset Management Collaborative Group	AAMCG
Australian Procurement and Construction Council Inc.	APCC
Cooperative Research Centre for Infrastructure and Engineering Asset Management	CIEAM
<i>Federal Highway Agency</i>	FHWA
Federal Real Property Council	FRPC
integrated strategic asset management	ISAM
<i>International Infrastructure Management Manual</i>	IIMM
Office of Management and Budget	OMB
Organization for Economic Cooperation and Development	OECD
Publicly Available Specficiation	PAS 55
Royal Institution of Chartered Surveyors	RICS
<i>Saudi Public Sector</i>	SPS
Senior Real Property Officer	SRPO
Total Asset Management	TAM
Best response	BR

APPENDIX A

THEMATIC ANALYSIS OF INTERNATIONAL ASSET MANAGEMENT STANDARDS AND GUIDELINES

This appendix is devoted to presenting the result of the thematic analysis conducted on the seven international AM standards and guidelines documents. In the first part brief explanation to the adopted approach is discussed and later, extracted quotations from each AM standards and guidelines practices are introduced. These quotations are extracted based on the SAMP framework, illustrated in Figure 3.20 of Part 5.

The adopted approach

This appendix attempts to briefly explain how the study is going to use the developed SAMP framework in Part 5. The template thematic analysis approach proposed by King (2004) is favoured over grounded theory because the researcher has already developed a theoretical model based on reviewing management literatures and AM standards and guidelines. Therefore, grounded theory cannot be adopted because Grounded theory can only be adopted when the researcher intends to discover the reality without using a pre-construct. The reason behind this is that the researcher needs to be unbiased and open to the data for generating theory grounded in these data (Saunders et al., 2009).

King (2004, p.256) have given a clear description of this analytical method which stated that

Template analysis does not describe a single, clearly delineated method; it refers rather to a varied but related group of techniques for thematically organizing and analysing textual data. The essence of template analysis is that the researcher produces a list of codes (template) representing themes identified in their textual data. Some of these will usually be defined a priori, but they will be modified and

added to as the researcher reads and interprets theme, as defined by the researcher, most commonly involving a hierarchical structure

King (2004, p.256) provides the process of how to conduct template method in which the researcher in this process starts by developing initial template derived from; “the academic literature, the researcher’s own personal experience, anecdotal and informal evidence, and exploratory research”. In current case of the study, codes are derived from the SAMP framework developed in Part 5. Afterward the researcher is going to set up the initial template by which the researcher will work systematically through the written official documents in order to identify and extract parts that relevant to the study’s aim.

Template

Table A.1 presents the developed thematic template that extracted from the developed SAMP conceptual framework in Part 5. Definitions of these concepts are presented in Chapter 4.

Table A.1. Themes and codes of the AM practices. Source: author.

1 Identifying
2 Diagnosing
2-1 Internal environment
2-1-1 Predicting physical asset failure
2-1-2 Present strategy
2-1-3 Performance indicators
2-2 External environment
3 Conceiving
3-1 Generating options
3-2 Evaluating option
4 Programme formulation
5 Portfolio alignment process group
6 Monitoring implementation of the portfolio

Analysis

This part presents the analysis of the international AM standards and guidelines. Therefore, the tables below deliver the following information:

- Type of theme or code extracted from the SAMP framework
- Sources of the extracted quotations from the AM standards and guidelines

- Extracted quotation
- Explanation and relevance of the extracted quotation. This information is discussed if the quotation not clear

Identification theme

Identification	
Asset Management Primer of the U.S. department of transportation	
Source	extract
FHWA, 1999	“Organizational goals, policies, and budgets establish a consistent evaluative philosophy”. “Decisions regarding program investments are optimized according to goals established by elected officials and policy makers”. “Organizational policies may be thought of as a broad overlay to the process. Nonengineering/noneconomic factors that reflect an agency’s values, perceptions, and predispositions may modify performance-based decisions”. “The key to establishing performance goals is determining user priorities, values, and standards” (p.20)
Explanation and relevance: asset managers are required to pay attention to policies, goal and mission of organisation in order to distil performance of physical assets.	

Identification	
(ISAM) and (TAM)	
Source	extract
NSW, 2006a	“Agency strategic plans should reflect government’s strategic agendas and priorities. These are communicated in various ways including through the NSW State Plan, current and emerging policy and legislation, Budget statements and Cabinet decisions” (p.2). “Service delivery information contained in the RSP and corporate planning documents provides necessary service details about which services are to be delivered and how, to develop an Asset Strategy that best meets an agency’s needs” (p.7).
Explanation and relevance: TAM guideline assists asset managers with various questions and recommendations dedicated for how asset managers can relate physical assets to mission and objectives of the organisations. In addition, the guideline articulated clearly the identification stage with explicit stage at their physical asset management practices.	

Identification	
OECD	
Source	extract
OECD, 2001	Goals, Policies and Budgets are the first stage of the AM process.
Explanation and relevance: The guidelines require asset managers to take into their considerations goal, policies and budgets at the time of physical asset management practices.	

Identification	
IIMM	
Source	extract
IIMM, 2006	After identifying physical assets users, then, “customer values will often need to be the first consultation step before an organisation develops level of service” (p.3.5).
Explanation and relevance: the guidelines require asset managers to pay attention to users’ value.	

Identification	
Property Asset Management in the USA	
Source	extract
FRPC, 2004	“To facilitate integrating real property asset management decisions with agency missions, two elements are needed – a clear understanding of the agency’s mission that drives the allocation and use of all available resources (human capital, physical capital, financial capital and technology/information capital) and an effective decision-making framework” (p.10).
Explanation and relevance:	

Identification	
RICS	
Source	extract
RICS, 2012	“To develop a business focused property asset strategy, property asset managers must have a complete understanding of the corporate policies of their organisation” (p.22). “Corporate goals objectives and strategy”, Corporate values and policy, the organisation’s vision for its future, operating Unit’s aspirations and plans, changes in internal organisation and structure, the organisation’s vision for property, impact of alternative work-style” (p.25).
Explanation and relevance: We can infer from this stage that the guideline motivate asset managers to identify the organisation issues and problems.	

Identification	
PAS 55	
Source	extract
BSI, 2008	Asset management policy
Explanation and relevance: the guideline mentioned various requirements under this stage. Therefore, we can infer from this stage that the guideline motivate asset managers to identify the organisation issues and problems.	

Diagnosing theme

“External environment”

diagnosing	
External environment.	
Asset Management Primer of the U.S. department of transportation	
Source	extract
FHWA, 2007	<p>“Applying risk management to look at decisions being made about delivery of the programs makes it possible to identify threats and opportunities, assess and prioritize those threats and opportunities, and determine strategies so that decisions can be made on how to deal with future issues affecting the Federal-aid highway program. Steps taken to manage risk include 1) gathering information about future events, threats, and opportunities; 2) identifying what and how those future events trigger the threats and opportunities; 3) assessing the likelihood and impact of risks; 4) prioritizing risks by their expected value and by their relative importance to a program, project, or State; 5) determining appropriate response strategies to risks; 6) carrying out response strategies, monitoring strategies, and re-evaluating risks” (p.16).</p> <p>“Role of preservation in asset management is to meet the growing travel demand and the public’s expectations” (p.16)</p>
<p>Explanation and relevance: although the FHWA guideline recommended integrating risk management approach with asset management process the guideline has not allocated an explicit stage for using risk management. In addition, the guideline has not provided variables that influence the federal highway programmes. However, the FHWA guidelines require asset managers to pay attention to the external environment.</p>	

diagnosing	
External environment.	
(ISAM) and (TAM)	
Source	extract
AAMCoG, 2011	<p>“ISAM takes into account environmental, social and economic issues as well as governance”. “Risk Management provides a systematic way of identifying and analysing potential risks, and helps to create and implement adequate responses” (p.9). “Understandably the community expects governments in particular to deliver their services expeditiously and at the local level” (p.10).</p>
NSW, 2006a	<p>Risk directly affecting assets during their useful life, such as Industrial action” (p.12).</p> <p>Risks which have an impact on the level of demand for service, such as:</p> <ul style="list-style-type: none"> • Community expectations • Technological change • Demand trends • Population growth; and • Environmental events (p.12)
<p>Explanation and relevance: The guidelines require asset managers to pay attention to the external environment.</p>	

diagnosing	
External environment.	
OECD	
Source	extract
OECD, 2001	Performance modelling
Explanation and relevance: part of performance modelling at the guideline is to conduct gap analysis. This type of analysis could be calculated by counting the difference between the need and current assets.	

diagnosing	
External environment.	
IIMM	
Source	extract
IIMM, 2006	“Level of service are aligned with the strategic objectives of an organisation and usually based on; customer expectations, legislative requirements, an organisation’s strategic mission and objectives and availability of resources and financial constraints” (p.3.6).
Explanation and relevance: the guideline provides asset managers with several variables effect demand on assets. Part of these variables is common to all assets such as population growth while others are unique for specific physical asset.	

diagnosing	
External environment.	
RICS	
Source	extract
RICS, 2012	“Customer interface, Possible changes in government policy, Changes in the external operating environment, Strategy and actions of partners, Regulation and standards, Sustainability and environment” (p.25).
Explanation and relevance: the RICS guidelines require asset management to pay attention to several identified external variables that affect organisations’ assets.	

diagnosing	
External environment.	
PAS 55	
Source	extract
BSI, 2008a	At the asset management strategy stage, asset managers are required to “Identify and consider the requirements of relevant stakeholders” (p.7)
Explanation and relevance:	

Diagnosing theme

“Internal environment, predicting physical asset failure”

diagnosing	
Internal environment: predicting physical asset failure	
Asset Management Primer of the U.S. department of transportation	
Source	extract
FHWA, 1999	“What is the current and predicted future condition and performance of our assets?, Forecasting Tools help to assess the impact of, say, inadequate routine maintenance and deferred capital maintenance” (p.25)
Explanation and relevance: the model requires asset managers to pay attention to different tools for physical asset failure or threshold investigation. However, the guideline allocated performance indicators stage to undertake forecast modelling.	

diagnosing	
Internal environment: predicting physical asset failure	
(ISAM) and (TAM)	
Source	extract
NSW, 2006a	Risk directly affecting assets during their useful life, such as: <ul style="list-style-type: none"> • “Inadequate maintenance • Capability • Equipment breakdowns” (p.12).
NSW, 2006d	“A maintenance strategy that sought to prevent all failures from occurring would be costly and disruptive. Similarly a strategy that attended to all maintenance only after failure would also be costly and even more disruptive” (p.10)
Explanation and relevance:	

diagnosing	
Internal environment: predicting physical asset failure	
OECD	
Source	extract
OECD, 2001	“Future condition – deterioration models, remaining life” (p.15).
Explanation and relevance:	

diagnosing	
Internal environment: predicting physical asset failure	
IIMM	
Source	Extract
IIMM, 2006	“Condition relates to the physical integrity of an asset, and rating systems need to address the expected failure pattern” (p.3.40). “All the decisions about the rehabilitation, replacement or disposal of an asset, and the timing for such activities, should be based on a sound determination of what the critical failure mode is” (p.3.57). In addition, “once risks are identified they are generally recorded in a risk register” (p.3.58).
Explanation and relevance:	

diagnosing	
Internal environment: Physical asset failure	
PAS 55	
Source	extract
BSI, 2008a	“the identification and assessment of risks shall consider the probability of credible events and their consequences, and shall as a minimum cover: physical failure risks, such as functional failure, incidental damage, malicious damage or terrorist action” (p.13)
Explanation and relevance: the standard in the asset management strategy stage requires asset managers to carry out risk management methodology with the previous requirements.	

Diagnosing theme

“Internal environment, present strategy”

diagnosing	
Internal environment: present strategy	
Asset Management Primer of the U.S. department of transportation	
Source	extract
FHWA, 1999	How can we preserve, maintain, or improve our assets to ensure the maximum useful life and provide acceptable service to the public?
Explanation and relevance : the model does not provide specific analytical tools or techniques for investigating this goal. In addition, the model attempts to drag asset managers’ attention to the linkage between assets and organisations. However, it is difficult to judge this extraction as present strategy activities.	

diagnosing	
Internal environment: present strategy	
(ISAM) and (TAM)	
Source	extract
NSW, 2006a	<ul style="list-style-type: none"> • “Agencies are encouraged to make their services less asset-dependent” (p.9). • The value of assets to agencies lies in how effectively they support delivered services. Ideally assets should be fully utilised in delivering services. Assets often have redundant spare capacity deliberately built-in for predictable future growth in service demand (p.10). • The impact of asset location varies with the type of services provided by the agency, (p.10) • Asset or system capacity is concerned with asset numbers, space or volume, or the rate of information flow and incorporates factors such as comfort, security, speed, power, specific safety requirements, etc, (p.11). • Asset functionality concerns the degree to which the asset is suitable for the delivery of the service it is intended to support, (p.11).
NSW, 2006e	<p>The identification of surplus assets should include the following considerations:</p> <ul style="list-style-type: none"> • “assets may no longer support an agency’s service objectives due to changes in the type of service or its delivery method;

	<ul style="list-style-type: none"> • Assets can have varying service life expectancies. Some are required to continue in service indefinitely with adequate maintenance, eg. civil structures such as mass gravity dams or sewerage systems; • assets such as buildings can often be economically maintained and kept in service for prolonged periods, • however some become uneconomic or cannot be economically adapted to changed operating environments or service requirements; • some assets may still be able to perform as originally planned but have been made redundant or incompatible because of advances in technology or changed work practices; and • The potential savings available from replacement of an asset must be weighed against the cost of that replacement, the estimated economic service life and the market value of the asset” • Agencies may have implied or secondary service obligations in addition to their core service delivery responsibilities. These could include heritage and other environmental aspects related to an asset and may affect its disposal. Agencies in these circumstances should refer to the Heritage Asset Management and Sustainable Development guidelines contained in the TAM Manual” (p.5)
Explanation and relevance :	

diagnosing	
Internal environment: present strategy	
OECD	
Source	extract
OECD, 2001	“Valuation – financial and economic value, capitalisation methods” (p.15).
Explanation and relevance: performance indicators are not given. Therefore, present strategy is the best code that might include these practices.	

diagnosing	
Internal environment: present strategy	
IIMM	
Source	extract
IIMM, 2006	“Level of service are aligned with the strategic objectives of an organisation and usually based on; customer expectations, legislative requirements, an organisation’s strategic mission and objectives and availability of resources and financial constraints” (p.3.6).
Explanation and relevance: performance indicators are not given. Therefore, present strategy is the best code that might include these practices.	

diagnosing	
Internal environment: present strategy	
Property Asset Management in the USA	
Source	extract
FRPC, 2004	“Integrated guiding Principles; support agency missions and strategic goals, use public and commercial benchmarks and best practices, employ life-cycle cost-benefit analysis, promote full and appropriate utilization, dispose of

	unneded assets, provide appropriate levels of investment, accurately inventory and describe all assets, employ balanced performance measures, advance customer satisfaction and provide for safe, secure and healthy workplaces” (p.4).
Explanation and relevance: part of the asset management plan requirements motivate asset managers to carry out how physical asset support the organisation’s objectives and mission.	

diagnosing	
Internal environment: present strategy	
RICS	
Source	extract
RICS, 2012	“The ‘ground level’ starting point is an understanding of the make-up of the present portfolio of property assets, their suitability for purpose, condition, cost of restoration to full repair, market value, flexibility of use, utilisation levels, user and customer satisfaction and remaining life” (p.21). “The question to be answered is: does the present property asset base fulfil the delivery needs of the occupying departments?”, (p.21). “Financial outlook of the organisation, Brand, Suitability and alignment of existing property portfolio, Efficiency savings, Relationship with other key resources, Possibilities for co-location, Changes in headcount, Access” (p.21)
Explanation and relevance: the guidelines require asset managers to pay attention to various factors affecting the relationship between the asset and organisations.	

diagnosing	
Internal environment: present strategy	
PAS 55	
Source	extract
PAS, 2008	“Monitoring the overall effectiveness and efficiency of the asset management system” (p.42).
Explanation and relevance: There is no separate stage for this practices.	

Diagnosing theme

“Internal environment, performance indicators”

diagnosing	
Internal environment: performance	
Asset Management Primer of the U.S. department of transportation	
Source	extract
FHWA, 1999	“What was the past condition and performance of our assets?, what is the current and predicted future condition and performance of our assets? improve asset performance, as measured by attributes such as ride quality, safety, and service life” (p.21).
Explanation and relevance: performance of physical asset was left to organisations in order to achieve flexibility and diversities of policies and required performance indicators.	

diagnosing	
Internal environment: performance	
(ISAM) and (TAM)	
Source	extract
NSW, 2006a	<p>“There are two groups of asset performance measures;</p> <p>Effectiveness measures</p> <ul style="list-style-type: none"> • demonstrate how well the asset portfolio supports agency services • Demonstrate the extent to which an asset’s performance supports the delivery of services. <p>Efficiency Measures</p> <ul style="list-style-type: none"> • demonstrate how well assets are managed; and • What is the cost to operate assets” (p.13).
NSW, 2006d	<p>“It is necessary to identify the asset deficiencies that could pose a risk to an agency’s service delivery. This may be achieved by conducting condition surveys, to compare actual asset condition and performance with required performance, or by sampling and statistical analysis of a large numbers of similar assets” (p.11)</p>
Explanation and relevance :	

diagnosing	
Internal environment: performance	
OECD	
Source	extract
OECD, 2001	<p>“Some of the different ways that performance can be represented are percentile of level of Condition, effects on users, levels of safety, effects on the environment and economic aspects of the network” (p.23).</p> <p>“The use of Performance Indicators, as a means of performance monitoring and target setting, has been examined by the OECD in its report Performance Indicators for the Road Sector 5. This identified 15 Performance Indicators used by OECD Member countries to monitor the performance of the road agencies” (p.23). In contrast, “The same measures of performance can be used by all stakeholders of the asset but the importance given to each measure may differ for the different stakeholders” (p.23). However, “Indicators were found to vary between different Member countries and sometimes even between jurisdictions within the same country” (p.25).</p>
Explanation and relevance :	

diagnosing	
Internal environment: performance	
IIMM	
Source	extract
IIMM, 2006	<p>“Performance measures are used to establish targets against which the performance of infrastructure assets can be measured” (p.3.11).</p>
Explanation and relevance :	

diagnosing	
Internal environment: performance	
Property Asset Management in the USA	
Source	extract
Explanation and relevance: the framework clearly allocated a separate stage for the performance indicators. Therefore, there is no need to repeat these indicators	

Conceiving theme

“Generating options”

Conceiving	
Generating options	
Asset Management Primer of the U.S. department of transportation	
Source	extract
FHWA, 1999	“Choosing one alternative over another through engineering and economic-based “what if” analyses” (p.25).
Explanation and relevance: although a separate stage for generating options to satisfy the organisations needs was not dedicated at these guidelines, yet the guidelines require asset managers to develop various options for investments.	

Conceiving	
Generating options	
(ISAM) and (TAM)	
Source	extract
NSW, 2006a	<ul style="list-style-type: none"> • “utilisation of non-asset or less asset-intensive solutions; • cross-agency asset sharing; and/or • Cross-agency service offsetting” (p.9). <p>Where unplanned surplus asset capacity is identified, agencies should consider:</p> <ul style="list-style-type: none"> • utilising surplus asset capacity to improve or enhance service delivery, provided this can be achieved in an efficient manner; • allocating surplus capacity to other agencies via cross-agency asset sharing arrangements where possible; and • Disposing the surplus asset capacity following analysis of future demand (p.10) • As with every gate of the process, asset capacity requirements can be met either by adjusting the asset portfolio or by changing service delivery, to make better use of the assets already available or make service delivery less asset-dependant (p.11). <p>many asset functionality problems can be overcome by:</p> <ul style="list-style-type: none"> • retrofitting, refurbishment or upgrading of existing assets; and/or • changing service delivery methods using other resources such as ICT or Human Resources (p.12).
NSW, 2006c	Options should be checked against the Project’s Outline. Any significant non-compliance with the Outline will require the option to be modified or discarded. Depending on the size, complexity and nature of the project the use

	of a Value Management study may be beneficial to fully canvas and develop options for subsequent evaluation (p.7).
NSW, 2006e	When asset is confirmed as surplus assets, asset managers should attempt to maximize benefits of assets disposal. “The disposal value of an asset is its sale value and the savings achieved in the cost of service delivery or other benefits” (p.6). “An asset can have a range of values to potential buyers, with each valuing different aspects of the asset” (p.6)
Explanation and relevance:	

Conceiving	
Generating options	
IIMM	
Source	extract
IIMM, 2006	<p>“the objective of demand management is to actively seek to modify customer demands for services in order to;</p> <ul style="list-style-type: none"> • Optimise utilisation/performance of existing assets • Reduce or defer the need for new assets • Meet the organisation’s strategic objectives • Deliver a more sustainable service • Respond to customer needs” (p.3.35). <p>“demand management (sometimes called non-asset solutions) is a key strategy for infrastructure management, and should always be investigated as part of the optimised decision making process” (p.3.35).</p>
Explanation and relevance:	

Conceiving	
Generating options	
RICS	
Source	extract
RICS, 2012	<p>“The plan will be appraised financially as it develops. This will be a broad and generic process which will also assess the effects on other corporate resources, principally staffing and technology” (p.25).</p> <p>“In order to deliver the outcomes, what options have been considered? Whilst at the project outset a long list of options and sub-options will be discussed, three broad options are invariably among the most important considered:</p> <ul style="list-style-type: none"> • Status quo – that is, carry on as we are now • Big bang – a major change initiative • The middle ground – a middle course with, for example, some refurbishment, some new build, and some disposals” (p.31).
Explanation and relevance:	

Conceiving theme
“Evaluating option”

Conceiving	
Evaluating option	
Asset Management Primer of the U.S. department of transportation	
Source	Extract
FHWA, 1999	<p>“What investment options may be identified within and among asset component classes? What are their associated costs and benefits?, Which option, or combination of options, is “optimal?”, What are the consequences of not maintaining our assets? How can we communicate the impact of the condition and performance of our assets on the system and end user?” (p.20).</p> <p>“The life-cycle cost analysis (LCCA) technique is widely accepted as a useful project evaluation tool” (p.24).</p> <p>“Engineering economic analysis (EEA) provides a broad collection of tools that collectively allow competing investment options to be prioritized according to relative economic efficiency levels, These tools include life-cycle cost analysis; benefit/cost analysis; optimization and prioritization; and risk analysis. These analytical procedures consider initial and discounted future agency, user, and other costs (such as external costs) over the life of each alternative investment option. They attempt to identify the option that will achieve established performance objectives at the lowest long-term cost, or provide maximum benefit for a given investment/funding level” (p.25)</p>
<p>Explanation and relevance: although a separate stage for generating options to satisfy the organisations needs was not dedicated at the guidelines yet it requires asset managers to develop various options for investments. In addition, the model requires asset managers to present the impact of asset deterioration if the need was not satisfied.</p>	

Conceiving	
Evaluating option	
(ISAM) and (TAM)	
Source	Extract
NSW, 2006a	<p>“any options for reducing asset-dependency should be assessed with respect to:</p> <ul style="list-style-type: none"> • total and relative economic advantages compared with other options; • demand for other resources; • the need for inter-agency agreements; and • The impacts on services” (p.10).
NSW, 2006c	<p>“Once verified against the Project Outline options should be evaluated, including broad consideration of procurement strategy, particularly any constraints which may surround particular options (e.g. financial, physical, time, functional and design)” (p.8).</p> <p>“Various ‘tools’ are available to assist in evaluating options, including Economic Appraisal, Financial Appraisal, Risk Analysis and Sustainable Development Assessment” (p.8).</p> <p>“Evaluation of verified options enables each option to be compared against the others with respect to (but not limited to):</p> <ul style="list-style-type: none"> - meeting service delivery requirements;

	<ul style="list-style-type: none"> - level of risks and their management; - key assumptions; - stakeholder considerations; - timing/sequencing considerations; - economic considerations; - cash flows; - budgetary considerations; and - Sustainability issues” (p.8).
NSW, 2006c	<p>“Options should be checked against the Project’s Outline. Any significant non-compliance with the Outline will require the option to be modified or discarded. Depending on the size, complexity and nature of the project the use of a Value Management study may be beneficial to fully canvas and develop options for subsequent evaluation” (p.7).</p>
NSW, 2006d	<p>“Maintenance resources include planning, technical procurement and trade skills. These skills may be available in house or on contract or a mix of two” (p.10).</p> <p>“An optimal balance between preventive and corrective maintenance is needed and will vary with each agency’s requirements, resources, and circumstances” (p.10).</p>
NSW, 2006e	<p>“the advantages of disposing must be weighed against the cost of continued ownership;</p> <ul style="list-style-type: none"> • Many assets require significant resources for their maintenance (repairs, servicing, etc) and operation (staff, energy, cleaning, security costs, etc.). • Other costs of ownership include opportunity costs on the residual value of the asset and insurance cost. • Property assets may also incur various local government rates and charges as well as those levied by other rating authorities” (p.12).
Explanation and relevance:	

Conceiving	
Evaluating option	
OECE	
Source	Extract
OECD, 2001	<p>“Analysis options;</p> <ul style="list-style-type: none"> • Cost-benefit • Environmental • Life-cycle cost • Multi-criteria • Risk • Safety • Treatments – maintenance” (p.15).
Explanation and relevance:	

Conceiving	
Evaluating option	
IIMM	
Source	Extract
IIMM, 2006	<p>Benefit-cost analysis (BCA) – Benefit-cost analysis community (BCA) – Multi-criteria analysis (MCA) (p.3.81).</p>

Explanation and relevance:	
Conceiving	
Evaluating option	
RICS	
Source	Extract
RICS, 2012	<p>“Strategic justification sets out the strategic context and overall reasons for the project. What are the operational objectives and what are the desired outcomes? How do these outcomes link to the key business goals of the organisation?” (p.31).</p> <p>“The project options are assessed by drawing together all the assessments and making a decision on overall value for money, affordability benefits and non-financial costs and risks” (p.34).</p> <p>“Government agencies mostly use the ‘5 case’ model (strategic case, economic case, financial case, commercial case, management case) and the guidance from HM Treasury on business cases – Treasury Green Book (Appraisal and Evaluation in Central Government)” (p.31)</p>
Explanation and relevance:	

Programme formulation theme

Programme formulation	
Programme formulation	
(ISAM) and (TAM)	
Source	extract
NSW, 2006c	<p>“How does this project fit in relation to other projects currently under way?, Will this be a joint-agency (Cluster) project? If so, what is the rationale for adopting this approach? Also, which will be the lead agency, which other agencies are involved and what is the nature of their individual roles/involvements?” (p.6).</p>
NSW, 2006e	<p>“Linkages should be made between the capital investment and disposal plans by listing assets for disposal that have service lives within the planning time frame” “These linkages are particularly important where the proceeds of asset disposals are being relied upon to fund capital works. In such situations, it is essential to allow an adequate time and funding buffer between the disposal and acquisition events” (p.8)</p>
Explanation and relevance: first stage at the capital investment process package, outline project, requires from asset managers to articulate the relation of the proposed projects to other projects whether inside or outside the organisation.	

Programme formulation	
Programme formulation	
RICS	
Source	extract
RICS, 2012	<p>“5.4.1 Delivery projects</p> <p>The property asset manager is now in a position to determine the broad tasks that need to be undertaken to implement the property asset management plan</p>

	<p>and to turn these tasks into delivery projects. Not all delivery projects will produce final results and some will be ‘preparation’ projects putting in place the business infrastructure to achieve final results. However, as many projects as possible should be about:</p> <ul style="list-style-type: none"> • property change and improvements • property development projects (where applicable); and • estates, facilities, construction and MandE service provision change and improvements” (p.37).
<p>Explanation and relevance: This stage is being carried out after procurement (sourcing) stage at the model. Therefore, this stage is located in different position from the developed model in the study.</p>	

Programme formulation	
Programme formulation	
PAS 55	
Source	extract
PAS, 2008	“the development of asset management plan(s) and life cycle activities shall include consideration of the impact of actions in one life cycle phase upon the activities necessary in other life cycle phases” (p.11).
<p>Explanation and relevance:</p>	

Portfolio alignment

theme

Portfolio alignment process group	
Portfolio alignment process group	
Asset Management Primer of the U.S. department of transportation	
Source	extract
FHWA, 1999	“Which option, or combination of options, is Optimal?” (p.19).
<p>Explanation and relevance: portfolio of projects are balanced and suggested to authority according to the optimum collection. However, the model has not introduced specific criteria upon which decision of optimisation can be recognised. In addition, portfolio balancing was conducted in two different stages without dedicating a separate stage for this practice. The first stage is for optimising the evaluated options. The second stage is for long and short range plan.</p>	

Portfolio alignment process group	
Portfolio alignment process group	
(ISAM) and (TAM)	
Source	extract
NSW, 2006a	“The Asset Strategy is prepared for a minimum four-year time frame and is reviewed and updated annually” (p.7).
NSW, 2006c	“Agencies should develop and submit proposed capital investments/acquisitions (i.e. projects), and address the following; governance, planning horizon and

	alignment, enhancement and maintenance of effort, prioritisation, project profile and business case” (p.9).
NSW, 2006d	<p>“The maintenance tasks are then ranked in order of priority based on supporting service objectives. The criteria that determine the importance and urgency of maintenance may include:</p> <ul style="list-style-type: none"> • Statutory requirements; • Occupational health and safety legislation; • Service delivery risk; and • Commercial risk” (p.12). <p>“Maintenance plans should include the impact on services if funding is not received for particular items or programs and the cost impact of delaying works. This enables Budget and agency deliberations to be made with the full knowledge of the implications and risks if tradeoffs are made” (p.14).</p>
Explanation and relevance:	

Portfolio alignment process group	
Portfolio alignment process group	
OECD	
Source	extract
OECD, 2001	<p>“Project selection/prioritisation;</p> <ul style="list-style-type: none"> • Project ranking – economic, environmental, risk, multi-criteria • Treatments – project and network level” (p.16).
Explanation and relevance:	

Portfolio alignment process group	
Portfolio alignment process group	
IIMM	
Source	extract
IIMM, 2006	<p>“Some organisations take a totally risk driven approach to making decisions” (p.3.67). Therefore, risks can be used to prioritise projects.</p>
Explanation and relevance:	

Portfolio alignment process group	
Portfolio alignment process group	
RICS	
Source	extract
RICS, 2012	<p>“Having assessed, using business cases, each of the potential projects’ options that have been developed from the property asset review, a realistic programme of some of the projects will now need to be assembled that provides the desired value for money, affordability and benefits” (p.34). “The potential proposed projects to be included in the programme will be assembled using each of their business cases to indicate which are the more desirable” (p.34).</p>
Explanation and relevance:	

Portfolio alignment process group	
Portfolio alignment process group	
PAS 55	
Source	extract
PAS,	“The asset management plan(s) shall be optimized and the actions prioritized.

2008	Multiple plans (for example, covering a portfolio of asset systems or assets) shall be jointly optimized and prioritized, taking into account overall value, resource requirements, interdependencies, risks and performance impact” (p.11).
Explanation and relevance:	

**Monitoring implementation of the intended strategy
theme**

Implementation	
Monitoring portfolio	
(ISAM) and (TAM)	
Source	extract
NSW, 2006c	“Monitoring and Reviewing CISP Implementation and updated annually and constantly reviewed to ensure that it incorporates, as practicable, changes to the service strategy as well as changes to resources available, including funding” (p.10).
Explanation and relevance :	

Implementation	
Monitoring portfolio	
OECD	
Source	extract
OECD, 2001	“Implementation programme; <ul style="list-style-type: none"> • Monitoring/feedback • Budget review • Goal review • Policy review” (p.16).
Explanation and relevance :	

Implementation	
Monitoring portfolio	
RICS	
Source	extract
RICS, 2012	Delivery management; <ul style="list-style-type: none"> • Performance measures, • Corporate project management, • Gateway review, • PRINCE2.
Explanation and relevance :	

APPENDIX B

THE STRUCTURED INTERVIEW

General information

Ministry No. Participant No..... Years of experience at public sector.....

Identifying Stage

Organisation's Mission

Q1- How often does your department write down the mission statement of the organisation when you submit the required portfolio of projects to the Ministry of Finance?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q2- To what extent do the following require your department to write down the mission statement of the organisation when you submit the required portfolio of projects to the Ministry of Finance?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Diagnosing stage

External Environment

Q3- How often does the increasing demand on organisation's services influence the increasing demand on physical assets?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q4- How often does your department forecast the demand on organisation's services?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q5- To what extent do the following require your department to forecast the increased demand on organisation's services?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q6- How often does your department analyse the impact of future demand?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q7- To what extent do the following require your department to analyse the impact of future demand?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q8- How often do you use probability or quantitative approach in analysing the impact of demand on services?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q9- To what extent do the following require your department to use probability or quantitative approach in analysing the impact of demand on services?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					

1.					
2.					
3.					

Q10- How often do you monitor technological development that may affect physical assets' operation?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q11- To what extent do the following require your department to monitor technological development that may affect physical assets' operation?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q12- How often do you analyse the future impact of technological development on physical asset operation?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q13- To what extent do the following require your department to analyse the future impact of technological development on physical asset operation?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q14- To what extent do the following require your department to use probability or quantitative approach in analysing the impact of technological development on physical asset operation?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					

Others (please specify below)					
1.					
2.					
3.					

Physical asset failure

Q15- How often does your department forecast the future failure of physical assets in delivering the required services?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q16- To what extent do the following require your department forecast the future failure of physical assets in delivering the required services?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Present strategy

Q19- How often do you calculate the minimum required physical asset in order to deliver your organisation's services?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q20- To what extent do the following require organisation to calculate the minimum required physical assets to deliver organisation's services?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q23- How often does your department attempt to reduce the reliance of organisation's services on physical assets?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q24- To what extent do the following require your department to reduce the reliance of the organisation’s services on physical assets?

	Never	Rarely	Sometimes	Often	Always
Organisation’s policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q17- How often do you investigate physical assets contribution to the organisation’s mission?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q18- To what extent do the following require your department to study physical assets contribution to the organisation’s mission?

	Never	Rarely	Sometimes	Often	Always
Organisation’s policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q21- How often do you revise the organisation’s physical assets locations in order to determine their effectiveness in delivering the organisation’s mission?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q22- To what extent do the following require your department reviewing the organisation’s physical assets locations in order to determine their effectiveness in delivering the organisation’s mission?

	Never	Rarely	Sometimes	Often	Always
Organisation’s policy					
Professional standard					
experience					
Others (please specify below)					
1.					

2.					
3.					

Performance measurements

Q25- How often do you follow official written criteria when you diagnose the state of physical assets?

Never..... Rarely.....Sometimes.....Often.....Always.....

Q26- To what extent do the following require your department to diagnose the state of physical assets using official written criteria?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q27- To what extent do these criteria cover all aspects of physical the asset performance?

Never..... Rarely.....Sometimes.....Often.....Always.....

CONCEIVING STAGE

Generating options

Q28- When the need for new physical assets is confirmed, how Often do you attempt to find a non-asset solution in order to achieve the organisation's mission?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q29- To what extent do the following require your department to find a non-asset solution to achieve the required organisation's mission?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q30- If a physical asset is surplus, how Often do you contact other government's organisations in order to benefit from excess assets?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q31- To what extent do the following require your department to contact other government's organisations in order to the benefit from excess assets?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Evaluating options

Disposal evaluation

Q32- If physical asset is surplus, how Often do you weigh benefit of disposing asset against retention it?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q33- To what extent do the following require your department to evaluate the benefit of disposing asset against retention?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Financial analysis

How Often is the following calculated?

	Never	Rarely	Sometimes	Often	Always
Q34- Net cash flow					
Q35- Who require it					
Q36- Budgetary consideration					
Q37- Who require it					
Q38- Funding sources with cost and revenues					
Q39- Who require it					
Q40- Net present value					
Q41- Who require					
Q42- 70% probability of estimated cost of the initial capital expenditures					
Q43- Who require					
Q44- 70% probability of estimated cost of the life cycle maintenance					
Q45- Who require					
Q46- 70% probability of estimated cost of the life cycle refurbishment					
Q47- Who require					
Q48- 70% probability of estimated cost of the life cycle of operation					
Q49- Who require					
Q50-51- Others (please specify below)					
1.					
2.					
3.					

Economic analysis

Q52- How often do you calculate the economic cost and benefit of required project?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q53- To what extent do the following require your department to calculate the economic cost and benefit of the required projects?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					

2.					
3.					

Market sounding

Q54- If the selected project has a new idea, how Often does your department evaluate the market capability for implementing it?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q55- If the selected project contains a new idea, to what extent do the following require your department to calculate market capability to implement the required projects?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q56- If the selected project is typical, how Often does your department evaluate the market capability for implementing the project?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q57- If the selected project is typical, to what extent do the following require your department to calculate market capability to implement the required projects?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Legislative approval issues

Q58- How often do you take into consideration the impact of the project on environment?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q59- To what extent do the following require your department to evaluate the impact of the project on environment?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q60- How often do you evaluate the impact of the project on planning issues?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q61- To what extent do the following require your department to evaluate the impact of the project on planning issues?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q62- How often do you evaluate the impact of the project on cultural heritage issues?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q63- To what extent do the following require your department to evaluate the impact of the project on cultural heritage issues?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q64- How often do you evaluate the impact of the project on native issues?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q65- To what extent do the following require your department to evaluate the impact of the project on native issues?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Evaluation of the whole-of-government policy issues

Q66- How often do you evaluate the impact of the project on national employment security?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q67- To what extent do the following require your department to evaluate the impact of the project on national employment security?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q68- How often do you evaluate the impact of the project on organisation's employee's structure?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q69- To what extent do the following require your department to evaluate the impact of the project on organisation's employees' structure?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					

1.					
2.					
3.					

Q70- How often do you evaluate the impact of the project on the region?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q71- To what extent do the following require your department to evaluate the impact of the project on the region?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q72- How often do you evaluate the impact of the project on social life?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q73- To what extent do the following require your department to evaluate the impact of the project on social life?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q74- How often do you evaluate the impact of the project on staff training?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q75- To what extent do the following require your department to evaluate the impact of the project on staff training?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					

Others (please specify below)					
1.					
2.					
3.					

Q76- How often do you evaluate the impact of the project on indirect flow-on effects on wages?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q77- To what extent do the following require your department to evaluate the impact of the project on indirect flow-on effects on wages?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					

Q78- How often do you evaluate the impact of the project on government regulation?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q79- To what extent do the following require the organisation to evaluate the impact of the project on government regulation?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Public interest assessment

Q80- How often do you evaluate the impact of the project's effectiveness on meeting service requirement?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q81- To what extent do the following require your department to evaluate the impact of the project's effectiveness on meeting service requirement?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q82- How often do you evaluate the impact of the project on stakeholders?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q83- To what extent do the following require your department to evaluate the impact of the project on stakeholders?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q84- How often do you take accountability into account?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q85- To what extent do the following require your department to take accountability into account?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Q86- How often do you take transparency into account?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q87- To what extent do the following require your department to take transparency into account?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q88- How often do you take public access into account?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q89- To what extent do the following require your department to take public access into account?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q90- How often do you take consumer rights into account?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q91- To what extent do the following require your department to take consumer rights into account?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q92- How often do you take public security into account?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q93- To what extent do the following require your department to take public security into account?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q94- How often do you take public privacy into account?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q95- To what extent do the following require your department to take public privacy into account?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

PROGRAMME MANAGEMENT

Formulation of programmes

Q98- How often do you link separate projects together in order to reap benefits that are not available if projects are managed separately?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q99- To what extent do the following require the department to link separate projects together in order to reap benefits that are not available if projects are managed separately?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q96- How often does your department put separate projects together in one contract?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q97- To what extent the following require your department to put separate projects together in one contract?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

To what extent are the following factors used for grouping different projects together in order to reap benefits from combining them?

	Never	Rarely	Sometimes	Often	Always
Q102- Dependency on each other's					
Q103- Who require					
Q104- Shared specification					
Q105- Who require					
Q106- Cost reduction					
Q107- Who require					
Q108- Risk mitigation					
Q109- Who require					
Q110- Contractor strength					
Q111- Who require					
Q112- The same region					
Q113- Who require					
Q114-115 Others (please specify below)					
1.					
2.					
3.					

Managing programs

Q100- How often do you make sure the benefit from grouping those projects is realized?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q101- To what extent do the following require the organisation to make sure the benefit from grouping those projects is realized?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					

PROTFOLIO MANAGEMENT

Aligning process group portfolio

Q116- How often do you rank projects based on their priority of achieving the organisation's mission?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q117- To what extent do the following require your department to rank projects based on their priority to achieve the organisation's mission?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q118- How often do you categorize grouped and individual projects?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q119- To what extent do the following require your department to categorize grouped and individual projects?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q120- How often do you evaluate grouped and individual projects?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q121- To what extent do the following require your department to evaluate grouped and individual projects?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q122- How often do you select the required individual and grouped projects from the pole of evaluated individual and grouped projects to achieve the organisation mission?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q123- To what extent do the following require the organisation to select the required individual and grouped projects from the pole of evaluated individual and grouped projects to achieve the organisation mission?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q124- How often do you balance the list of the selected individual and grouped projects for the best benefit to the organisation?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q125- To what extent do the following require the organisation to balancing the list of the selected individual and grouped projects for the best benefit to the organisation?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Monitoring portfolio

Q126- After getting approval for implementing the proposed portfolio, how Often are some of these projects not needed anymore?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q127- After getting approval for the implementation the proposed portfolio, to what extent do the following require your department to monitor the persist need for projects?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard experience					
Others (please specify below)					
1.					
2.					
3.					

Q128- After getting approval for the implementation of the proposed portfolio, how Often do you make sure the resources are used sensibly?

Never.....Rarely.....Sometimes.....Often.....Always.....

Q129- To what extent do the following require your department to make sure the resources are used sensibly?

	Never	Rarely	Sometimes	Often	Always
Organisation's policy					
Professional standard					
experience					
Others (please specify below)					
1.					
2.					
3.					

Having finished all the required questions do you like to add any comments, feelings or practices that you find useful for the physical assets management practices?

Having finished the entire interview I do appreciate your participation and thank you very much

APPENDIX C

LETTER OF PERMISSION

Dear Sir,

July 2012

Improving asset management practices in Saudi public sector

My name is Naief Alhazmi. I am currently doing a PhD in Physical Asset Management at the University of Leeds in the UK. The aim of my study is to improve the asset management practices in the Saudi public sector.

As part of my studies I am trying to understand the formality of the current processes and procedures for developing physical assets in the Saudi public sector. I feel that your organisation can make a valuable contribution to my study. I would appreciate your help with my studies. I would like to interview you about assets and projects management practices in the public sector. I assure you that your responses will remain confidential and anonymous and only be used for my PhD purposes. Your participation will be really appreciated. The interview will last approximately one hour. The discussion and responses will be about the current managerial practices in your organisation.

I should be grateful if you would confirm if it is possible to meet and/or to arrange suitable other time. It is normal practice when undertaking such studies to provide collaborating organisations with details of the study's findings if they request.

If you have any queries as to the authenticity of this request my project supervisor can be contacted. My researcher supervisor's contact details are as follows:

Mr Krisen Moodley
School of Civil Engineering
University of Leeds
Ls2 9JT
UK
Telephone number: 01133432329
E-mail: K.moodley@leeds.ac.uk.

Thank you for your time and consideration.

Yours faithfully,

Naief Alhazmi
Research student

**APPENDIX D
CONCENT FORM**

<u>Title of the study : Improving AM practices in the SPS</u>	Please confirm agreement to the statements by putting your initials in the box below
I have read and understood the participant information sheet	
I have had the opportunity to ask questions and discuss this study	
I have received satisfactory answers to all of my questions	
I have received enough information about the study	
I understand that I am free to withdraw from the study:-	
I understand that any information I provide, including personal details, will be confidential, stored securely and only accessed by those carrying out the study.	
I understand that any information I give may be included in published documents but all information will be anonyms.	
I agree to take part in this study	
Participant Signature	Date
Name of Participant	
Researcher Signature	Date
Name of Researcher	

APPENDIX E

INFORMATION SHEET

INFORMATION SHEET

Study title: Improving asset management practices in the SPS.

Researchers: Naief alhazmi

1. What is the purpose of this study?

This study aims to improve the current practices of Saudi public sector by, firstly, finding out the deficiencies and problems of the current practices and later attempts to improve it by introducing action plan or road map for the public sector.

2. Do I have to take part?

No, you do not have to take part of the study and you are not entitled to be part of the study but participation is voluntary action. If you do participate, you also have the complete right to withdraw from the study at any time. Your comments and views will remain anonymous.

3. How do I complete the questionnaire / (insert methodology details) ?

You do not need to fill in the questionnaire by yourself, the researcher will interview you and ask you all the required questions and in the same time, the researcher will fill in your responses. All this procedure will happen if your time permits for that.

4. Will my taking part in this study be kept confidential?

All your responses will be kept in a safe place and stay confidential. Nobody will share the researcher in all the collected data.

5. What's in it for me?

The benefit from this research will affect all the public servants and you are one of them. The benefit comes in a form of improving the practices of asset management in Saudi Arabia.

6. Results of the study?

Your views from the interview will be analysed together with those from the other participants in the study. The results will be summarised and used to generate a list of attitude statements that will be developed into a questionnaire for measuring the practices. The results will also be used for publishing papers in journal. Your comments and views will remain anonymous.

7. Who has reviewed the study?

Ethical review of the study,

8. Consent

The attached litter include the consent form in order to get permission for the study.

Contact details for further information:

If you would like more information about this research, please contact Naief Alhazmi on 0554202001

Thank you for taking time to read this information.

Researcher

Supervisor

APPENDIX F

ETHICAL APPROVAL LETTER

Performance, Governance and Operations
Research & Innovation Service
Charles Thackrah Building
101 Clarendon Road
Leeds LS2 9LJ
Tel: 0113 343 4873
Email: j.m.blaikie@leeds.ac.uk



UNIVERSITY OF LEEDS

Naief Alhazmi
Civil Engineering
University of Leeds
Leeds, LS2 9JT

**MEEC Faculty Research Ethics Committee
University of Leeds**

16 March 2014

Dear Naief

Title of study Improving asset management practices in Saudi Public sector
Ethics ref MEEC 11-018

I am pleased to inform you that the application listed above has been reviewed by the MaPS and Engineering joint Faculty Research Ethics Committee (MEEC FREC) and following receipt of your response to the Committee's initial comments, I can confirm a favourable ethical opinion as of the date of this letter. The following documentation was considered:

Document	Version	Date
MEEC 11-018 Fieldwork risk assessment.doc	2	26/06/12
MEEC 11-018 provisional opinion.doc	2	26/06/12
MEEC 11-018 RM form signature.pdf	2	26/06/12
MEEC 11-018 Ethical_Review_Form_V3.doc	3	27/06/12
MEEC 11-018 letter to request participation.docx	1	26/06/12
MEEC 11-018 the information and consent forms.pdf	3	27/06/12
MEEC 11-018 ethical form signature.pdf	2	26/06/12
MEEC 11-018 rough outline for the structured interview.docx	1	08/12/11

Please notify the committee if you intend to make any amendments to the original research as submitted at date of this approval, including changes to recruitment methodology. All changes must receive ethical approval prior to implementation. The amendment form is available at www.leeds.ac.uk/ethics.

Please note: You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, and other documents relating to the study. This should be kept in your study file, which should be readily available for audit purposes. You will be given a two week notice period if your project is to be audited. There is a checklist listing examples of documents to be kept which is available at http://researchsupport.leeds.ac.uk/index.php/academic_staff/good_practice/other_information_nhs_sites in the 'Other useful documentation' section.

Yours sincerely

Jennifer Blaikie
Senior Research Ethics Administrator, Research & Innovation Service
On behalf of Professor Gary Williamson, Chair, [MEEC FREC](#)
CC: Student's supervisor(s)

APPENDIX G
TABLES FOR
IMPLIATIONS OF AM CHARACTERISTICS
IN SPS

Table G1a. Practice analysis.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
1	Identifying stage	How often does your department write down the mission of the organisation when you submit the required project to the ministry of finance?	15					1		1
2	External environment	How often does your department forecast the demand on organisation's the services?	10			3	2	1		5
3	Physical asset failure	How often does your department forecast the future failure of physical assets in delivering the required services?	12		2	1		1		4
4	Present strategy	How often do you calculate the minimum required physical asset in order to deliver your organisation's services?	12		1	1	1	1		5
5		How often do you revise the organisation's physical assets locations in order to know their effectiveness in delivering the organisation's mission?	9	2	4			1		3
6		How often do you investigate the physical assets contribution to the organisation's mission?	14		1			1		3
7	Performance indicators	How often do you follow written official criteria when you diagnose the state of physical assets?	12		2	1		1		4
8	Generating options	When the need for new physical assets was confirmed, how often do you attempt to find a non-asset solution in order to achieve the organisation's mission?	14		1			1		3
9		If physical asset is surplus, how often do you contact other government's organisations in order to benefit from excess assets?	8	6			1	1		2
10	Evaluation practices	If physical asset is surplus, how often do you weigh benefit of disposing asset against retention it?	4	3	2	4	2	3	2.8*	5
11		Net cash flow	14				1	1		5

* Normality test is presented in Appendix H.

Table G1b. Continuation of practice analysis.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
12	Evaluation practices	Budgetary consideration					15	5		5
13		Funding sources with cost and revenues	15					1		1
14		Net present value	15					1		1
15		70% probability of estimated cost of the initial capital expenditure			1	1	13	5		5
16		70% probability of estimated cost of the life cycle maintenance	15					1		1
17		70% probability of estimated cost of the life cycle refurbishment	15					1		1
18		70% probability of estimated cost of the life cycle of operation	15					1		1
19		If the selected project has a new idea, how often do your department evaluate the market capability for implementing it?	10	1		2	2	1		5
20		If the selected project is typical, how often do your department evaluate the market capability for implementing the project?	13				2	1		5
21		How often do you take into consideration the impact of the project on environment?	9	2		3	1	1		5
22		How often do you evaluate the impact of the project on planning issues?	3	4	2	1	5	3		5
23		How often do you evaluate the impact of the project on cultural heritage issues?	12	2	1			1		3
24		How often do you evaluate the impact of the project on native issues?	5	3	4	1	2	2		5
25		How often do you evaluate the impact of the project on national employment security?	14				1	1		5

Table G1c. Continuation of practice analysis.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
26	Evaluation practices	How often do you evaluate the impact of the project on organisation's employee's structure?	15					1		1
27		How often do you evaluate the impact of the project on the region?	7	2	2	1	3	2		5
28		How often do you evaluate the impact of the project on social life?	8	4	1		2	1		5
29		How often do you evaluate the impact of the project on staff training?	14	1				1		2
30		How often do you evaluate the impact of the project on indirect flow-on effects on wages?	15					1		1
31		How often do you evaluate the impact of the project on government regulation?	7	4	2		2	2		5
32		How often do you evaluate the impact of the project's effectiveness based on meeting service requirement?	13	1	1			1		3
33		How often do you evaluate the impact of the project on stakeholders?	6	5	3	1		2		4
34		How often do you take accountability into account?	10	1	1	1	2	1		5
35		How often do you take transparency into account?	1	2		6	6	5		5
36		How often do you take public access into account?	7	1	1	3	3	2		5

Table G1d. Continuation of practice analysis.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
37		How often do you take consumer rights into account?	15					1		1
38		How often do you take public security into account?	15					1		1
39		How often do you take public privacy into account?	13	1	1			1		3
40	Programme management	How often do your department put together separate projects under one contract?	4	4	7			2		3
41		How often do you make sure the benefit from grouping projects was realized?	14			1		1		4
42		Common region	2		6	5	2	3		5
43	Portfolio management	How often do you rank projects based on their priority of achieving the organisation's mission?	1				14	5		5
44		How often do you categorize grouped and individual projects?	12				3	1		5
45		How often do you evaluate grouped and individual projects?	15					1		1
46		How often do you select the required individual and grouped projects from pole of evaluated individual and grouped projects to achieve the organisation mission?	15					1		1
47		How often do you balance the list of the selected individual and grouped projects for the best benefit to the organisation?	15					1		1

Table G1e. Continuation of practice analysis.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
48	Portfolio management	After getting approval for implementing the proposed portfolio, how often some of those projects are not needed anymore?	5	10				2		2
49		After getting approval for implementing portfolio, how often do you make sure the resources are used sensibly?	15					1		1

Table G2a. Organisational policy base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
1	Identifying stage	How often does your department write down the mission of the organisation when you submit the required project to the ministry of finance?	15					1		1
2	External environment	How often does your department forecast the demand on organisation's services?	15					1		1
3	Physical asset failure	How often does your department forecast the future failure of physical assets in delivering the required services?	15					1		1
4	Present strategy	How often do you calculate the minimum required physical asset in order to deliver your organisation's services?	15					1		1
5		How often do you revise the organisation's physical assets locations in order to know their effectiveness in delivering the organisation's mission?	15					1		1
6		How often do you investigate the physical assets contribution to the organisation's mission?	15					1		1
7	Performance indicators	How often do you follow written official criteria when you diagnose the state of physical assets?	13		1	1		1		4
8	Generating options	When the need for new physical assets was confirmed, how often do you attempt to find a non-asset solution in order to achieve the organisation's mission?	15					1		1
9		If physical asset is surplus, how often do you contact other government's organisations in order to benefit from excess assets?	15					1		1

Table G2b. Continuation of Organisational policy base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
10	Evaluation practices	If physical asset is surplus, how often do you weigh benefit of disposing asset against retention it?	15					1		1
11		Net cash flow	15					1		1
12		Budgetary consideration	2				13	5		5
13		Funding sources with cost and revenues	15					1		1
14		Net present value	15					1		1
15		70% probability of estimated cost of the initial capital expenditure	2				13	5		5
16		70% probability of estimated cost of the life cycle maintenance	15					1		1
17		70% probability of estimated cost of the life cycle refurbishment	15					1		1
18		70% probability of estimated cost of the life cycle of operation	15					1		1
19		If the selected project has a new idea, how often do your department evaluate the market capability for implementing it?	15					1		1
20		If the selected project is typical, how often do your department evaluate the market capability for implementing the project?	15					1		1
21		How often do you take into consideration the impact of the project on environment?	15					1		1
22		How often do you evaluate the impact of the project on planning issues?	12	1			2	1		5
23		How often do you evaluate the impact of the project on cultural heritage issues?	15					1		1
24		How often do you evaluate the impact of the project on native issues?	15					1		1
25		How often do you evaluate the impact of the project on national employment security?	14				1	1		5

Table G2c. Continuation of Organisational policy base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
26	Evaluation practices	How often do you evaluate the impact of the project on organisation's employee's structure?	15					1		1
27		How often do you evaluate the impact of the project on the region?	15					1		1
28		How often do you evaluate the impact of the project on social life?	15					1		1
29		How often do you evaluate the impact of the project on staff training?	15					1		1
30		How often do you evaluate the impact of the project on indirect flow-on effects on wages?	15					1		1
31		How often do you evaluate the impact of the project on government regulation?	15					1		1
32		How often do you evaluate the impact of the project's effectiveness based on meeting service requirement?	15					1		1
33		How often do you evaluate the impact of the project on stakeholders?	15					1		1
34		How often do you take accountability into account?	15					1		1
35		How often do you take transparency into account?	2				13	5		5
36		How often do you take public access into account?	15					1		1
37		How often do you take consumer rights into account?	15					1		1
38		How often do you take public security into account?	15					1		1
39		How often do you take public privacy into account?	15					1		1
40	Programme management	How often do your department put together separate projects under one contract?	15					1		1
41		How often do you make sure the benefit from grouping projects was realized?	15					1		1
42		Common region	15					1		1

Table G2d. Continuation of Organisational policy base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
43	Portfolio management	How often do you rank projects based on their priority of achieving the organisation's mission?	13		1		1	1		3
44		How often do you categorize grouped and individual projects?	15					1		1
45		How often do you evaluate grouped and individual projects?	15					1		1
46		How often do you select the required individual and grouped projects from pole of evaluated individual and grouped projects to achieve the organisation mission?	15					1		1
47		How often do you balance the list of the selected individual and grouped projects for the best benefit to the organisation?	15					1		1
48		After getting approval for implementing the proposed portfolio, how often some of those projects are not needed anymore?	14			1		1		4
49		After getting approval for implementing portfolio, how often do you make sure the resources are used sensibly?	15					1		1

Table G2e. Professional standards base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
1	Identifying stage	How often does your department write down the mission of the organisation when you submit the required project to the ministry of finance?	15					1		1
2	External environment	How often does your department forecast the demand on organisation's services?	14				1	1		5
3	Physical asset failure	How often does your department forecast the future failure of physical assets in delivering the required services?	15					1		1
4	Present strategy	How often do you calculate the minimum required physical asset in order to deliver your organisation's services?	14			1		1		4
5		How often do you revise the organisation's physical assets locations in order to know their effectiveness in delivering the organisation's mission?	15					1		1
6		How often do you investigate the physical assets contribution to the organisation's mission?	15					1		1
7	Performance indicators	How often do you follow written official criteria when you diagnose the state of physical assets?	14			1		1		4
8	Generating options	When the need for new physical assets was confirmed, how often do you attempt to find a non-asset solution in order to achieve the organisation's mission?	15					1		1
9		If physical asset is surplus, how often do you contact other government's organisations in order to benefit from excess assets?	14		1			1		3
10	Evaluation practices	If physical asset is surplus, how often do you weigh benefit of disposing asset against retention it?	14			1		1		4
11		Net cash flow	14				1	1		5
12		Budgetary consideration	15					1		1

Table G2f. Continuation of Professional standards base practices. Source: Author.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
13	Evaluation practices	Funding sources with cost and revenues	15					1		1
14		Net present value	15					1		1
15		70% probability of estimated cost of the initial capital expenditure	15					1		1
16		70% probability of estimated cost of the life cycle maintenance	15					1		1
17		70% probability of estimated cost of the life cycle refurbishment	15					1		1
18		70% probability of estimated cost of the life cycle of operation	15					1		1
19		If the selected project has a new idea, how often do your department evaluate the market capability for implementing it?	15					1		1
20		If the selected project is typical, how often do your department evaluate the market capability for implementing the project?	15					1		1
21		How often do you take into consideration the impact of the project on environment?	11			1	3	1		5
22		How often do you evaluate the impact of the project on planning issues?	15					1		1
23		How often do you evaluate the impact of the project on cultural heritage issues?	14			1		1		4
24		How often do you evaluate the impact of the project on native issues?	15					1		1
25		How often do you evaluate the impact of the project on national employment security?	15					1		1
26		How often do you evaluate the impact of the project on organisation's employee's structure?	15					1		1
27		How often do you evaluate the impact of the project on the region?	15					1		1
28		How often do you evaluate the impact of the project on social life?	14				1	1		5
29		How often do you evaluate the impact of the project on staff training?	15					1		1

Table G2g. Continuation of Professional standards base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
30	Evaluation practices	How often do you evaluate the impact of the project on indirect flow-on effects on wages?	15					1		1
31		How often do you evaluate the impact of the project on government regulation?	14			1		1		4
32		How often do you evaluate the impact of the project's effectiveness based on meeting service requirement?	15					1		1
33		How often do you evaluate the impact of the project on stakeholders?	15					1		1
34		How often do you take accountability into account?	15					1		1
35		How often do you take transparency into account?	15					1		1
36		How often do you take public access into account?	9		1	3	2	1		5
37		How often do you take consumer rights into account?	15					1		1
38		How often do you take public security into account?	15					1		1
39		How often do you take public privacy into account?	15					1		1
40	Programme management	How often do your department put together separate projects under one contract?	15					1		1
41		How often do you make sure the benefit from grouping projects was realized?	15					1		1
42		Common region	15					1		1
43	Portfolio management	How often do you rank projects based on their priority of achieving the organisation's mission?	15					1		1
44		How often do you categorize grouped and individual projects?	15					1		1
45		How often do you evaluate grouped and individual projects?	15					1		1
46		How often do you select the required individual and grouped projects from pole of evaluated individual and grouped projects to achieve the organisation mission?	15					1		1

Table G2h. Continuation of Professional standards base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
47	Portfolio alignment	How often do you balance the list of the selected individual and grouped projects for the best benefit to the organisation?	15					1		1
48		After getting approval for implementing the proposed portfolio, how often some of those projects are not needed anymore?	15					1		1
49		After getting approval for implementing portfolio, how often do you make sure the resources are used sensibly?	15					1		1

Table G2i. Experience base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
1	Identifying stage	How often does your department write down the mission of the organisation when you submit the required project to the ministry of finance?	15					1		1
2	External environment	How often does your department forecast the demand on organisation's services?	10				5	1		5
3	Physical asset failure	How often does your department forecast the future failure of physical assets in delivering the required services?	12			1	2	1		5
4	Present strategy	How often do you calculate the minimum required physical asset in order to deliver your organisation's services?	13			1	1	1		5
5		How often do you revise the organisation's physical assets locations in order to know their effectiveness in delivering the organisation's mission?	10				5	1		5
6		How often do you investigate the physical assets contribution to the organisation's mission?	14				1	1		5
7	Performance indicators	How often do you follow written official criteria when you diagnose the state of physical assets?	14				1	1		5
8	Generating options	When the need for new physical assets was confirmed, how often do you attempt to find a non-asset solution in order to achieve the organisation's mission?	14				1	1		5
9		If physical asset is surplus, how often do you contact other government's organisations in order to benefit from excess assets?	8				7	1		5
10	Evaluation practices	If physical asset is surplus, how often do you weigh benefit of disposing asset against retention it?	4			1	10	5		5
11		Net cash flow	15					1		1
12		Budgetary consideration					15	5		5
13		Funding sources with cost and revenues	15					1		1

Table G2j. Continuation of Experience base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
14	Evaluation practices	Net present value	15					1		1
15		70% probability of estimated cost of the initial capital expenditure?					15	5		5
16		70% probability of estimated cost of the life cycle maintenance?	15					1		1
17		70% probability of estimated cost of the life cycle refurbishment?	15					1		1
18		70% probability of estimated cost of the life cycle of operation?	15					1		1
19		If the selected project has a new idea, how often do your department evaluate the market capability for implementing it?	10				5	1		5
20		If the selected project is typical, how often do your department evaluate the market capability for implementing the project?	13				2	1		5
21		How often do you take into consideration the impact of the project on environment?	10			1	4	1		5
22		How often do you evaluate the impact of the project on planning issues?	4			1	10	5		5
23		How often do you evaluate the impact of the project on cultural heritage issues?	12				3	1		5
24		How often do you evaluate the impact of the project on native issues?	5				10	5		5
25		How often do you evaluate the impact of the project on national employment security?	14				1	1		5
26		How often do you evaluate the impact of the project on organisation's employee's structure?	15					1		1
27		How often do you evaluate the impact of the project on the region?	7				8	5		5
28		How often do you evaluate the impact of the project on social life?	8				7	1		5

Table G2k. Continuation of Experience base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
29	Evaluation practices	How often do you evaluate the impact of the project on staff training?	14				1	1		5
30		How often do you evaluate the impact of the project on indirect flow-on effects on wages?	15					1		1
31		How often do you evaluate the impact of the project on government regulation?	7			1	7	4		5
32		How often do you evaluate the impact of the project's effectiveness based on meeting service requirement?	13				2	1		5
33		How often do you evaluate the impact of the project on stakeholders?	6				9	5		5
34		How often do you take accountability into account?	10				5	1		5
35		How often do you take transparency into account?	11			1	3	1		5
36		How often do you take public access into account?	7			2	6	4		5
37		How often do you take consumer rights into account?	15					1		1
38		How often do you take public security into account?	15					1		1
39	How often do you take public privacy into account?	13				2	1		5	
40	Programme management	How often do your department put together separate projects under one contract?	4				11	5		5
41		How often do you make sure the benefit from grouping projects was realized?	14				1	1		5
42		Common region	2				13	5		5
43	Portfolio management	How often do you rank projects based on their priority of achieving the organisation's mission?	1				14	5		5
44		How often do you categorize grouped and individual projects?	12				3	1		5
45		How often do you evaluate grouped and individual projects?	15					1		1

Table G2l. Continuation of Experience base practices.

Practice No.	STAGE	Question	Never	Rare	Sometimes	Often	Always	median	mean	BR
46	Portfolio alignment	How often do you select the required individual and grouped projects from pole of evaluated individual and grouped projects to achieve the organisation mission?	15					1		1
47		How often do you balance the list of the selected individual and grouped projects for the best benefit to the organisation?	15					1		1
48		After getting approval for implementing the proposed portfolio, how often some of those projects are not needed anymore?	5				10	5		5
49		After getting approval for implementing portfolio, how often do you make sure the resources are used sensibly?	15					1		1

APPENDIX H

NORMALITY TEST

Appendix G presented the central tendency of the recorded values for each practice's question. Mean and median score is decided according to the normality test results. However, most of the practices' questions scores do not need quantitative analysis because majority of them is skewed either to right or left. Only one practice needs to be tested against normal distribution of the data in order to make the right decision, practice no. 10 of table G1a:

If physical asset is surplus, how often do you weigh benefit of disposing asset against retention it?

According to the normality test using SPSS, Shapiro test determines the data is significant with $p = 0.055$, therefore, this result means that the data is not normally distributed but the result is inconclusive and it is close to be normally distributed. Therefore, the mean and median of the data are calculated and found them close to each other.