

**Department of Construction Economics Management**



**Title: Identifying and managing the factors needed to implement Benefits Realization Management frameworks in publicly funded innovation projects in South African context.**

**A Research Report presented to the  
Department of Construction Economics and Management**

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## Abstract

Innovation projects seeks to bring fourth new technology products or services to the marketplace (community) to respond to broader socio-economic challenges. Innovation projects have elements of complexity and uncertainty which often fails to meet stakeholder expectations. This requires the need to determine requirements which need to be considered while dealing with publicly funded innovation projects so as to ensure project benefits are realised.

The objective of the study is to *identify factors needed to implement Benefit Realisation Management (BRM) frameworks in managing publicly funded innovation projects*. BRM framework was unpacked in assessing its role on publicly funded innovation in ensuring project benefits achievement. The framework was applied in assessing innovation projects within the Department of Science and Innovation (DSI).

A qualitative research methodology was employed as to achieve the project objectives of the study. An in-depth approach was used through face to face interviews in collecting primary data from study respondents within the DSI. The study participants entailed project managers on two government level of authority, namely middle and senior management.

The study output revealed the critical role of a BRM framework in achieving project benefits and meeting stakeholder's expectations. To ensure that project benefits are realised, factors such as **project governance, return on investment, project success and value creation** need to be taken into account. Furthermore, a relationship between BRM and business strategy need to co-exist for project benefits realisation. The BRM framework is essential and should play a central role in every project implemented. The framework quantifies the need for project stakeholders to embrace the modern approach of assessing projects without limiting it on the constraints of time, cost and quality also known as the iron triangle. Project should be assessed based on the impact and benefit derived and the BRM framework is a critical tool to effect it.

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## **CHAPTER 1: INTRODUCTION**

### **1.1 Chapter overview**

This chapter introduces the research problem, the research question and research objectives to the reader. This chapter also briefly discusses innovation and Benefits Realization Management (BRM). Finally the research method applied in the report and the structure of the report is briefly discussed. For purpose of clarity: It should be noted that Benefits Management, BRM mean the same thing and the study will adopt the use of BRM.

### **1.2 South Africa overview**

South Africa has a long history of embracing innovation but according to the (World Bank Group, 2017) the country has been experiencing a challenge, in particular with its productivity and this has been a hindrance for fostering development of innovation. Successful innovations were recorded at 27.2% while unsuccessful innovations were recorded at 38.2%, this shows a relatively lower introduction of innovative products/services in the market (Moses et al., 2012).

Globally, countries are assessed on innovation index capability based on a quality of its human capital development structures (universities, quality scientific publications and new knowledge generation) and technology outputs (Cornell University, INSEAD & World Intellectual Property Organisation, 2020). The global innovation index offers a metric instrument on the country's innovation performance and assessment is done based on average innovation input and output, in 2017, South Africa was ranked 54 out of 127 countries on the index (National Advisory Council on Innovation, 2017a). South Africa innovation outputs have risen very slowly and by 2020, the country is estimated to rank below lower middle income countries (National Advisory Council on Innovation, 2020). Enhancing research innovation outputs is important taking in account country competitiveness at global level and South Africa has commercialised about 7.5% of actionable disclosures (intellectual property) (Department of Science and Technology, 2018).

Wang, Kunc and Bais (2017) suggest that the rapidly changing environment and uncertainties revolving around projects can be a factor that result in project failure. In the case of publicly funded innovation, the high levels of failure could be attributed to planning and control methods that are not really effective tools to manage the projects and these tend to stifle innovation outputs (Kapsali, 2011).

The public sector is mandated to drive innovation through creation of a conducive environment designed to support innovation in both sectors of the economy (public and private) (National Advisory Council on Innovation, 2017a). The South Africa government is the primary source of funding for innovation activities and it is expected to achieve its ambitions on issues of economy, education, health and mineral beneficiation through innovation outputs (Department of Science and Technology, 2018). Government funds innovation projects through financing of research and development (R&D) activities (Hendry, Harborne & Brown, 2010) and with a clear focus of achieving maximum benefits (Caglar & Gurel, 2019). In funding innovation, government makes use of two modes, which is direct funding (this includes funding instruments from the Department of Science and Innovation (DSI), Department of Trade, Industry and Competition, Technology Innovation Agency and Industrial Development Corporation) and indirect funding (R&D Tax Incentive and Venture Capital Company) (National Advisory Council on Innovation, 2017a).

Innovation process is a reaction towards competitive pressures (European Communities, 2004) and is not complete unless it includes desired economic and social impacts to its stakeholders (National Advisory Council on Innovation, 2017a). Innovation is described as introduction of “new or improved products or process that differ significantly from the unit’s previous products or process and that has been made available to potential users (products) or brought into use by the unit (process)” (Organisation for Economic Co-operation and Development, 2018:20). As part of its impact, innovation is seen as important for the country’s economic growth (Department of Science and Technology, 2017).

Innovation theory argues that innovation does not take place in exclusion of others, but relies on different types of actors/stakeholders, playing different roles along the value chain (Bloch & Bugge, 2013). These actors are government, academia and industry (National System of Innovations (NSI)), which play an essential role in promoting innovation through its strategy and decision-making (Department of Science and Technology, 2018).

The Triple Helix approach was developed to ensure that there is a close working relationship between government, industry and academia to ensure that innovation is achieved (Klitkou & Godoe, 2013). The South African Triple Helix approach, in which the NSI underpins innovation and other priorities for national development has noted that there is a need to demonstrate tangible benefits which can be achieved on projects (Dassah & Uken, 2010). Financial resources have a huge impact on the activities of NSI actors and government funds innovation activities in different approaches though they are still challenges in tracking project benefits (National Advisory Council on Innovation, 2017b).

It is continuously found challenging to offer funding incentives for innovation activity through the use of formal contract and rules only (Nishimura & Okamuro, 2018). Hence decision-makers need a tool, which they can use for efficient and fair allocation of resources among different project categories (Caglar & Gurel, 2019). Government financial pressures require that there should be better use of financial resources for innovation projects in order to achieve specific outcomes (Department of Science and Technology, 2017).

When investment is made on new projects, the use of traditional methods to evaluate projects tends to stifle innovation (Keegan & Turner, 2002; Kapsali, 2011) hence it is difficult to secure financial resources for projects (Wang, Li & Furman, 2017). Organisations struggle to measure the benefits delivered through their portfolio in comparison with the funds invested in the projects (Mossalom & Arafa, 2016). Hence there are still a number of innovations taking place but government lacks instruments to assess or measure the impact created (Bloch & Bugge, 2013).

Publicly funded innovation projects are challenging with regards to assessment of underlying issues of complexity and dynamics associated with them (Kim, Kim & Kim, 2017). Additionally, assessment of net present value of these projects is also a challenge (Keegan & Turner, 2002). This is further exacerbated by identifying which projects should be supported based on factors such as technologies and business opportunities that will come out (Wang, Li & Furman, 2017). Therefore, there is a need to develop a framework which will be used to measure innovation within the public sector's space (Bloch & Bugge, 2013).

### **1.3 Background to the research problem**

The traditional tools of project management highlight the importance of efficiency in managing projects, but pressure is laid on delivering the project within the predetermined well known iron triangle criteria, of cost, time and quality (Keegan & Turner, 2002). The iron triangle is a fundamental aspect of understanding project success and also serves as representation of basic criteria on which project success is measured (Pollack, Helm & Adler, 2018).

The conventional approach is incomplete in measuring project success (Musawir et al., 2017) and although recent project management practices have improved in delivering project within the time, cost and quality criteria, challenges are still being experienced in achieving project benefits (Zwikael, Chih & Meredith, 2018). This calls for a shift from focusing solely on the traditional iron triangle in assessing project to a focus-on the benefits to be delivered by the projects (Mossalom & Arafa, 2016).

Failure of a project to satisfy the measure of time, cost and quality does not necessarily perceive it as a failure or successful as a project can meet the set criteria but still deliver an unsuccessful business experience (Gomes & Ramao, 2016). Ford Taurus project was completed later than the scheduled timeframe but it turned out to be successful in terms of its commercialisation aspects in the market (Svejvig, Geraldi & Grex, 2019).

However, numerous projects do not achieve the objectives set in the inception phase and there has been pressure to achieve project benefits to the funders (Musawir et al, 2017). Projects are risky, the likelihood of success is uncertain, for example 70% of drug developed and commercialised in the market have failed to return the cost of capital (Bar & Gordon, 2014).

It is important to note efforts that have been made globally to measure government-funded projects to yield positive results (Kim, Kim & Kim, 2017). Governments of emerging countries have developed mechanisms to assess funding for innovation support programmes (Caglar & Gurel, 2019). Though limited research has been done on factors contributing to organisations ability to achieve innovation impact from government support scheme (Spanos, Vonortas & Voudouris, 2015).

Benefits are a flow of value from project outputs and reasons why organisation makes investment in a project (Musawir et al., 2017). Benefit is defined as a “gain realised by the organisation and beneficiaries through portfolio, program or project outputs and resulting outcomes” (Project Management Institute, 2018:2). Benefits are measured through improvement and positive change, which brings advantage to a project (Andrade, Fernandes & Tereso, 2016). Benefits are regarded as return on investment in a project by its stakeholders/funders (Zwikael, Meredith & Smyrk, 2019). Project benefits are divided into two types of benefits namely; tangible can be measured in terms of objectivity, quantitative and even financial way and intangible can be assessed through subjective and qualitative measures (Andrade, Fernandes & Tereso, 2016).

BRM is a new concept, which seeks to ensure that checks need to be done as to confirm that there is a relationship between practices aiming to achieve organisational strategic goals through project implementation (Mossalam & Arafa, 2016). BRM aims to deliver value and attract benefits to ensure that project objectives are translated into benefits (Svejvig, Geraldi & Grex, 2019).

“BRM and its consequences as incurred by project management to realize pre-defined project benefits” (Badewi, 2016:763). BRM has been positioned as a response to project, which had challenges in meeting project benefits (Zwikael, Chih & Meredith, 2018; Breese et al., 2015).

A BRM framework is a fundamental mechanism for ensuring that there is accountability in government on the use of public funds (Breese, 2012). There is a need to account for the use of investment made in a project, which further resulted into adoption of a BRM framework and such introduction in project management was a response to investment made but not achieving its objectives (Breese et al., 2015; Breese, 2012). The focus on project constraints for success solely has shifted with attention to BRM framework which tend to ensure benefits are realised from project completion (Badewi, 2016).

Project can be completed within the time, cost and planned performance but actual fails to meet its envisaged benefits to its stakeholders (Serrador & Turner, 2014). BRM has become an important driver for project and is now used for project assessment by achieving its benefits rather than evaluating success only based on the triangle measure, previously known as the traditional approach (Mossalam & Arafa, 2016).

Organisations use projects to implement their business strategy and adopt BRM framework to make strategic relevance of each project and it further helps them to reduce project failure rates (Serra & Kunc, 2015). The lack of using a BRM framework to realize project benefits can result in a loss of investment within a project (Zwikael, Chih & Meredith, 2018). Adoption of a BRM framework can help project managers address high failures on projects (Breese et al., 2015).

BRM framework can be used in two areas within the organisation, firstly at strategic level, it can assist them to allocate resources and secondly, to improve the uptake, usability, efficiency, effectiveness and benefits provided by projects (Economic Co-operation and Development, 2007).

Creation of value by implementing the organisational strategy relies on programme and project achieving benefits (Serra & Kunc, 2015). Different methods on BRM were developed and what is important is the connection amongst projects, benefits and value (Breese et al., 2015).

Return on an investment is important as to establish relationship between resources invested and benefits received (Andrade, Fernandes & Tereso, 2016). Project value can be understood as far as it meets customer needs, aligns project outputs with strategy and return on investment (Badewi, 2016; Musawir et al., 2017). The use of BRM was a response to project where investment was made with no follow-up while it seeks to incorporate cost and benefits analyses in project management process (Organisation for Economic Co-operation and Development, 2007).

In the past, most focus on project management was on dealing with scheduling problems in order to ensure that there is project success but however, the current focus is on factors that determine project success or failure (Belassi, 1996). To achieve project success there are two steps that need to be taken into account and these entail appraisal (done before the beginning of a project) and evaluation (conducted during the phase out of the project), project implementation within the context of return on investment (Serra & Kunc, 2015).

There is a growing need to demonstrate commercial benefits of publicly funded research output towards its citizens and ultimately economic development (Lanskoronskis, Ramoniene & Barsaukas, 2009). In South Africa, there has been a growing need for the demonstration of tangible benefits, impact or value that has been achieved in a project to its stakeholders (Dassah & Uken, 2010). About 83% of organisations lacks BRM framework and they do not realize expected benefits from project they implement (Zwikael, Meredith & Smyrk, 2019).

The impact of innovation can only be realised when such technology products or services achieve benefits for users (World Bank Group, 2017). There is therefore a need to develop a BRM framework to measure innovation within the public sector.

## **1.4 Problem Statement**

The problem can therefore be stated as:

The lack of using a BRM framework within the South African public sector results in a high failure rate on publicly funded innovation projects.

## **1.5 Research Question**

What are the factors that need to be present to implement a BRM framework in managing publicly funded innovation projects?

## **1.6 Research Aim**

The research aim was to identify the factors needed to implement a BRM framework in managing publicly funded innovation projects.

## **1.7 Research Objectives**

The study objectives are captured as follows:

- i. Determine if project benefits are defined and identified in publicly funded innovation projects.
- ii. Determine factors that need to be present when using BRM framework.
- iii. Unpack the methodology used to measure project benefits.
- iv. Determine the relationship between BRM framework and business strategy.

## **1.8 Research Preposition**

Research preposition on this study was as follows:

BRM framework factors are important for achieving project benefits in publicly funded innovation projects.



## 1.9 Research Methods

A literature review was compiled as part of the study using peer reviewed articles in journals and conference proceedings to provide underlying features of the variables interrogated in the study. The research methodology approach employed in the study was the qualitative research design using the case study method and in-depth interview conducted to obtain a clearer understanding of the factors that need to be present for the application of the BRM framework. The qualitative research approach helped the study to gain more insight on management of publicly funded innovation through interviews conducted with government officials to as part of data collection for the study.

## 1.10 Limitations

The study was limited to a single government department (Department of Science and Innovation) which is the main custodian of research and development and innovation policy within the country. In South Africa, there are sister government departments whose function revolves around publicly financed innovation projects and which were not included. The study was not able to include sister departments due to their role in public innovation projects being limited to co-implementer as opposed to lead department. The study also focused solely on publicly funded innovation projects with the exclusion of privately funded innovation projects

## 1.11 Structure of the research report

The research structure will be as follows:

### **Chapter one: Introduction**

Chapter one provided an introduction to the reader with the underlying background of the study in line with the problem statement to be interrogated. The chapter gives the reader the context of the study based on phenomenon. As part of unpacking the study, the chapter outlined the study research questions, aims, objectives, prepositions and limitations.

## **Chapter two: Literature Review**

Chapter two provided a review on the existing literature with the focus on bringing forth key issues of the study. This chapter unpacked variables in the study as to further induct the reader with the context of the study. Further reference was made in relations to their models and historical conceptualisation.

## **Chapter three: Research Methodology**

Chapter three provided a research approach in relation to the methodology, which was used throughout the study. The study employed a qualitative research approach with the usage of in-depth interview for data collection.

## **Chapter four: Data Analysis and Discussion**

Chapter four provided an analysis of data collected through the use of interview and a discussion on the study findings.

## **Chapter five: Recommendations and Conclusion**

This chapter provided study conclusion in relation to variables under study and outcomes of data collected. A summary of the research findings with proposed recommendations was discussed.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

The intent of the literature review was to study existing literature in relation to Benefits Realisation Management (BRM). The chapter unpacked various concepts as to have a context of BRM. The overall study focus was on publicly funded innovation, in this chapter we discussed innovation so as to give the reader the nature of projects which were dealt in the study. Project management was discussed with further focus on concept such as project success, project governance, project portfolio selection, project management office and which are found to be fundamental for the realisation of benefits management.

### **2.2 Definition of Benefits**

Benefit is described as a tool used to measure project outcomes, which can be perceived as change and improvement to its stakeholders (Andrade, Fernandes & Terroso, 2016). Projects are driven by the need to realize desired benefits throughout project lifecycle and lack of identifying them at beginning may lead to difficulties to achieve and manage benefits (Yates et al., 2009). Benefits are an advantage to organizational management and their stakeholders over a project (Balta et al., 2015).

Andrade, Fernandes and Terroso (2016) expressed benefits in terms of the impact they can make to its stakeholders and these can either be as short term and long term impact. Benefits can be classified in terms of target benefits which focus on stakeholder's expectations to be achieved from project results and fortuitous benefits which emerged during the project life cycle (Zwikael, Chi & Meredith, 2018). Benefits can be categorized in terms of the scope, which entails value creation, strategy, resources, performance, employability, knowledge, inter-relational (Andrade, Fernandes & Terroso, 2016).

Types	Outcomes
i. Strategic	- Business opportunities that promote growth and development
ii. Operational	- Changes in activities of the organisation
iii. Social	- Knowledge transfer to society
iv. Economic	- Regulations of goods & services of organisations and financial related issues

Table 1: Types of Benefits (Andrade, Fernandes & Terroso, 2016)

To satisfy stakeholder's expectations, benefits can be measured in terms of tangible benefits, which focuses on objective quantitative, financial measure, and intangible benefits which focuses on subjective and qualitative measures (Braun, Ahlemonn & Riempp, 2009). Benefits can further be categorized in terms of efficiency (which seeks to reduce the cost of performing a particular process without changing the nature of the project) and effectiveness (a way of doing things differently to attain better results (Bennington & Baccarin, 2004).

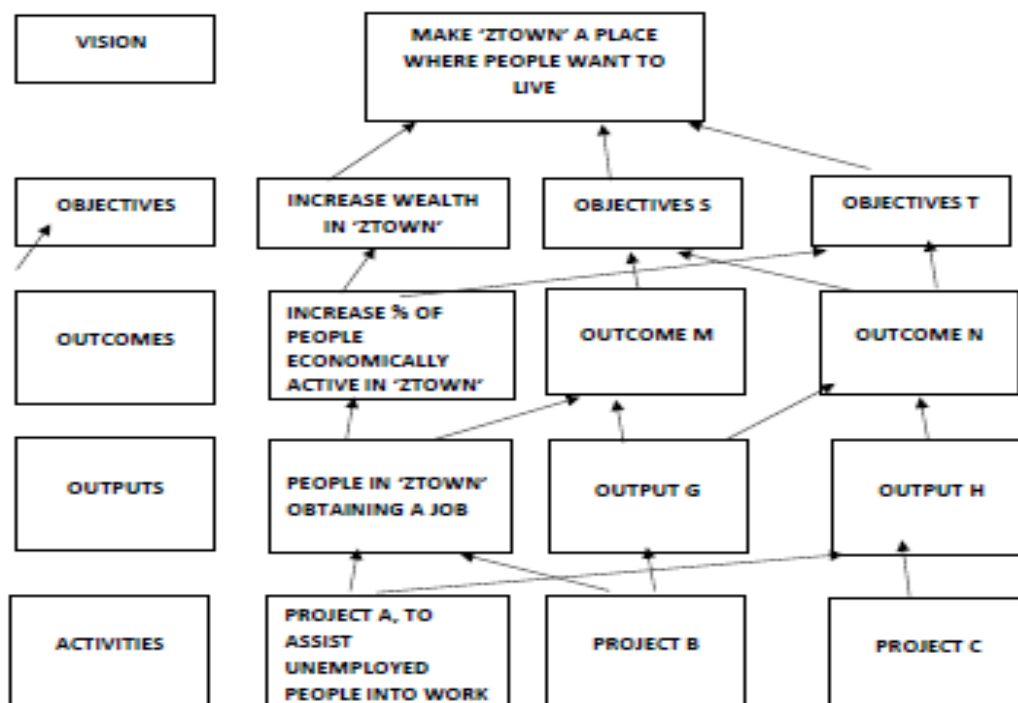


Figure 1: Benefits Hierarchy in Regeneration (Breese, 2012)

An example of benefits hierarchy is outlined in figure 1, which outlines programme vision, objectives and outcome in an inter-related complex manner (Breese, 2012).

The benefits hierarchy further indicates how organisational visions are achieved through project activities, outputs and outcomes which ultimately result in the attainment of project benefits. The hierarchy shows how the benefits can be structured within projects with the focus of achieving organisational vision of the strategy.

The use of benefits is intended to make sure that a programme or project deliver desired benefits as per the benefits realisation plan (Marnewick, 2017). Benefits should form part of the business case in the beginning to avoid overlooking them once a project has gone through the traditional project management (Yates et al., 2009; Pina, Ramao & Oliveira, 2013).

Benefits key areas of interest are value creation, resources, performance, knowledge and inter-relational (Andrade, Fernandes & Terroso, 2016). Organisation face challenges to create and deliver value (Fuentes, Smyth & Davies, 2019) and they tend to lose a lot of money due to failing to deliver such desired benefits (Braun, Ahlemann & Riempp, 2009). In public projects, benefits should be considered within the context of societal perspective to ensure that value for money is derived (Samset & Volden, 2016).

### **2.3 Benefits Realisation Management**

BRM is a “discipline that manages concepts that function parallel to project management” (Terlizzi, Albertin & Moraes, 2017: 765). BRM was developed as a response to limitations to traditional appraisal techniques namely, return on investment and has been seen as an element of project and programme delivery (Association of Project Management, 2009). BRM deals with analysing all project information relating to project strategies, internal and external factors as a way to identify and categorise expected benefits (Andrade, Fernandes & Tereso, 2016).

BRM was initially introduced in the 1980s and 1990s in the United Kingdom (UK) in project management domain (Walters, Scott & Mars, 2019). Since the 1990s, BRM captured the interest of government departments and professional bodies (Breese et al., 2015). BRM was introduced to projects which were failing to deliver desired

benefits and outcomes as organisations were losing a large sum of money (Braun, Ahlemann & Riempp, 2009).

Organisations which experienced challenges with the evaluation of project performance used BRM to make value and strategic relevance of project in order to reduce failures (Serra & Kunc, 2015). BRM has influence on the use of public funds into projects, should be applied to every projects due to its relations with project success (Breese, et al., 2015).

A report by international organisation (Project Management Institute, 2016a) found that the lack of BRM on projects resulted in a decline project in success rate where as an organisation with high benefits realisation maturity experienced a 67% reduction in money wasted on projects. The use of BRM required identification of project benefits in the beginning and 74% of projects were found to meet project goals and business intent (Project Management Institute, 2016a). The report further states that about 83% of organisations with no benefits realisation maturity struggled to achieve project benefits at the end of project (Project Management Institute, 2016b).

BRM was developed in four different stages as provided by (Terlizzi, Albertin & Moraes, 2017) and described below:

- i. Stage 1 (1990): focused on consultancy and training in an attempt to respond to project failures in place.
- ii. Stage 2 (1990-2000): incorporation of BRM into project management and Information Technology domain.
- iii. Stage 3 (late 2000): best practice and maturity models were developed.
- iv. Stage 4 (2010): accreditation of BRM and introduction of it as a qualification.

Several models were developed dating back to 1990 and the intent of these models were to help organisations to manage benefits and such models entails active benefits management; cranefield process model; benefits realisation approach; active benefits realisation; towards best practice to benefits management; managing successful programmes; and the gateway process (Yates et al., 2009).

BRM provides a direction on how benefits can be achieved over the life time of the project and deliver value to the business (Gray & Ulbrich, 2017). It is a process which realise, prepare, manages planned benefits and helps to deliver successful projects (Yates et al., 2009). BRM helps to close the gap from planned benefits to actual realisation when implementing projects (Project Management Institute, 2018).

	<b>Output-focused project management</b>	<b>Benefit-oriented project management</b>
Managerial focuses	Managing inputs and outputs	Multiple focuses: managing inputs and outputs with a focus on the ultimate realisation of project benefits.
Project objectives	Meet agreed efficiency targets measured by the iron triangle	Multiple objectives: respond to stakeholders needs, improve organisational capacity and implement strategic plans.
Performance evaluation	Iron triangle (time, budget and scope/quality)	Multiple evaluation measures: distinguish project success and project management success, where iron triangle is used for measuring project management success and benefits realisation is used to measure project success
Project leadership focus	The project manager leading the output delivery process	Multiple project leadership focuses: project owner leading the benefit realisation process, whereas the project manager remains the leader for the output delivery process

*Table 2: Output-focused vs. Benefit-oriented Project Management (Chih & Zwikael, 2015:353).*

BRM has been perceived as a tool of growing value and it requires a relationship to be established between resources invested in a project and benefits obtained in order to be easily measured (Andrade, Fernandes & Tereso, 2016). This approach will ensure a measure of project performance, deliver benefits and value for money (United Kingdom Infrastructure and Project Authority, 2017).

The BRM framework is an integrated set of governance and management practices designed to define, develop, deliver and sustain planned benefits derived from outputs of portfolio and is further expressed in life cycle stages (Project Management Institute, 2018). The framework relates to established models and techniques that enable successful benefits management within a project for benefits realisation (Terlizzi,

Albertin & Moraes, 2017). The framework stages entail identification and classification; benefits realisation planning; execution of the realisation plan; benefits realisation evaluation; and identification for further benefits (Balta et al., 2015; Pina, Ramo & Oliveira, 2013). This means that BRM should not only be done during project investment decision, it should follow the full extent of the lifecycle (United Kingdom Infrastructure and Project Authority, 2017).

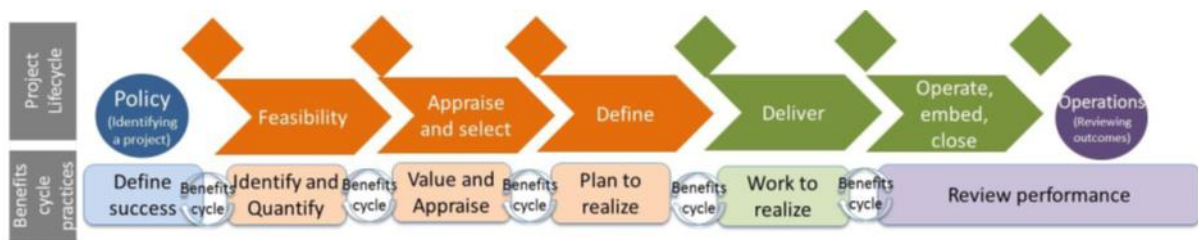


Figure 2: Benefits Life Cycle (United Kingdom Infrastructure and Project Authority, 2017)

Balta et al., (2015) identifies these five steps life cycle which entails the following:

- i. Benefits identification and classification;
- ii. Benefits realisation planning;
- iii. Execution of the plan;
- iv. Evaluation of the benefits; and
- v. Further benefits identification.

Critical element of the lifecycle is the benefits identification, which is regarded as the first step in project business case, it involves organisational goals and objectives (Keeyes & Hueman, 2017).



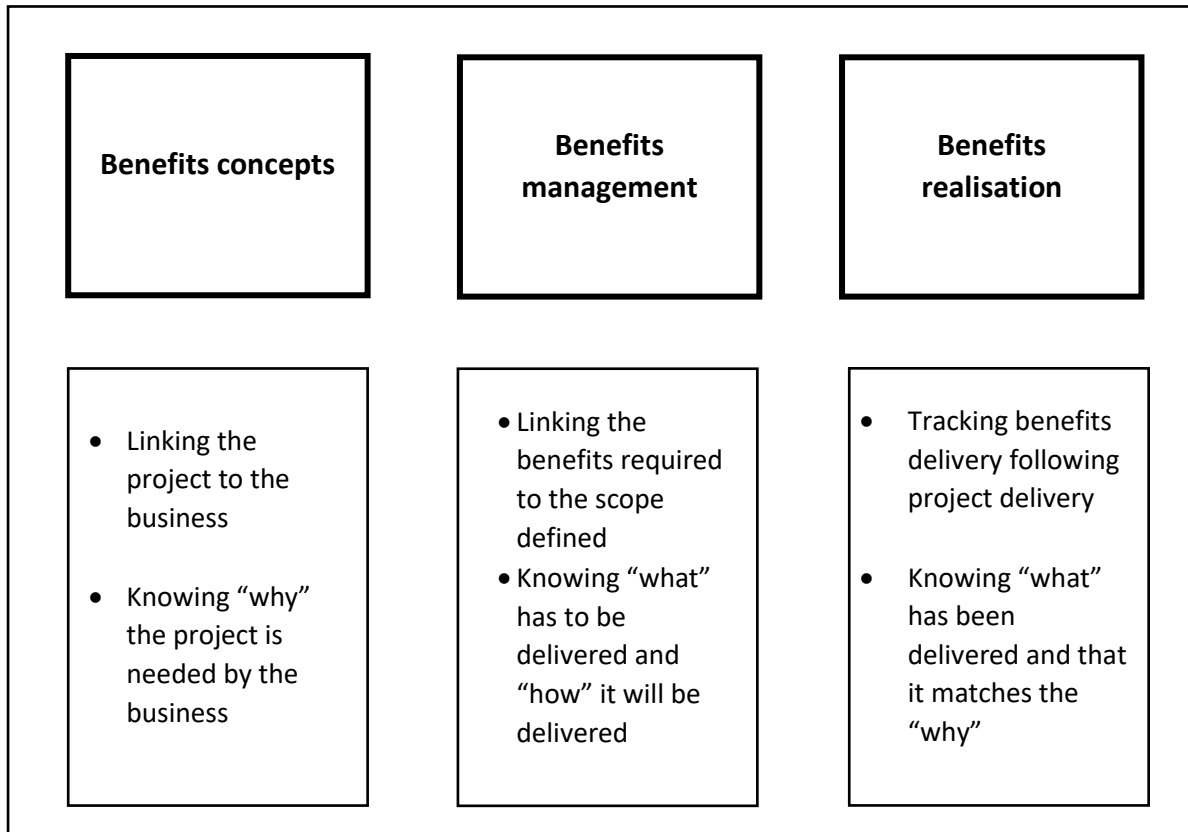


Figure 3: Benefits Management Lifecycle (Melton, Iles-Smith & Yates, 2008:17)

Benefits identification should be done before the project is initiated which then requires benefits to be developed throughout the project lifecycle and assessed throughout the delivery of the project (Authority, 2017). It is crucial that benefits identification should be done during project inception phase of the life cycle and it should not be treated as a separate activity within the project (Walters, Scott & Mars, 2019). In the UK, public sector organisations use benefits identification to decide whether to make investment in new projects (Association for Project Management, 2009).

The use of the BRM framework helps the user to identify, develop, deliver and sustain planned benefits derived from the project outputs (Project Management Institute, 2018). Mossalam and Arafa (2016) adds that in order to achieve benefit realisation, benefits should be defined and tracked throughout the project cycle.

Project managers should not only study the traditional triple constraint but should further study the effects of benefits delivery and about 80% of organisations with

mature benefits realisation process are found to achieve their business intent (Pina, Ramao & Oliveira, 2013).

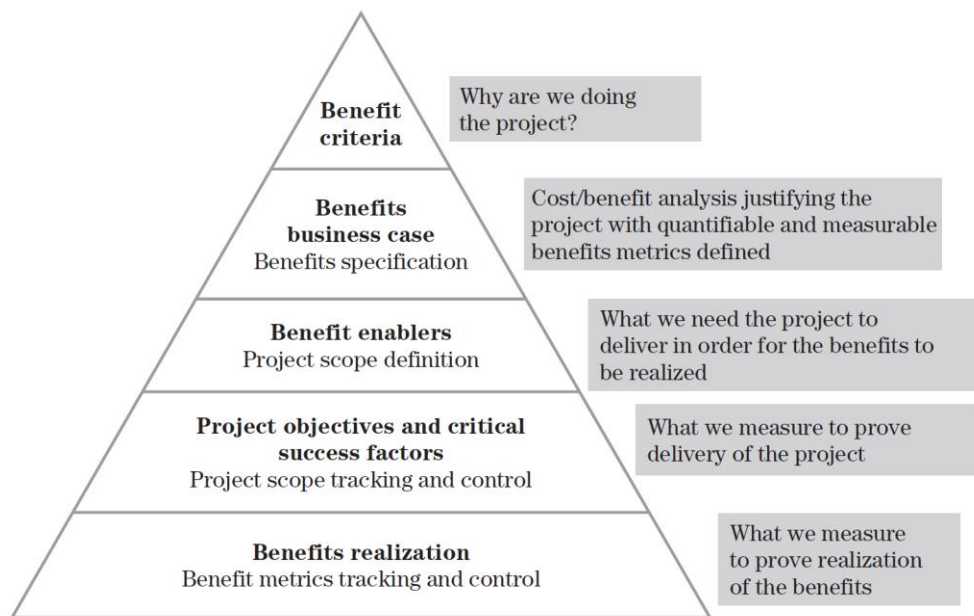


Figure 4: Benefits Hierarchy (Melton, Iles-Smith & Yates, 2008:13)

BRM has distinctive characteristics which entails: benefits focus; management involvement; journey not destination; collective responsibility; transform the organisation; benefits realization through regular review; develop workable practices; manage the portfolio; and lastly, culture of change (Doherty, 2014).

Realisation of benefits provides an assurance to project stakeholders that investment made on the project is worthwhile (United Kingdom Infrastructure and Projects Authority, 2017). Benefit realisation deals with the comparison between the actual benefits delivered and planned benefits to be delivered within the project (Bernington & Baccarin, 2004). Benefit realisation can be measured in terms of economic terms such as increased revenue, cost savings, and customer satisfaction (Dupont & Eskerod, 2016). The measurement can further be done through setting up theme such as economic, social, environment, customer, efficiency with key performance indicators assigned to identify benefits (Mossalom & Araf, 2016). To achieve benefits realisation depends on the availability of resources within the organisation which can be assigned into a project (Balta et al., 2015). Project efficiency goals has also been

the key driver for the adoption of benefits realisation (Organisation for Economic Co-operation and Development, 2007).

Furthermore, another important aspect of benefit management is managing disbenefits which are negative consequences that tend to arise from the project (United Kingdom Infrastructure and Projects Authority, 2017; Project Management Institute, 2018). Project can deliver benefits with wider positive consequences and they can also deliver disbenefits with wider unintended consequences (Fox, 2012). Project disbenefits can prevent realisation of any benefits and as results further costs can be incurred in the project (Fox, 2008).

## **2.4 Project defined**

Project is defined as “a temporary endeavor undertaken to create a unique product, services or results” (Project Management Institute, 2018:24). A project is designed to achieve strategic goals and benefits as part of organisational strategy (Project Management Institute, 2018; Crawford & Helm, 2009). A project can introduce innovation as an attempt to address challenges in place or find solutions for existing problems (Santos et al., 2014). A project should be well managed to enable strategic and long term goals to be achieved (Zwikael, Meredith & Smyrk, 2019). Projects are used as a tool to deliver strategy or policies within an organisation (Crawford & Helm, 2009).

Project can be categorised in terms of different types such as research project (increase knowledge); development project (development of product and pre-testing); or implementation project (implementation of existing intervention) (Santos, et al., 2014).

Project funders regard benefits achievement as their return on their investment (Zwikael, Meredith & Smyrk, 2019). A project is driven by the need to achieve benefits and the lack of identifying them at the inception of the project can make it difficult to achieve and manage the benefits (Yates et al., 2009).

## 2.5 Project management overview

Project management is about “planning, organisation, monitoring and control of all aspects of the project, with the motivation of all included to achieve project goals on a safe manner with schedule, budget and performance” (Radujkovic & Sjekavica, 2017:608).

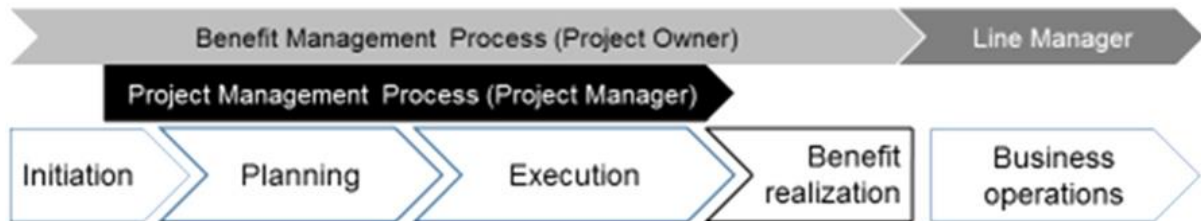
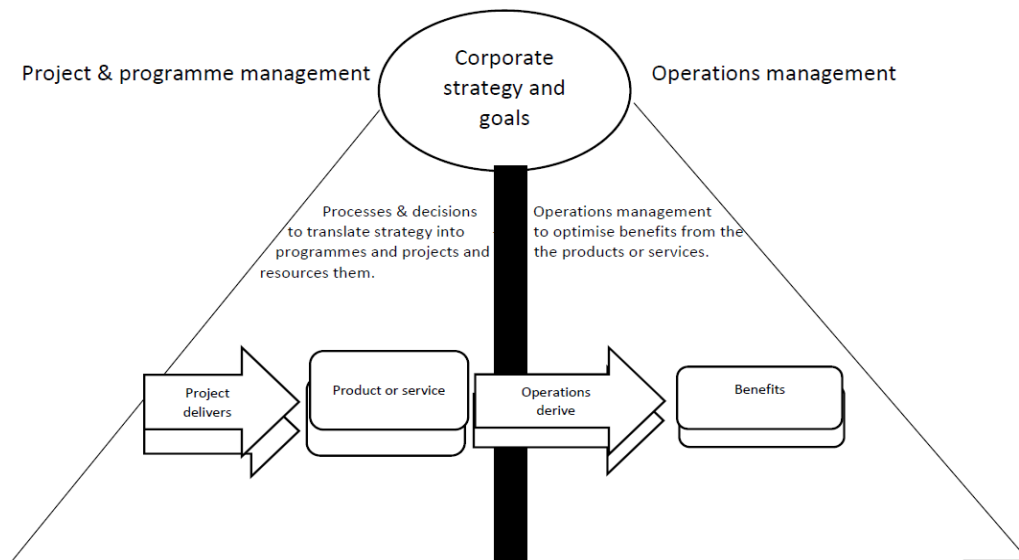


Figure 5: Benefit Management and Project Management across Project Life (Zwikael, 2016)

The traditional project manager focuses on the iron triangle approaches of managing projects (Kapsali, 2011). Traditional projects have been making use of critical path method, evaluation techniques, mathematical programming techniques but however, a majority of some projects failed due to strategic issues of project management (Pargar et al., 2019). The new focus has been on the need for project managers to take note of the business aspects of the organisation and not just focus on getting the job completed (Serrador & Turner, 2014). This then requires project management to deal with the aspects of the impacting business strategy rather than just solely focusing on meeting the traditional time, budget and performance goals (Hyvari, 2016).

Research on project management has changed with a particular focus on issues such as customer satisfaction and achieving project’s strategic objectives (Badewi, 2016). Project management literature has been pre-occupied with delivering output, whereas a new view on project management has emerged with the focus of investing on project with a specific objective of realising identified benefits (Zwikael, 2016). Project management should play an important role within the project management environment (Marnewick, 2017). The new view tends to combine project management and benefit management process to improve project success rates (Zwikael, 2016).



*Figure 6: Project Management and Operations Management (Cooke-Davies, 2002)*

To deliver project benefits, a management process requires involvement of a close working relation between project management and line management functions (Cooke-Davies, 2002). Since 1995, project management models have been developed to assist organisations to achieve benefits identified (Yakes et al., 2009).

Project management value is measured in five levels, which are stakeholder satisfaction; aligned use of practice; process outcome; business outcome and return on investment (Zhai, Xin & Cheng, 2009). In addition to these five levels, there are project management critical success factors which are senior management support; skilled designers; skilled project managers; troubleshooting; project team motivation; commitment of all project participants; detailed effort in design; adequate communication channels; control measures; and financial budget (Alias et al., 2014).

Organisational project management (OPM) deals with the integration of all project management related activities and their role in a project (Muller, Drouin & Sankaran, 2019). Mossalam and Arafa (2017) linked strategy management and OPM practices through the use of priority areas, namely: business drivers; portfolios; programs; and project business cases. The model of OPM is designed in a manner to reach the

management of individual projects and create a strong cohesion between institutions (Muller, Drouin & Sankaran, 2019).

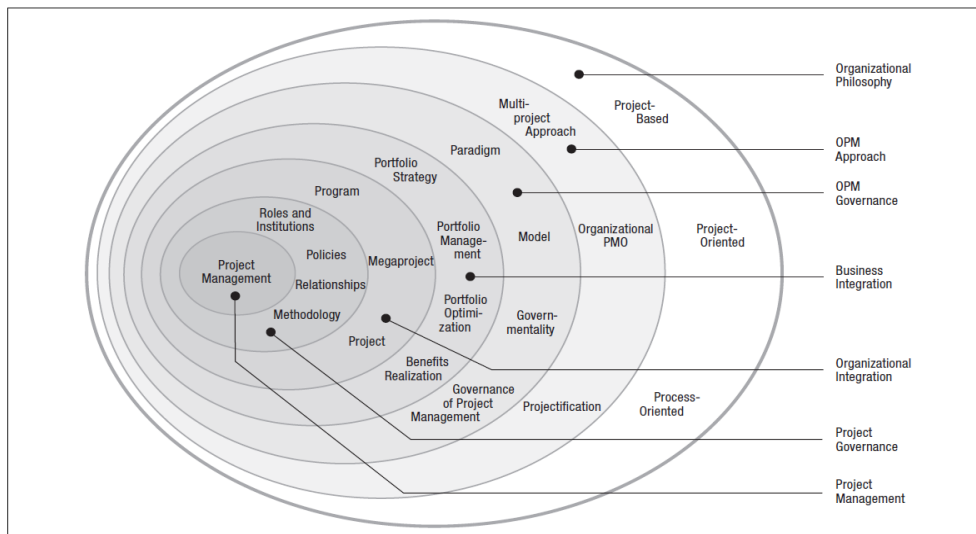


Figure 7: The Onion Model OPM (Muller, Drouin & Sankaran, 2019)

Benefits are the core value proposition and they are the main driver for the creation of all OPM components, they should be identified and get managed at all levels (Mossalam & Arafa, 2017).

Stakeholders are defined as “any person or group affected by, or which has a legitimate claim on, an organisation, this means organisations stakeholders will include shareholders, customers, employees, competitors and government” (Melton, Iles-smith & Yates, 2008:21). Stakeholder engagement has been identified as an important part of benefits identification and quality of stakeholder engagement influence understanding of stakeholder perceptions and benefits determination (Keeyes & Hueman, 2017).

## 2.6 Project success defined

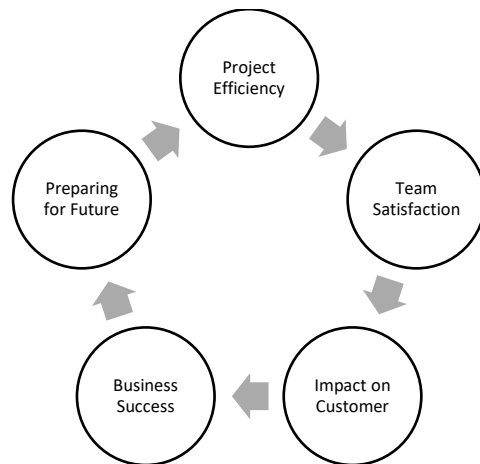
Project success can be described based on expectations put out in the beginning of the project by project stakeholders (Alias et al., 2014). Project success is a multi-dimension approach and is often found to be at the heart of project management field (Muller & Jugdev, 2012).

A distinction should be made between project success and project management success, where the first relates to overall objectives of the project as well as the end-user upon completion and the later deals with specific objective that the project management team should achieve (Bouras, 2013). Project success deals with the success of management being in charge of the project and once the project has been successfully implemented, project management success is reached (Albert, Balve & Spang, 2017).

Stakeholders involved can view project success differently and as such two viewpoints exist which are macro-level success (achievement of original project concept by its end-users) and micro-level success (deals with the traditional triangle which focus on time, budgets and specifications) (Too & Ogunlana, 2010). The iron triangle is project management artifacts which often does not tell the whole story of project success (Pollack, Helm & Adler, 2018). The iron triangle tool works through a mutual dependency approach between the three constraints (cost, time and quality) and is used as a motivation for stakeholders involved on how well the project is understood (Ebbesen & Hope, 2013).

Traditionally, project success used to be measured on the basis of the iron triangle, but however this is no longer the case (Gray & Ulbrich, 2017) as limitations were identified on this decision-making approach (Balta et al., 2015). Such limitations entails that project success should not be based on delivery of output, the focus should rather be on positive, measurable improvement delivered to the project stakeholders (United Kingdom Infrastructure and Project Authority, 2017). The dependency of the iron triangle has resulted in organisation being able to achieve project constraints (time, cost and quality) but then the project becomes a failure at completion (Ebbesen & Hope, 2013).

A project may have short and long term success, for instance a project product (outcomes) may be promising during the commission phase but it later turns out not to be acceptable in the market (Albert, Balve & Spang, 2017).



*Figure 8: Dimensions of Project Success (Serrado & Turner, 2014)*

A project can be measured by looking beyond the immediate output to enable envisaged impact (Samset & Volden, 2016) and its contribution to the overall organisational benefits. (Marnewick, 2017). Project success can be improved by the combination of the project management and benefits management process (Zwikael, 2016).

Since the late 1960s researchers have been doing research to try and identify which factors leads to project success (Cooke-Davies, 2002), and which should form the basis on how project success should be evaluated based on criteria to determine success or failure (Serra & Kunc, 2015). Project success is crucial, can further be measured in a variety of ways and focus has been more on tangible outputs (Serrado & Turner, 2014).

Success criteria forms part of the inputs towards the management system that lead to project success and indicates how project success should be measured (Santos et al., 2014). Critical success factors have an important impact to deliver through measurable improvement to project success and these factors can be clustered in categories such as human-related factors, project related, project procedures, project management actions and external environment (Alias et al., 2014).

To ensure strategic goals are achieved, project benefits are often too complex to be captured by financial measures which then calls for interpretative measures such as critical success factors and subjective methods (Braun, Ahlemann & Riempp, 2009).



Critical success factors tend to change according to project features for instance in private sector where profit is involved may not be similar to the public sector ones (Santos et al., 2014).

Project success is not the same as project performance, based on that the success can be measured until a project is in completion and performance can be measured during the life cycle of the project (Cooke-Davies, 2002).

## 2.7 Importance of Value

It is important to note that benefits and value are not the same though they are often used interchangeably (Institute, 2018). Value is concerned with optimizing cost rather than benefit (Laursen & Svejvig, 2016). Value is described as the net results benefits less the costs of achieving benefits in envisage project (Project Management Institute, 2018). It can further be categorized into soft value management (a social process whereby stakeholders could negotiate shared understanding of project definition) and hard value management (focuses on cost reductions, use of technical experts to achieve specified function at minimum cost) (Green & Sergeeva, 2019).

Value as an input towards project business case tend to ensure that there is correlation between the project and strategic value outcomes (Fuentes, Smyth & Davies, 2019). The traditional project management triangle has been proposed to include the crucial dimension of value (Winter & Szczepanek, 2008).

Value generation in projects can be assessed in financial terms and it can unfold in three main stages which entails: value identification; creating value; and harvesting value (Riis, Hellstrom & Wikstrom (2019)

Value creation is a “complex and multifaceted concept that is central to management and organisational literature” (Laursen & Svejvig, 2016:737). Value creation is key to the business strategy and success of the organisation in achieving its objectives depends on the extent of how they create value (Too & Weaver, 2014). Value creation

contributes to optimization of the return on investment and relies on quantity of value to transform its perception into an exchange (Andrade, Fernandes & Tereso, 2016).

A strong focus for a project to deliver value emerges due to challenges faced in managing project such as need for quick results and delivery of value as opposed to output (Svejvig, Geraldi & Grex, 2019). Business adopted the use of project management practices to achieve their strategic goals and create value for their organisation (Too & Waver, 2014). Value creation focuses on the outcomes of projects and overall success is more focused on benefits, impact on stakeholders within the project (Laursen & Svejvig, 2016).

Managing value outcomes begins at the front end stage and continues along the project life cycle activities (Fuentes, Smith & Davies, 2019). Realisation of value can be uncertain, can only be assessed once the project has been fully implemented and value of innovation provides different types of benefits to different stakeholders (Organisation for Economic Co-operation and Development, 2018).

Organisations undertake projects with the intent to create value, deliver project benefits (Sumset & Volden, 2016) and ultimately value to the organisation (Marnewick, 2017). Organisations face challenges in creating value outcomes and this is one of the discussions that has been on-going for many years with the intent to maximize benefits for a wide range of stakeholders (Fuentes, Smith & Davies, 2019). Emphasis on value has been long standing debate which is understood as a social construct that continuously contested amongst project stakeholders (Green & Sergeeva, 2019).

## **2.8 Return on investment as an evaluation tool**

Traditionally, return on investment (ROI) is described as a tool, which is mostly used in the private sector to evaluate and compare projects and investments, however, it has now been expanded to public sector activities (Kousky et al., 2019). ROI is widely acceptable in business and financial management areas and is used as a persuasive communication tool to senior management in making financial decisions (Grazier, et al., 2013). The ROI is related to a range of economic approaches used to compare

benefits and costs in a project, it has been used to communicate and compare benefits achieved (Kousky et al., 2019).

Projects can be risky, likelihood of success might be unknown and project selected should be able to achieve ROI to the organisation (Bar & Gordon, 2014). Globally, government requires a demonstration of return for their investment in research which produces benefits beyond academia (Heyers, et al., 2019).

Project benefits are apparent in measures that relate to project management success, which then requires positive effect to identify the cost and benefit component for the ROI determination (Lappe & Spang, 2014). A long term ROI is enabled by a benefits management approach in a project (Esteves, 2009).

## **2.9 Definition of business strategy**

Business strategy is implemented through the use of projects in attempt to bring change to the organisation (Serra & Kunc, 2015). Project gives effect to strategy and can be further used as an instrument for business strategy implementation (Zwikael, 2016). Project should be done with the intention to realize organisational strategic objectives and long-term goals (Zwikael, Meredith & Smyrk, 2019). Organisations gradually use projects as a tool to respond to complex environment as part of their strategy (Gray & Ulbrich, 2017). Selection of right project is key to the ability of organisation to deliver strategic intent (Hadjinicolaou & Dumrak, 2017).

Organisations invest in change so as to ensure that they deliver their business strategy in an attempt to remain competitive and make use of projects to deliver such change (Association for Project Management, 2009).

Organisations develop strategies to guide their direction and then tied to overarching goals that are associated with benefits and this should be closely aligned to strategic goals and organisational objectives to ensure that the business strategy is attained (Project Management Institute, 2018).

## 2.10 The role of project governance

Project governance refers to “process established to organize and manage resources required to complete a project within defined scope, quality, time and cost constraints” (Samset & Volden, 2016: 289).

Governance mechanisms are mainly divided in two categories contractual and relational, which serves as an important predictor of enhancing project performance (Haq et al., 2019). Governance has to deal with the organisational boards which tends to ensure that projects, programs, and portfolio are properly managed with a structure that identifies the distribution of rights and responsibilities among different participants (Hyvari, 2016). Governance creates connection between all levels of the organisation and provide greater visibility into project, program and portfolios to enable better decision support system (Mossalam & Arafa, 2017).

Governance tends to focus on the relationship between the project manager and project owner’s organisation who are responsible for guiding the organisation to achieve its objectives (Derakhshau, Turner & Mancini, 2019). Governance can contribute to value creation and also capture value through established links between different domains within organisation (Riis, Hellstrom & Wikstrom, 2019). Governance ensures that procedural and cultural aspects are established within an organisation to enable delivery of success (Hyvari, 2016). Project management implementation is closely aligned with governance and value expectation as its inputs towards good governance in an organisation (Crawford & Helm, 2009).

Governance provides the use of resources in a transparent, accountable and effective manner which is ideal for a project to remain strong (Crawford & Helm, 2009; Mossalam & Arafa, 2017). Governance is a key factor that impacts on the innovation process in the public sector through shaping innovation, source ideas and innovation culture (Arundel, Bloch & Ferguson, 2019).

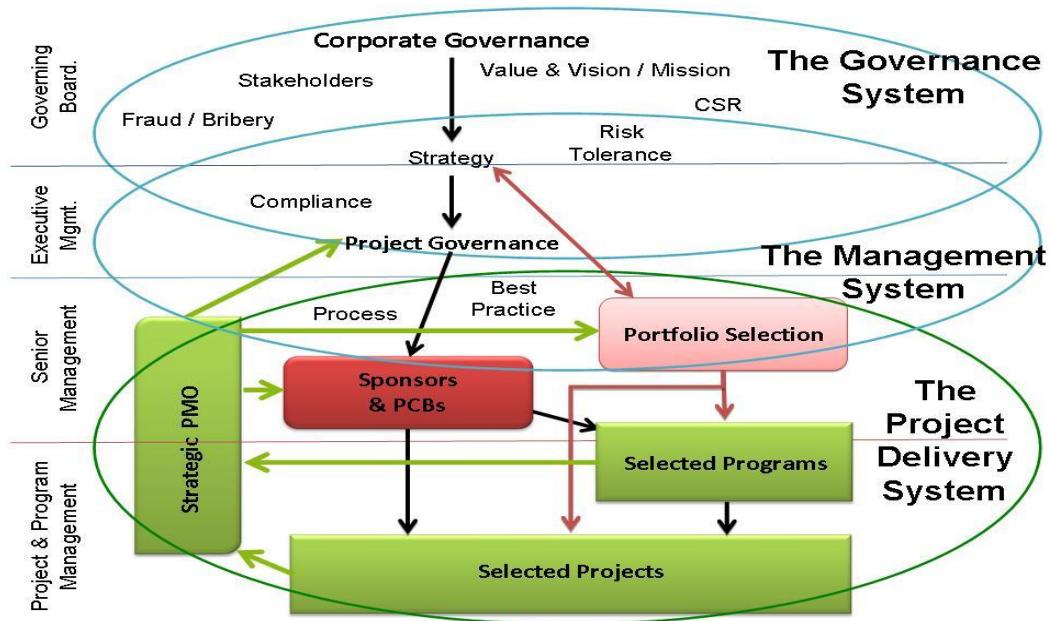


Figure 9: Project Governance Framework (Too & Weaver, 2014)

The framework illustrates interlink of elements which are designed to support effective project governance within an organisation (Too & Weaver, 2014).

## 2.11 The role of program and portfolio management

Program and portfolio management are sub-sets of project management approaches towards project governance within an organization (Blomquist & Muller, 2006). Portfolio management plays an important role on the implementing company strategy, provides valuable information to support organizational strategies and investment decision (Hyvari, 2014). The use of portfolio management allows companies to fully select projects that are considerably and dynamically aligned to the organizational strategy (Cooke-Davies, 2002).

Program and portfolio management address governance in two parallel perspectives, namely interconnectedness and interrelationships among requirement of projects (Blomquist & Muller, 2006). Portfolio management deals with the coordination of various projects within the organisation in attempt to achieve its strategic objectives (Hyvari, 2014).

Portfolio management supports governance process to ensure that organisational strategy is achieved (Too & Weaver, 2014). Hence there is an increasing use of project to achieve organisational objectives which has increased the number of projects implemented and this further requires the need to establish a programme and portfolio management to manage simultaneous aligned projects (Blomquist & Muller, 2006).

Organisations struggle with performance pressures and they use project portfolio management to gain efficiency (Muller, Martinsuo & Blomquist, 2008). Program and portfolio management are used to lessen costs that can be incurred during the process of converting inputs to outputs through the use of projects (Blomquist & Muller, 2006).

Project portfolios are part of the wider organisational context on which portfolio decisions on projects are to be supported and should be aligned to organisational goals (Muller, Martinsuo & Blomquist, 2008). The project portfolio frameworks for decision making were traditionally used for selection and resources assignment for R&D projects (Blomquist & Muller, 2006).

## **2.12 Project portfolio selection methods**

Not all research project can be commercialised upon completion (Beesley, 2003). Hence it is important to have decision making approach on project selection as this process can be challenging when dealing with numerous projects with budget limitation (Shafahi & Haghani, 2018). Selection of R&D projects has been found to be problematic due to their nature and subjective judgment of expert involved in the process (Liu et al., 2019). Project selection process has uncertainty, thus managers should be able to take strategic decisions on project portfolio under nondeterministic conditions (Costantino, Gravio & Nonino, 2015).

Decision-making in the project selection process requires information on competing projects to evaluate attributes of different projects for funding purposes (Pantelias et al., 2009). Project success remains the key determinant of project selection through evaluation of individual project for implementation as part of achieving organizational objectives (Costantino, Gravio & Nonino, 2015).

The first step in project portfolio selection is the evaluation of individual projects on their impact, benefits and costs (Ghaeli, Vavrik & Nasvadi, 2003). The process of project portfolio assessment should consider criteria factors and key performance indicators developed as determinant of project success (Costantino, Gravio & Nonino, 2015).

However, project selection has decision levels based on the funding for a project, which they can either be higher level concerned with overall budget allocations or lower level which deals with administration of projects, specific functions and process (Pantelias et al., 2009). Project selection goals should intend to maximize value of portfolio; strike the right balance between risk and reward; and appropriate linkages with the business strategy (Ghaeli, Vavrik & Nasvadi, 2003). The selection process can be based on the ROI and project risk assessment outcomes (Costantino, Gravio & Nonino, 2015) and these can be attributes for project profitability (Shafahi & Haghani, 2018).

Control measures of projects portfolio can provide an overview on the expected results on each project and risk analysis (Costantino, Gravio & Nonino, 2015). Project selection requires a formalized structured process which should be transparent and consistent (Liu et al., 2019). Project portfolio selection should be done in alignment with company's strategic business objectives and such main objectives are identification, ranking, prioritization, selection and authorization of projects (Costantino, Gravio & Nonino, 2015).

### **2.13 The role of the project management office**

Project management office (PMO) "is a department of group that defines and maintains standards for project management within the organisation" (Phan, 2015:65). The office is responsible for providing support for project management functions and linkages with knowledge and application of process performance standard for a project work (Too & Weaver, 2014). PMO was introduced in response to organisations which

were not implementing projects according to project management methodology and this resulted in poor outcomes (Monteiro, Santos & Varajao, 2016).

“The positive outcomes of PMO is a structured approach towards project planning with clear definition of project and this further impacts on how the business is conducted” (Phan, 2015:65).

Due to increasing growth of project management, there has been a need for a centralized project coordination (Monteiro, Santos & Varajao, 2016). PMO plays a critical role in the development of organizational benefit management processes for the implementation of individual projects (Terlizzi, Albertin & Moraes, 2017). PMO should seek information that helps to review project from its portfolio and analyse new project before implementation, it should also have capacity and resources to deliver on organizational objectives (Phan, 2015).

PMO performs the following roles: on operational level it provides basic centralised support to individual projects and ensures professionalism (Monteiro, Santos & Varajao, 2016);

- at a tactical level provides management of cross-project dependencies and value add multi-project coordination;
- at the strategic level it involves aspects of operational and tactical level;
- PMO is also equipped with the authority to prioritise projects

## **2.14 Innovation defined**

Innovation policies were initially introduced in 1980s as a response to economic challenges based on inevitable strengthening of firms and organisation competitiveness (Moura et al., 2019). Innovation is defined as “introduction of new/and improvement of products/ services and production process, the driving force of a nation’s economic development and improvement of competitiveness” (Orlemans, Buys & Pretorius, 2001:3). Innovation is crucial factor for achieving competitiveness at both the country and business level and be able to respond to economical, technological, and social issues (Aracena & Sutz, 2000).



The concept of innovation is required to solve societal challenges and one of the key element is novelty which has to deal with introduction of new (Nooteboom & Stam, 2008). Innovation is central to the improvement of the country standards, can take place in all sectors of the economy and it is not only restricted to the business enterprise sector (Organisation for Economic Co-operation and Development, 2018).

Innovation process requires prototype development, testing, design, marketing and distribution (Nooteboom & Stam, 2008). Innovation can also be based on the results of new technological development and processes that can be considered through a three linear stage, from inputs and resources, activities and final output being the innovation products/service (European Communities, 2004). Innovation process flow entails pre-defined phases which are from idea conceptualisation, selection, technology development and commercialisation at the market (Salerno et al., 2015; Nooteboom & Stam, 2008).

Policy makers need to identify economy and market trends which will later stimulate innovation to occur and ensure that it becomes effective in achieving new impulse for economic growth (Moura et al., 2019). A systematic data, theoretical framework and indicators is required to measure innovation within the public sector (Bloch & Bugger, 2013).

It should be noted that the innovation process is not fully complete unless it has achieved desired outcomes such as economic and social impact to its stakeholders (National Advisory Council on Innovation, 2017a). Empirical measure of innovation can be done through assessing inputs (R&D; innovation expenditures and risk capital); process (linkages with public knowledge institutes); outputs (patents, publication, licenses sold and prototypes); and impacts (application of new technologies, improved processes, new markets entry, profit, market share growth and high quality employment) (Nooteboom & Stam, 2008).

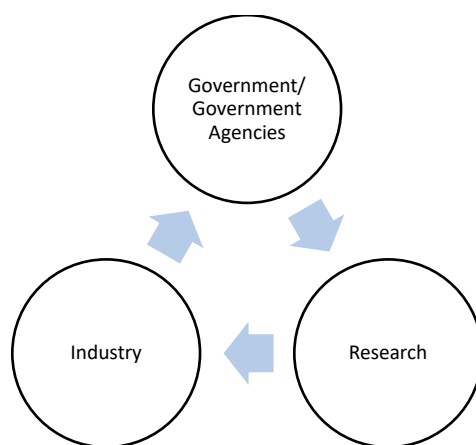
Innovation is uncertain, can take longer to be completed (Mazzucato & Semieniuk, 2017) and involves some level of complexity due to different stakeholders involved (Kapsali, 2011). Innovation projects has been previously focusing on creating new

products for the market with little or no benefits intended to be created for the stakeholders (Svejvig, Geraldi & Grex, 2019).

Innovation can be successful or unsuccessful based on its output, Cozijnsen and Vrakking (2000:152) defined successful innovation as the “degree in which innovation meet the demands of the market”.

Innovation is the outcome of user-producer interactions (Aracena & Sutz, 2000). Stakeholders play an important role in the achievement of innovation through their complex interaction and these stakeholders are mostly government, industry and universities (Organisation for Economic Co-operation and Development, 1997). Stakeholders can be identified as a group or individual who have (direct or indirect) in the achievement of organisation objectives and their activities need to be considered or understood by project managers (Balta et al., 2015).

Innovation can be achieved through a Triple Helix model whereby a collaborative effort between the government, universities and industry is established in order to make a visible impact on the local, regional and national economy (Johan & Doret, 2014). The Triple Helix model tends to ensure that institutions (government, industry and universities) engage in symbiotic roles through interacting with one another and the government is the facilitator for such a relationship (klitkou & Godoe, 2013).



*Figure 10: Model of Industry, Government and Research Institutions Interactions (Beesley, 2003)*

Government support publicly funded innovation in different forms such as direct funding through finance to universities, public research institutes and science park; and indirect support through taxes concession, matching grants and promotion of national R&D projects (Mani, 2001). On a global level, the European Union promotes the increase of industry contribution to research activities alongside identified benefits which are an important factor for applying for funding support (Lanskoronskis, Ramoniene & Barsaukas, 2009).

## **2.15 The need for research and development**

Research and development (R&D) activities are seen as the source of innovation and was firstly adopted by the United States in 1950s (Freeman, 1995). The undertaking of R&D is an important input towards domestic technology development and the public sector has put in place measures to encourage R&D activities (Mani, 2001). Innovation industries are mostly characterised by performing R&D activities in order to introduce new solutions or products (Arocena & Sutz, 2000). Technological innovation is produced through new knowledge generated by basic research which is later transformed to R&D (Beesley, 2003). This approach was part of the public sector creating a conducive environment through development of frameworks which enables science, technology and innovation policy, and funding for R&D, innovation (National Advisory Council on Innovation, 2017b).

R&D requires the commitment of resources to carryout research activities and refinement of ideas which are intended for development of commercially viable products (European Communities, 2004). The South African government has established funding grants designed to support innovation and are administered by different agencies (Mani, 2001). To enhance innovation outputs it is important to take into account the country competitiveness in a global space (Department of Science and Technology, 2018).

When R&D projects are commercialized, benefits can be achieved through securing of outputs such as intellectual property rights (Lanskoronskis, Ramoniene & Barsaukas, 2009). University company spin-off is also one of the R&D outputs and

has become important for the modern economies through their creation in the market place to ensure that there is a high degree of innovation opportunities taking place which later contributes towards economic growth (Kong-Rae, 2014).

Public funded R&D projects are faced with challenges such as the increasing pressure to demonstrate value of research projects outcomes (Procca, 2008). There are uncertainties which are attached to the R&D results and with little control how innovation should unfold (Plank & Doblinger, 2018). R&D project always involves risks which may latter not succeed (Burghart, Cameron & Gerdes, 2017) in a manner that it can take longer successfully bring a product into the market (Bar & Gordon, 2014). Technological uncertainty can be divided into different levels in terms of innovation required, time to design stability and technical skills in place (Procca, 2008).

## **2.16 Conclusion**

The literature review focus was on the use of secondary data, which attentively looked at journal articles published under variables in the study. The literature review provided the context of BRM framework and its strategic objectives within project environment. Project management as a discipline and different concepts that are critical for the realisation of BRM were unpacked. R&D and innovation were unpacked as to give the reader the nature of project under study. Literature highlights the essence of BRM framework for the full realisation of benefits in a project.

## **CHAPTER 3: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter provides an outline of how data was collected for the fulfilment of the study. A brief discussion on the research philosophical approach was done so as to explain what informed the choice of research methodology. Qualitative research approach was used for research design data collection. The approach was informed by how interview will be conducted, interpretation and analysis of research data. The importance of validity and reliability together with ethics in conducting of research are also highlighted.

### **3.2 Research design and methodology**

Research design and methodology is a mechanism that assists the researcher to collect data for research. The methodology describe how data will be collected from research participants. The aim of the research is to assess the use of Benefit Realisation Management (BRM) on publicly funded innovation projects. The research focus area will be on the Department of Science and Innovation (DSI). The DSI is the custodian of research and development (R&D) policy mandate within the country. However, it should be noted that there are other government departments who support small portion of R&D activities as aligned to their mandate. The DSI provides funding for undertaking of innovation projects and they also oversee implementation of such projects as aligned to their strategic objectives.

Research design involves a set of decisions that need to be taken by the researcher in relation to the topics under study, population to focus, research methods and for what purpose (Babbie, 2001). Research design outlines how the researcher will undertake a research and serves as a link between research question and implementation (Blanche, Durrheim & Painter, 2006).

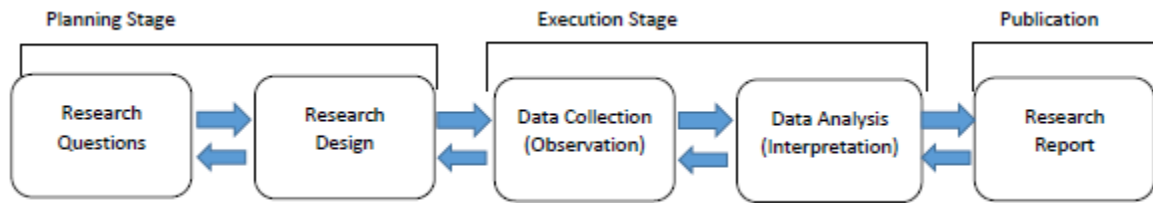


Figure 11: Research Process (Blanche, Durrheim & Painter, 2006)

A summary of the research process from inception to implementation is given in Figure 11, and the current study followed the research design process. Three types of research designs are namely, descriptive designs; experimental designs and quasi-experimental designs. This study made use of descriptive research design, which tends to provide an overall picture of phenomena under study as it occurs as opposed to its effects/ analysis as proposed by (Bickman & Rog, 2009). The study sought to assess the use of a BRM framework in publicly funded innovation projects and this required interpretative analysis to be employed. Interpretive analysis places real events, phenomena into some kind of perspective through following steps: familiarization and immersion; inducing themes; coding; elaboration; interpretation and checking (Blanche, Durrheim & Painter, 2006).

The study adopted a qualitative research methodology as opposed to quantitative research design. Quantitative research works with numbers and interested in causalities (Flick, 2011). Qualitative research design is more diverse than quantitative research methodology (Ambert et al., 1995). Quantitative research has some limitations to capture meanings, experience and interpretive elements of the research study (Collingridge & Gant, 2008). Taking into account the quantitative limitations, qualitative research methodology was used this study to achieve its objective. Qualitative research is empirical in a manner that it collects data about a phenomenon under study, further works on them and hold them against their ideas (Smith, 1987). The use of qualitative research methodology is based on that it seeks to obtain in-depth information about how and why people under study behave in a certain manner (Ambert et al., 1995).

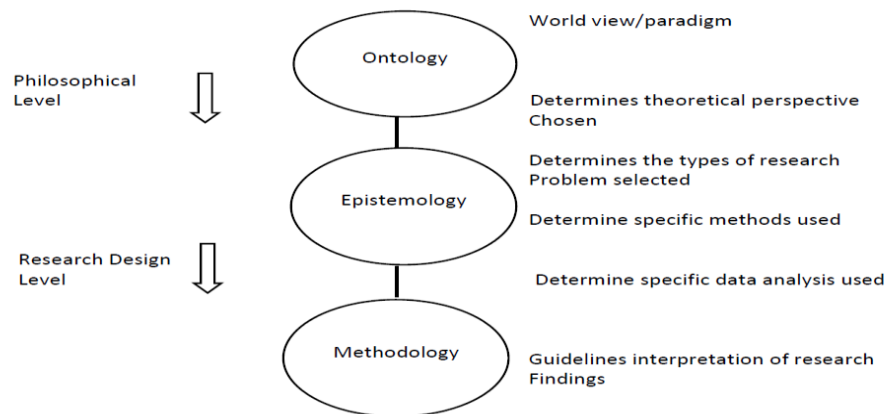


Figure 12: Linkage between philosophical, assumptions and research (Hesse-Biber, 2017)

Based on figure 12, Hesse-Biber (2017) mentioned four dimensions of qualitative research, which are namely, ontology; epistemology; methodology and method. Ontology study focuses on what exists, how it can be understood and what is real whereas epistemology focuses on how we came to have legitimate knowledge of the world and there are different rules for knowing it (O’Leary, 2010). The study will adopt the epistemology philosophical approach as to put forth our argument.

The use of qualitative research helps to purposively select study participants and research questions that addresses issues by use of the following approaches: grasping the subjective meaning of issues; latent meaning of situation in focus; and social practices and the life world of participants are described (Flick, 2011).

Decision on the use of qualitative research methodology was informed by its advantages as outlined by Alshenqeeti (2014), which entails the following:

- i. High return rate of the response;
- ii. Fewer incomplete answers asked by the researcher;
- iii. Involves reality of issues being asked by the researcher;
- iv. The process is controlled by the answering order; and
- v. Relatively flexible process.

### **3.3 Sampling**

The study adopted the use of a probability sampling approach for the selection of research participants. Probability sampling provides the researcher with precise data, statistical descriptions of the large populations and it also increases the likelihood of achieving the project objectives (Babbie, 2001). Probability sampling uses random selection process rather than human judgment to select participants for the study (Bickman & Rog, 2009). In the case of this study, seven project managers within the DSI who are involved in management of innovation projects were randomly selected to participate. The researcher used a random sampling selection criteria for study participants amongst the DSI officials managing innovation projects.

### **3.4 Data collection**

Two sets of data collection methods were employed in the study, which are primary and secondary data. Primary data collection tends to focus on people within the community, program participants, independent observers of events and physical documents and test results and whereas secondary data collection entails information that is collected through already existing sources such as census, data and program administrative records (Bickman & Rog, 2009).

### **3.5 Semi-structured interviews**

Qualitative research techniques refers to the modes of collecting data which entails written responses, interview and conducting focus group (Collingridge, 2008). Data collection using qualitative research instruments becomes descriptive in nature and participants also get exposure to the topic discussed (Quick & Hall, 2015). There are various forms of interview in qualitative research approach, which are: semi-structured interviews; narrative-based interview; and focus group interview (Flick, 2011). In this study semi-structured interview to collect data from research participants was used. Semi-structured interview makes use of research questions, guide the conversation to remain more loosely and allows the individual participants some freedom to expressed their opinion or mention things important to them (Hesse-Biber, 2017).



The use of interviews technique provide an opportunity to analyze resulting data making an allowance for participants social life and can press for complete, clear answers in any topic in discussion (Alshenqeeti, 2014). Interviews were held with seven officials, project managers of the DSI who are involved in project management of publicly funded innovation. The scope was limited to focus on publicly funded innovation project in line with the strategic objective of the study as opposed to generic projects within the department.

### 3.6 Study population

The case study is focused on projects executed by the DSI officials, rationale behind choosing them was influenced by the fact study population is involved with innovation projects across the country. Seven (7) participants were randomly selected on the basis of their work within the DSI. A face to face interview sessions were scheduled for a duration of 1 hour with each participant. 11 open-ended questions were conceptualised along research objectives. Table 3, shows a profile of research participants at the DSI. These participants entailed officials occupying positions from middle management and senior management within the department.

Department	Unit	No.
Department of Science and Innovation	Health Innovations	01
	Bio-economy	01
	Power	01
	Space System	01
	Space Science	01
	Hydrogen and Energy	01
	Space Science and Technology	01

Table 3: Research Participants

### 3.7 Department publications

In order to fulfill the study, secondary data collection was done through the use of the DSI documentation (department's strategy documents, annual performance plans and

annual reports) and journal articles as sources of data. Literature review was done on the basis that it helps to sharpen preliminary consideration regarding the topic under study, method and data source (Yin, 2016). These documents were reviewed, information aligned to our phenomenon was extracted and form part of the study. Since the DSI was the study focus, it made sense to make use of their secondary information as part of data collection.

### **3.8 Data analysis**

Once data had been collected through the use of interviews, the study was the analyzed for reporting purposes. Coding was used to analyze the data generated and two steps of the coding entailed producing useful data units; and classify and order units (Alshenqeeti, 2014). Data analysis entailed systematic analysis which involves coding of data in themes (Quick & Hall, 2015).

The study followed the steps outlined below to analyze and interpret data as suggested by Hesse-Biber (2017):

1. Step 1: Data Preparation- this step entailed collection of data and how it will be analyzed. The interpretation of the data is important so as to ensure that it translates the message that was conveyed by the participants.
2. Step 2: Data Exploration- in this step exploration of data collected so as to assess if it serves the intended purposes. A contrast will be done as to determine if the data sets from the interviews are similar or differ.
3. Step 3: Specification and Data Reduction- on data collected from participants will be analyzed and interpreted through descriptive codes, categorical codes and analytical codes.
4. Step 4: Interpretation- this step will interpret the data collected from the participants for inclusion in the study..

### **3.9 Validity and reliability**

The use of research methods in a research project is important as it tends to determine its success based on issues of validity and reliability which are of great importance to the outcomes of the study (Alshenqeeti, 2014). Within the context of the study, there should be an attempt to prove that the objective of the study is reliable and valid on its outcomes (Smith, 1987). Validity tends to refer to the extent to which empirical measures of the research correctly reflect the real meaning of topic under study and reliability deals with whether a particular technique applied more than once can produce similar results each time (Babbie, 2001). In this study the research questions are regarded to be valid and reliable based on the in which manner they have been crafted in relation to variables in the study. The outcomes of research questions should not be something different from our anticipation from the study.

There are three main types of research questions: exploratory questions (focus on a given situation); descriptive questions (observation of particular situation); and explanatory question (focuses on relation) (Flick, 2011). Eleven open ended research questions were developed and used during the interview session with research participants. The validity and reliability of the research questions were tested through conducting prior test interviews with two colleagues who are familiar with the subject matter before carrying out the actual interviews.

### **3.10 Ethical consideration**

The study upheld ethics of research through seeking approval from the University Ethics Clearance Committee. Ethics refers to “the principles or rules of behavior that act to dictate what is actually acceptable or allowed within the profession” (O’Leary, 2010: 41). When dealing with participants, research projects should follow ethical considerations (Alshenqeeti, 2014). The researcher informed research participants that information collected during interview session will be treated with confidentiality and will only be used for the purpose of the study. Participation in the research was voluntary and participation was treated with discretion. The study followed ethical guidelines as discussed by O’Leary (2010) which entailed, ensuring respondents have been given consent; ensuring that there will be no harm; ensuring confidentiality and

anonymity. Moral integrity of the research is important so as to ensure that the research outcomes are trustworthy and valid (Hesse-Biber, 2017).

### **3.11 Limitations**

The innovation projects cover a wide range of government department and in this study the scope is limited to only one department, namely the DSI due to issues of time. The DSI is the main custodian of driving the R&D policy and strategies within the South African context, whereas the other sister departments are co-implementers. The study was not unable to focus on sister departments due to their limited role within the publicly funded innovation project or R&D policy. Due to the nature of data collection being face to face interview, the questionnaire were not able to be distributed to other participants without arranged interview session. The number of the study participants was limited to only seven due to time constraints. .

### **3.12 Conclusion**

The choice of using qualitative research approach was beneficial as it tends to give an in-depth discussion about the phenomenon under study. It gave an exposure on the management of innovation projects with the government with particular focus on the DSI. The use of qualitative research methodology was beneficial in the manner that respondents were able to give more information to questions asked and this is not the case in closed ended questions.

## CHAPTER 4: DATA ANALYSIS AND DISCUSSION

### 4.1 Introduction

Chapter four deals with the presentation of data collected from the respondents. Data was collected from investigating a single case study and is presented in three main sections pertaining to the study, which entails the case analysis, respondent's inputs and under further discussions. Respondents consisted of seven (7) study participants who are all working on innovation projects.

### 4.2 Overview of the case

#### 4.2.1 The organisation

The Department of Science and Innovation (DSI) is the national government department mandated to support undertaking for research and development (R&D) with the intent of introducing innovation products/services to the market. Innovation outcomes are intended to support South African socio-economic well-being. The department seeks to create a conducive environment to enable R&D to take place through various policy initiatives. It further strengthens science, technology and innovation activities through various projects and programmes.

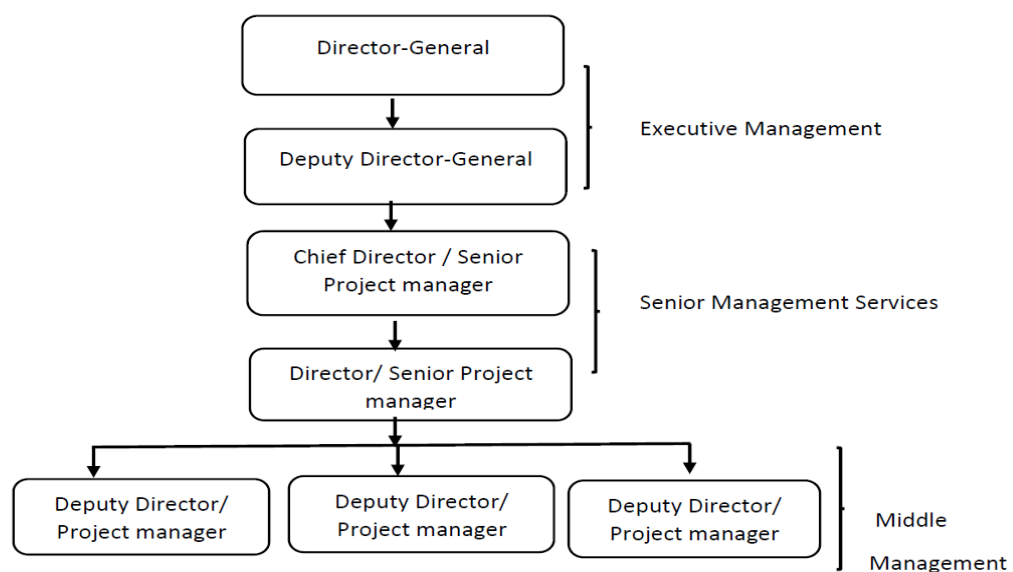


Figure 13: DSI Organisational Structure

As depicted in figure 13, in the DSI organisational structure, projects are mostly implemented by the deputy directors with the support of senior official namely, directors and chief directors. The department has a delegation of authority which serves as a guiding point on the level of decision making one can exercise during the course of the project. Deputy Directors are mainly involved in the actual implementation of project with the support of senior management. However, senior management's role is mostly to oversee implementation of projects in line with the organisational strategy. Furthermore it should be noted that Directors are often found to be involved in the project implementation. The executive management role tends to translate government policy intent through development of business strategy, which is then implemented by different projects and programmes. They further provide oversight support in ensuring that such departmental strategy is effectively implemented.

### **4.3 Theme one: Nature of projects undertaken by the DSI**

#### **4.3.1 Nature of projects undertaken**

All seven respondents interviewed agree that projects undertaken by the DSI can be described as innovation projects as they intend to bring forth new products/services which are unique and novel to the community (market). A total of thirteen (13) projects were discussed, eight (8) of them were successfully completed, three (3) were not yet complete and only one (1) project was unsuccessful. Based on the three (3) which were not yet fully complete, there were certain parts of benefits which were achieved in terms of the innovation value chain. The study reveals that innovation projects are complex and in some instances, a project can be unsuccessful but certain components remain a success and this has led to certain benefits being achieved. For instance a project can fail to deliver the final end goal but manages to deliver benefits on skills deliverables through the human capital development component or are able to generate new knowledge for further exploration. Therefore, the failure of innovation projects needs to be assessed on an individual project basis than a generic approach.

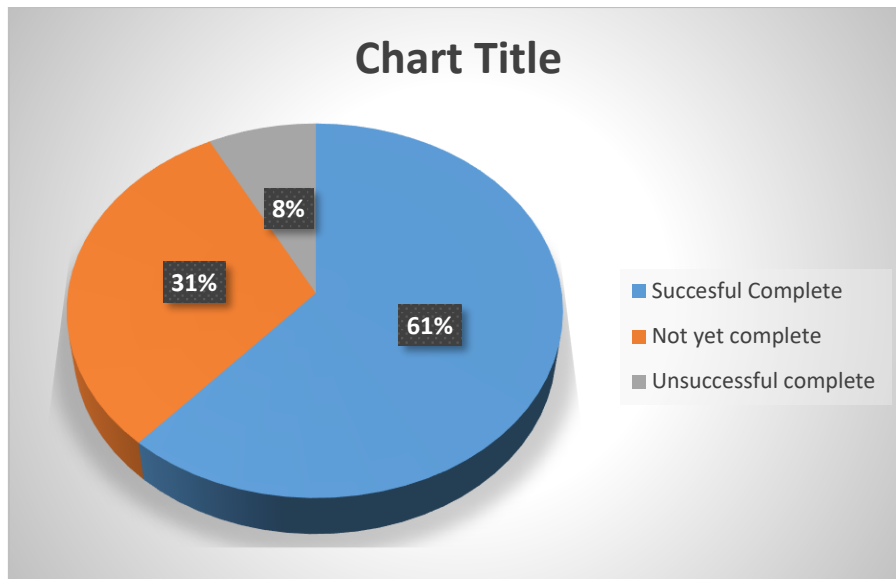


Figure 14: Project Summary

#### 4.3.2 Benefits identification

Research respondents indicated the importance of managing benefits and a need for identification of these benefits prior to undertaking the project. While from the interview sessions outcomes, (6 respondents) 86% indicated that benefits are clearly defined during project planning/conceptualisation, structured along the project plan and milestones while 14% (1 respondent) of the respondents-indicated that they do not clearly define benefits during the planning phase but only get to assess them at the completion of the project. Six of the respondents stated:

*“benefits are defined in the project inception and integrated into project plans”* while one respondent mentioned that *“benefits are only done at the completion of the project”* One respondent indicated that *“project benefits were not clearly defined during project inception and the focus has been on the assessment of end results”*.

Figure 15, displays percentage of how benefits are managed within the department. It should also be noted that projects that do not clearly define project benefits are more likely not to achieve their benefits.

Project benefits should be identified, monitored and reviewed as the project is implemented (Musawir et al. 2017). It is important to note that in cases where project

benefits were not clearly defined, such a project turns out to be unsuccessfully completed. In successfully completed projects, the study revealed that benefits were identified in the inception phase, monitored across the project lifecycle and led to project success.

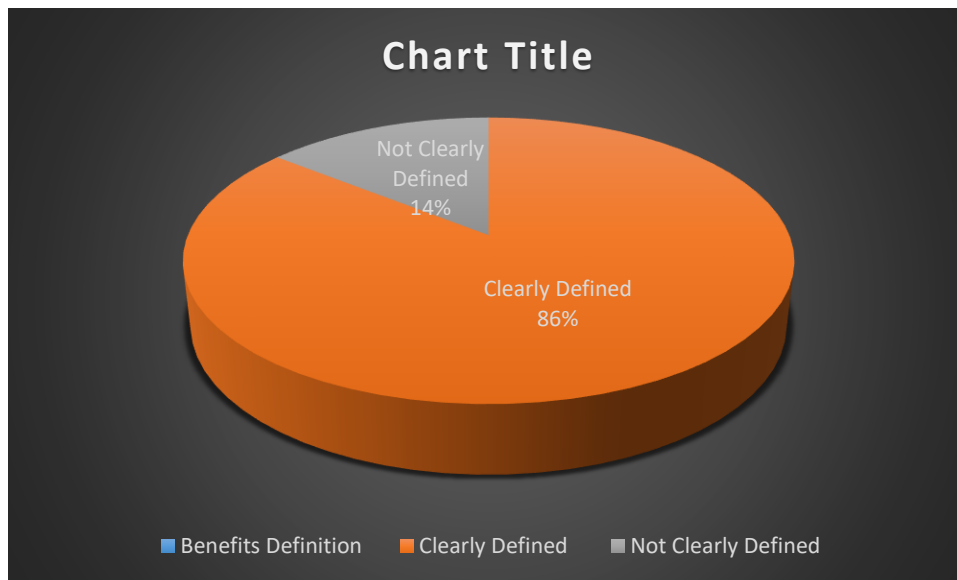


Figure 15: Benefits Identification

Benefits identification is one of the crucial steps to ensure that there is clear understanding of benefits to be achieved along the project plan. One approach for the inclusion of project benefits is by defining them in the inception phase of the project and include in the business case as it is important for benefits realisation during the project implementation (Keeyes & Huemann, 2017).

#### 4.4 Theme two: Factors that need to be present when using benefits management

##### 4.4.1 Factors that need to be present when using benefits management

Within projects context, different factors play a crucial role to enable benefits achievement. In this study, we clustered these factors as informed by the literature review and assess their role in benefits realisation within the DSI's projects:



#### **4.4.1.1 Project Success**

Respondent no. 1 stated that *“in TB diagnostic device project was regarded a success because benefits were achieved through the technology device being successfully used by the community as part of the new solutions. These benefits were realised when it offered medical results within 30 minutes of administering the test and whereas in the past it took days for the results to be delivered”*. Respondent no. 2 stated that *“there is a correlation between project success and benefits achievement. If a project is not successful, benefits will not be achieved”*. Respondent no. 3 mentioned that *“project success contributes to benefits achievement as new technology systems (decision-making technology) that are successfully developed will assist in future decision making and this will be part of benefits realisation*. Respondent no. 2 indicated that *“success of the project has huge impact to achieve benefits at project completion”*. Respondent no.5 stated that *“achieving positive project output can lead to outcomes and benefit realisation”*. Respondent no. 6 in his response indicated *‘there’s a correlation between project benefits and project success. Project success can lead to benefit realisation’*. Respondent no. 7 also stated *‘that there is alignment between project benefits and project success’*.

#### **4.4.1.2 Value Creation**

All respondents in this study stressed the importance of value creation when undertaking the project.

Respondent no. 1 mentioned that *“value creation has an influential role in benefit realisation and lack of such value may result in a project being a failure”*. Respondent no. 2 stated that *“value creation from the project can be viewed from the country perspective as part of the impact and it can further help in advancing project benefits”*. Respondent no. 3 mentioned that *“project value added can be seen from the reviving of the industry through projects which subsequently had an impact on the socio economic issues”*. Respondent no.4 mentioned that *“value creation has a huge impact on benefit realisation as the*

*project undertaken (space launching capability) were able to create access to space aircraft, which can further be seen as a huge benefit for the country". Respondent no. 5 indicated that "value creation were seen to play a huge role in benefit realisation when intellectual property generated out of the research and development projects were commercialised in the market". Respondent no. 6 stated that "project value is attached to the functionality and reliability of the technology developed". Respondent no. 7 stated that "project benefits can be achieved as a result of value creation".*

#### **4.4.1.3 Return on Investment**

The DSI implements projects with the focus of achieving return on investment (ROI) through the impact and benefits achievement. In every project undertaken by the DSI, there is a strong emphasis on achieving on ROI.

*Respondent no. 1 stated that "projects are initiated with an understanding of achieving economies of scale. In the case of the umbiflow project, the ROI was realised when the device was able to detect health condition of unborn children on pregnant women. The use of the device was able reduce the number of women going through miscarriage". Respondent no. 2 stated "ROI is a key government focus area to invest in new projects and there is an alignment with benefits realisation". Respondent no. 3 mentioned that "the DSI ensures that there should be a ROI through conceptualizing of project activities and deliverables. The projects are carried out only with the intent of achieving maximum ROI and potential to achieve benefits". Respondent no.4 in his response "gave an example of launching capability project which was carried out with the focus of assessing the South African space aircraft launching capability. The project was unsuccessfully completed as the technology could not respond to the user requirement but a ROI was achieved on the component of the project on new skills set (human capital) developed for the local space science industry. The project output was not entirely a failure as new skills sets were developed, which was integrated in the launching capability programme". Respondent no.5 stated "that all projects are done in line with achieving ROI and this is an area that ensures that benefits are achieved". Respondent no.6*

stated that *“there is a correlation between ROI and benefits realisation, realisation of investment on project lead to benefit achieved”*. Respondent no. 7 also agreed with other respondents in sense that *“ROI is a key factor to ensure that project benefits are achieved”*.

All study respondents indicated that in *“publicly funded innovation projects the main benefits to be achieved is to ensure that there is ROI and service delivery”*. All the benefits are designed in such a manner that they adhere to government mandate of service delivery.

#### **4.4.1.4 Governance**

Projects are undertaken with the involvement of the project governance in the form of steering committee. Project governance tends to provide some aid in the project implementation so as to ensure that benefits are achieved.

Respondent no.1 stated that *“projects are implemented with the participation of the governance committee. There is a steering committee which reports to the Minister and composed of government officials, researchers and business experts. Respondent no.2 indicated that “projects are done in support of the steering committee and advisory committee. These committees provide guidance on the implementation of the project and they also ensure that there’s alignment with the benefits management”*. Respondent no.3 mentioned that *“governance committee plays a huge role towards achieving project benefits. Project governance provides guidance on the implementation of the project and this latter translates to the project achieving benefits”*. Respondent no.4 stressed *“the importance of project governance in benefits realisation in the project as it offers oversight on project activities and resource allocation”*. Respondent no.5 states that *“projects are inclusive of local and international committee members due to the value of governance in project implementation. Furthermore project governance is an integral part of project management”*. Respondent no. 6 in his response indicated that *“project governance is important for monitoring project milestones which later informs benefits management”*. Respondent no. 7 indicated that *“project governance is used to*

*provide guidance on the undertaking of the project and it also helps the project to deal with challenges in the project”.*

#### **4.5 Theme three: Unpack methodology used to measure project benefits**

The study unpacked the methodology used to measure project benefits upon completion phase. The outcomes of the study revealed that the DSI uses a qualitative methodology approach to measure benefits and it done in the following manner:

##### **4.5.1 Value Creation**

Project benefits can measured through assessing value created by the project outputs or deliverables. Value creation can be used as a basis for measuring benefits achieved at the end of the project. All respondents in the study indicated that they measure value through the project impact assessment on stakeholders. The approach of measuring value created as part of benefits realisation appears to be the same from all the respondents' inputs in the study.

Figure 16 shows that about 86% of respondents stated that they manage value as part of measuring the impact on projects, while 14% indicated that they do not necessarily manage value on projects. Value creation is an important issue to be considered when implementing a project. Study respondents mentioned that value was mostly measured through the service or impact achieved by the project. The ROI was also another way where a project can quantify or measure value in a project.

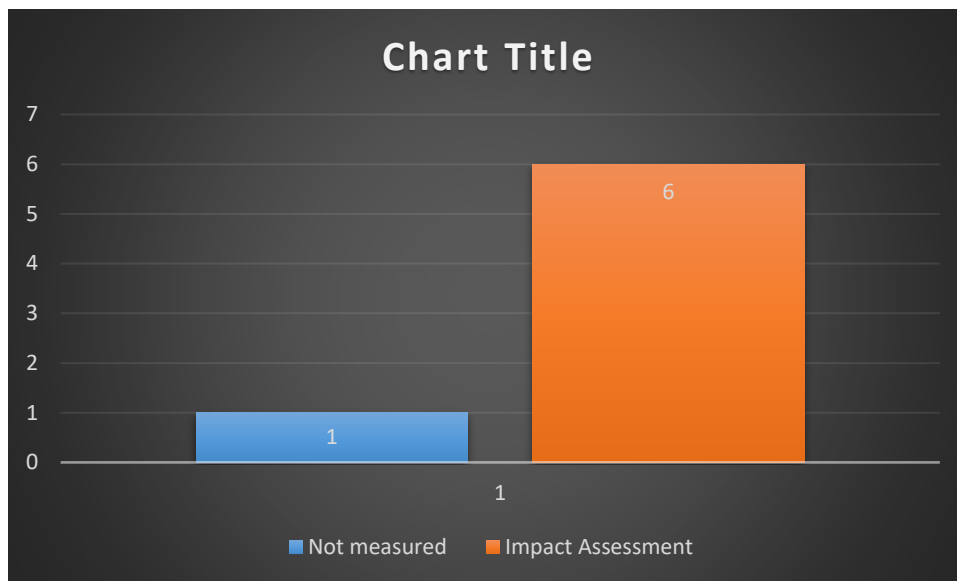


Figure 16: Value Creation

Respondent no.1 mentioned that “*project value creation can be managed through assessment on the socio economic impact to the end-users who are mostly communities. Technology solutions developed can be assessed in terms of their contribution to socio economic (job creation, poverty alleviation and crime prevention) in line with services delivery*”. Respondent no. 2 indicated that “*they do not necessarily measure created value in a project as there is no specific approach towards such*”. Respondent no.3 stated that “*project value creation is measured through the impact of new technologies introduced and the savings that can be seen by government on the use of these technologies*”. Respondent no. 4 stated that “*value creation can be measured based on the impact of new skills developed and how it can further be used for future. The number of people who are using new skills acquired on future technology development projects can be used as a measure for benefits achieved*”. Respondent no.5 mentioned that “*they measure value creation using financial indicators such as efficiency of technology developed. Research publications and IP commercialised were also used as a measure for project value*”. Respondent no. 6 indicated that “*value creation can be measured through the usage of project outputs (deliverables) in line with the solution derived by the project*”. Respondent no.7 also stated that “*value can be measured through use of technology output. If project outputs are not making any impact in relation to the service delivery, then the project is regarded as not making any value*”.

#### 4.5.2 Change and Improvement

In measuring project benefits, change and improvement should be realised as results of project outcomes.

Respondent no.1 mentioned that *“benefits were measured through positive change created by project outcomes. In the case of drug development project for malaria disease, change and improvement was measured when the country was malaria free upon rolling out the project outcomes”*. Respondent no.2 mentioned that *“project benefits were measured when new start-up companies were created as a result of project outcomes. The new start-up company also contributes towards government socio-economic issues”*. Respondent no. 3 mentioned that *“project change were seen from the end-users point of view, when they implement new technology system (project outcomes) which saved them money for instance, making using of energy efficient technologies. If a project does not make any positive change or improvement to its stakeholders, it was regarded a failure”*. Respondent no.4 indicated that *“project benefits were seen when new skills sets developed were being used in the industry”*. Respondent no.5 mentioned that *“positive change was achieved when there was wide use of new technologies which reduce emissions, energy refuelling time and improve service delivery”*. Respondent no. 6 mentioned that *“benefits were measured when the project implementation brought change on the status quo as technology developed brought forth agility and efficiency in decision making process and which further assisted in improving government systems for decision-making”*. Respondent no.7 stated *“project change was measured when there was access to new data received from satellite and skills capability (outcomes) developed within the industry”*.

The study revealed that change and improvement experienced in a project can be used as methodology to assess project benefits.

#### 4.6 Theme Four: Relationship between benefit realisation management framework and business strategy

In applying the BRM framework, it was found that there is a relationship that should co-exist between BRM and business strategy. Such relationship should be strengthened by an alignment between the two variables. Mossalam and Arafa (2016) said factors such as strategy alignment with benefits; start with the end in mind; utilise successful delivery methods; integrate benefit with performance management; manage benefits from portfolio perspective; effective governance; and a value culture needed to be considered while applying the BRM framework.

In the context of the DSI, projects are implemented in line with organisational policy and strategy documents (business strategy). It was found that all respondents agree that for a project to achieve benefits there should be alignment of business strategy with projects being implemented. The relationship is found to exist on the basis that there is emphasis on alignment on factors such as organisational structure, annual performance plans, project portfolio and governance taken into consideration.

Respondent no. 1 mentioned that *“the project focus is informed by the departmental policies and strategy. Project selection process is influenced by the department strategy. Respondent no.2 indicated that “the DSI mandate provides guidance over the choice of the project, which should be undertaken”.* Respondent no.3 also stated that *“projects are not implemented in isolation of departmental strategy and policy documents such as strategic plan, 10 year Innovation Plan and National Development Plan. Outcomes of these projects respond well to the departmental strategy as there is a well-coordinated alignment. The selection process is strengthened in sense that only projects that respond to the business strategy are implemented”.* Respondent no. 4 mentioned that *“the selection process is informed by the unit’s Ten Year Innovation Policy Plan (departmental policy) and National Space Strategy”.* Respondent no.5 stated that *“the selection process is influenced by the policy initiatives of the department”.* Respondent no.6 indicated that *“project selection is informed by the energy strategy which provides a roadmap for projects that should be implemented”.* Respondent no.7 stated that *“project selection is based on the department plan and research capability”.*

The business strategy provides direction on the type of projects that should be undertaken by the department. Taking into account responses on the business strategy by participants, the study revealed that the DSI projects are aligned to the business strategy and furthermore projects were used as an instrument to implement it. The application of BRM framework was done through ensuring alignment of project selection and business strategy for benefits realisation purposes. Emphasis on the alignment tends to prevail a relationship which will ensure project benefits are well realised.

Project outcomes and milestones were designed in a manner in which they should allow for implementation of organisational strategy. Furthermore, benefits are realised when activities within the project are should be well in-line with milestones along the project life cycle.

Respondent no.1 stated that *“managing benefits, project team is involved across the project life cycle (innovation value chain). The project team tends to ensure that benefits are achieved as the projects progress.* Respondent no. 2 mentioned that *“project milestones are used as the basis for managing benefits and ensures that such benefits are achieved. The project plan and contract are used for adherence to milestone achievement and later translate to benefits”.* Respondent no. 3 and 4 indicated that *“benefits management are done in the context of end-results. Projects on the development of new technology can be successfully completed but if the end-users are not integrating it, there will not be any benefits”.* Respondent no.5 stated that *“project benefits are managed through the use of continuous performance monitoring and evaluations”.* Respondent no. 6 and 7 agreed that *“project benefits are managed through the impact assessment during the course of the project”.*

## **4.7 Discussion of findings**

### **4.7.1 Benefits identification**

The study revealed that project benefits were defined in the inception phase, but this is not a standard process applicable to every project. There were projects where benefits were not clearly defined or identified in the inception. This became prevalent



during data collection with respective respondents whereby others indicated that they do not define project benefits in the inception phase. Benefits identification plays a central role in aligning project outcomes with benefits realisation. Lack of identification of benefits tends to lead to projects not structurally aligned to project outcomes. In projects where benefits were identified and integrated in the business, such projects achieved their benefits. These enabled project managers to monitor project activities in line with milestone and benefits defined. Keeys and Hueman (2017) discussed that project benefits identification is the first step in the business case, benefits realisation relies on change and value creation upon project completion. Benefits can be done through positive change which is measured in economic terms such as increased revenue, cost savings, user compliance and satisfaction (Dupont & Eskerod, 2016). To enable a project to deliver benefits, there should be benefits metrics tracking to ensure benefits achievement (Melton, Iles-Smith & Yates, 2008).

The DSI approach in benefits realization appears not be a standard practice as some project managers do not necessarily defines benefits in the inception and while others do defined them. The study revealed that the benefits identification is not a prerequisite practice in the DSI. In projects where benefits were identified, the study indicates that project benefits were achieved and in cases where they were not clearly defined, we found that there was no realisation of benefits. This further place a strong argument that benefits identification is critical and should form part of project activities.

## **4.7.2 Factors that need to be present when using benefits management**

### **4.7.2.1 Governance**

The DSI makes use of project steering committees to provide support for project implementation. Too and Weaver (2014) make similar remarks revealed by the study in that governance function deals with decisions about projects to approve and oversight. To effectively apply BRM framework and realise benefits, there should be well established governance systems within an organisation. Governance tends to ensure that project activities (roles and responsibilities and control mechanisms) designed to support project implementation are carried out (Terlizzi, Albertin &

Moraes, 2017). All respondents indicated that their projects have governance systems in place in the form of committees so as to ensure projects are successful implemented. In projects where there was strong governance mechanisms in place, the study discovered that such projects were continuously monitored and assessed by the stakeholders. The study also discovered that incorporation of governance systems in project management has led to project success.

However, the study indicates that project management office (PMO) play a critical role in strengthening project governance. Too and Weaver (2014) mentioned that PMO tends to ensure that the information is available to the executive management and project reports are accurate and useful. PMO further deals with development of organisational benefit management process for the implementation of projects and it has been found to play an essential role towards benefits realisation (Terlizzi, Albertin & Moraes, 2017). The DSI governance approach toward project management, has limitations in a sense that they do not have an established or operational PMO. Respondents indicated that the DSI only has standard operating procedures in place for executing projects which are not empowered by centralized PMO. Respondents implements projects based on an ad-hoc basis as opposed to well-informed project management methodology oriented.

#### **4.7.2.2 Project success**

The study assessed project success as a factor to understand its role in project BRM. The study discovered that, project success plays an important role in benefits management. The study findings are in line with Serra and Kunc (2015) which stated that successful projects are expected to deliver organisational benefits which is also used as a measurement of project impact. Project benefits were more likely not to be achieved if the project was not successful. The overall project success will ensure that the benefits identified are achieved. In the DSI project management context, the study discovered that if a project is not achieving any success in terms of project milestone, there will not be any further financial support from government and this will result in the termination of the project.

Failure to achieve project success results in no project benefits realisation in the project. The study revealed that there is a close correlation between project success and BRM. Scholars have argued that the traditional approach to measure project success based on the iron triangle is insufficient. Project success should not be constrained to the iron triangle in line with benefits realisation and its impact. This further calls for a need to broaden the iron triangle model to anticipate management of stakeholders' satisfaction, benefits to organisation and long-term impact of the project (Radujkovic & Sjekavica, 2017). The new approach should be able to look beyond the iron triangle as constraint measures. Project success should focus on achievement of comparable goals, purpose and customer satisfaction with the product (Albert, Balve & Spang, 2017).

#### **4.7.2.3 Value creation**

Value creation has an influential role towards benefits management and project impact to its stakeholders. The study adopted the concept of value creation as guided by the literature to assess its role in BRM. It is important to note that value creation leads to project benefits realisation. The study discovered that the DSI implemented projects with the intent of creating value in order to achieve benefits. Value creation is central towards stakeholder satisfaction. Project managers tend to incorporate value creations management in projects so as to ensure that there is benefits management.

Value assessment should be done throughout the entire project lifecycle so as to deliver short term and long term impact to the investment (Pargar, 2019). In ensuring value creation, different instruments are used to assess value, which are financial indicators and the study revealed that the DSI does not necessarily use financial indicators to measure value. Braun, Ahleman and Riempp (2009) stated that tangible benefits can be measured through objective quantitative (financial measures) and intangible benefits can be measured on subjective basis, qualitative. The DSI focus on measuring benefits is skewed towards subjective basis than objective. This is based on the fact that most of the projects are service delivery oriented to communities in line with the national government mandate.

#### **4.7.2.4 Return on investment**

The study revealed that the ROI is an influential factor that contributes significantly towards realisation of project benefits. Project benefits can be measured through financial measures such as ROI (Love & Matthews, 2019). According to all respondents in the study, ROI as a factor plays a crucial role to ensure that projects outputs are aligned with benefits identified in the inception phase. The study assessed the application of ROI in determining its role towards realisation of project benefits. It comes out evident that ROI has a contributing positive effect towards project benefits realisation.

ROI application can help decision makers to make decisions about where to invest by identifying projects with greatest returns (Kousky, Ritchie, Tierney & Lingle, 2019). Project selection is done within the context of ROI is achieved and this ultimately leads to benefit realisation. The selection process requires decision making to determine which new projects should be selected for implementation (Liu, et al., 2019). The DSI approach towards project selection has been through issuing a call for proposal to research community to submit research proposals. A steering committee is established to select a project that meets minimum requirements and this is in line with the departmental strategy and policies.

The use of project selection requires application of tools such as mathematical programming, decision support system, fuzzy multiple decision-making and analytic network process (Liu et al., 2019). The study found that project management tools such as cost benefits analysis, net present value and internal rate of return were not implemented but done on an ad-hoc basis.

### **4.7.3 Methodology to measure project benefits**

#### **4.7.3.1 Project Change and Improvement**

The study discovered that project benefits can be achieved by realising positive change and improvement realised by the stakeholders. Project benefits can be viewed on the basis of positive change, which is measured through increased revenue and

cost savings (Dupont & Eskerod, 2016). Projects are implemented with the key focus of achieving change and improvement on the status quo. Successful projects are expected to deliver organisational benefits which is also used as a measure of project impact (Serra & Kunc, 2015). Change realisation within the context of project implementation was essential so as to ensure that ROI and value is achieved. Projects are implemented in line with the mandate of the department and change was centred on service delivery. In cases where such projects do not achieve any change, the project was more likely to be regarded as a failure since they will not be any impact realised from the implementation.

#### **4.7.3.2 Value Creation**

Project will not yield any benefits if there is no value created during the implementation phase. The study used value creation as a measurement for project benefits achievement. In the DSI projects, the study revealed that value creation was measured through assessment of project impact on its stakeholders. Value creation relates to performance level (higher performance, the perceived value), is further concerned with reconciling the views to achieve desired performance (benefit) through the use of minimal resources (cost) (Melton, Iles-Smith & Yates, 2008). Keeyes and Hueman (2017) indicated that value creation in the project occurred as part of creating benefits.

Study respondent's indicated that they are involved throughout the project life cycle so as to ensure that the project achieves intended benefits. The involvement of project managers throughout the lifecycle will ensure that project value is created and ultimately lead to benefit realisation. However, it is important to note that the DSI does not have a standardised approach when measuring value. Respondent's stated that they are involved throughout the project life cycle so as to ensure that value is managed and this will ensure that the project outcomes create impact to its stakeholders.

#### **4.7.4 Relationship between benefit realisation management and business strategy**

To enable benefit realisation, there should be a correlation/relationship between the business strategy and BRM. In DSI, the study discovered that an alignment between BRM and business strategy should co-exist. Projects are implementing departmental strategy and other national policy directives such the National Development Plan. The intent of alignment is to make sure that projects respond to departmental strategy. Management of project in strategy implementation requires senior management involvement and there should be formal alignment between business and project plans, portfolio and programs (Morris & Jamieson, 2005). The study revealed that DSI practice is in line with what the prevailing literature, where no project was implemented outside the scope of the organisation's business strategy.

Dupont & Eskerod (2016) stated that BRM tends to turn business strategy into success demands through project as part of ensuring benefit realisation. Once projects are aligned with the organisational strategy, it later influenced the selection process. Benefits can be achieved using project management techniques, which entail creation of value for business by the successful execution of business strategy, which depends on programmes and projects to deliver benefits (Serra & Kunc, 2015).

To fully ensure that BRM is aligned to business strategy, evaluation is critical to ensure project deliverables respond to benefits. Benefits evaluation was done through impact assessment on project milestones in line with the project plan and contract. Appraisal measures of project is used as input for the definition of success criteria and project success can be measured through assessment of project management performance and benefits (Serra & Kunc, 2015).

The study discovered that innovation projects can be completed beyond costs but at completion deliver benefits expected by stakeholders. This is another area that we found uncommon in DSI innovation projects which can be unsuccessfully completed but certain benefits get to be achieved along the innovation value chain. This supports the notion of not accessing projects on the basis of iron triangle but more on impact assessment.

## 4.8 Conclusion

The study was carried out on the basis of assessing the use of BRM framework in the implementation of innovation projects within the DSI. A sample of seven (7) participants was selected and 13 projects were discussed in line with BRM framework. Factors were identified and assessed in line with the DSI project implementation approach and it came out evident that they indeed played a huge role towards benefit realisation. Respondents employed different approaches towards project management so as to ensure that they achieve benefits. The project success should not be constrained to the triple project constraints but more on the impact or benefits achieved. At the core of any project implemented by the DSI, the benefit realisation was found to be important.

# **CHAPTER FIVE: RECOMMENDATIONS AND CONCLUSION**

## **5.1 Introduction to the chapter**

This chapter provides research conclusions which has been drawn on the basis of research objectives, questions and problem statement interrogated. The research objectives and research questions are revisited and the chapter provides recommendations based on primary and secondary data collected during the course of the study.

## **5.2 Research objectives**

The objectives of the study was structured as follows:

### **5.2.1 Determine if project benefits are defined and identified in publicly funded innovation projects**

The study assessed benefits identification and definition in the implementation of the Department of Science and Innovation (DSI) projects as part of Benefits Realisation Management (BRM) framework. The study revealed that in most projects, benefits were identified during the inception of the project and in other instances benefits were not clearly defined. In cases where benefits were defined in the inception phase, the study revealed that these were easily tracked and achieved towards the end. Benefits identification and definition are very crucial in ensuring that benefits realisation becomes effective. Based on the data collected the study revealed that benefits identification should be done at all times.

### **5.2.2 Determine factors that need to be present when using BRM framework**

The study identified factors that need to be present when using the BRM framework as guided by the literature review. These factors entailed value creation, governance, return on investment, and project success. These factors were assessed on their role towards benefits realisation. The study respondents provided their insight on the role



played by these factors in project implementation so as to ensure that benefits are achieved. The study discovered that these factors contributed towards benefits realisation due to their underlying impact towards project outcomes. In the absence of integrating these factors in the project implementation, benefits were more likely not to be achieved.

The use of these factors tends to ensure that projects are no longer implemented within the iron constraints. The study is in agreement with other scholars who argued for a shift of emphasis on implementing projects on the sole focus of the iron triangle satisfaction. The study revealed that innovation projects are uncertain and complex, in most instances they can be implemented outside the iron triangle and regarded a success due to benefits realised. The DSI project focus mostly involve research and development, which seeks to introduce innovative solutions to the community or markets. To fully realise benefits in these projects, the use of BRM framework with identified factors is found to be critical.

Lack of adopting the BRM framework as a standard procedure, may lead to project implemented with no benefits realisation.

### **5.2.3 Unpack the methodology used to measure project benefits**

The study intent was to unpack methods applied to measure project benefits realised. To fully satisfy the stakeholders that benefits have been achieved there should be a methodology to measure them and particularly in cases where most benefits are intangible benefits. In unpacking the methodology, the study revealed that the DSI measured its project benefits through the use of subjective indicators. The study discovered that project benefits can be measured through positive change or improvement and value creation made by project outcomes. A project may not be regarded as a success without any change or improvement made towards the status quo prior the implementation. Projects should seek to create value to its stakeholders so as to satisfy that it has been successfully implemented. The study argues that the use of these methods to identify project benefits tends to look beyond the traditional iron triangle.

#### **5.2.4 Relationship between benefit realisation management framework and business strategy**

The study assessed if there is any relationship between the BRM and business strategy. The study revealed that projects are used as a tool to implement organisational business strategy. This then requires that there should be alignment between benefits and business strategy as part of ensuring that benefits are achieved. To fully make more impact on organisational strategy, projects should be used to implement business strategy. The DSI's projects are implemented in line with the organisational strategy and policies. Benefits realisation then helps the organisation to make positive effect to its strategy. It can be concludes that a correlation exists between the framework and business strategy.

#### **5.3 Research Question**

***What are the factors that need to be present to use a BRM framework in managing publicly funded innovation projects?***

To address the research question, the research used primary data (personal interview sessions) and secondary data (literature review).

The study identified different factors that played a crucial role in project benefits realisation and such factors entailed project success, governance, return on investment and value creation. The study assessed their role and correlation in benefit realisation and study respondents indicate these factors are useful for benefits realisation. To enable a project to achieve its end-goals and meet stakeholder expectations, a BRM framework should always be applied in line with the usage of factors (governance, project success, return on investment and value creation).

Taking into account that innovation projects are complex and uncertain, the study found that for such projects to achieve benefits they should continuously apply BRM framework. The BRM framework positions itself as a modern project assessment tool that is more useful than traditional approach of iron triangle constraints.

The research report has therefore responded to the research question and has achieved the research aim of the study.

#### 5.4 Major findings

The study made the following findings:

The study discovered that the DSI focus on project success is not only limited to well-known iron triangle constraints. The use of BRM framework, reveals that project success can no longer be viewed from the traditional triangle assessment measures. Innovation projects can be completed outside the scope of the iron triangle but later achieve benefits. This is can be supported by recent argument around discarding of assessment of projects through the use of traditional iron triangle. Innovation projects are complex and uncertain, which then makes the BRM framework an effective tool to realise benefits.

To effectively implement the BRM framework, there are factors that need to be integrated in the project. These factors play an essential role towards benefits realisation. The study respondents indicated that each of these factors have a strong relationship with benefit realisation and it is important that project be implemented inclusive of them as a guiding point. Projects that do not apply any of these factors on their execution were more likely to fail and furthermore unable to achieve any benefits.

Though the DSI was making use of the BRM framework factors in the project management, the study discovered that there is no established Project Management Office (PMO) to provide guidance on project management and play a key role towards benefits realisation. The lack of a PMO has resulted to project managers implementing projects using their own discretions with less attention to project management techniques, which aid support for effective execution of projects.

Standardization of project management tools and skills together with metrics will drive the quality of execution of all elements of the process including project lifecycle phases, project activities and milestones (Milosevic & Patanakul, 2005). The study

also indicated that project management as an effective tool applied in the execution of projects is not a standardised methodology as project managers tend to rely heavily on past exposure for implementing projects. In some projects, benefits were not even identified in the initiation phase, which then becomes difficult to assess them at the end. Project contracts were used as the main instrument to enforce milestone delivery. Inadequate use of BRM framework tends to result into projects financially supported and completed with no impact to stakeholders.

Application of the BRM cannot take place without alignment between organisational business strategy and projects. Organisation uses project as an instrument to implement their strategy. To enable the project to deliver on its strategic goals, project benefits should be an integral part of business strategy hence such alignment is crucial. The study established that business strategy alignment has an influential role towards benefits realisation as projects are used to implement strategies.

## **5.5 Further Discussion and Implication**

The study found that innovation projects are not linear, their outcome can be uncertain and complex. The innovation projects benefits should be conceptualised along the innovation value chain (research & development, technology development, prototype and technology commercialised) so as to ensure they are successfully achieved. The complexity of innovation projects has led to some projects being regarded a failure but able to achieve certain benefits. This is an area of interest in the study where by projects can be regarded as unsuccessful but certain activities could have been a success.

The DSI needs to adopt project management techniques that will help them with project selection. Currently, there is no specific techniques used to select project and the focus has been strategy influence. Effective techniques are required in order to select rightful projects from its pool.

Technology commercialisation is critical for the successful realisation of project benefits for innovation projects. Innovation projects are regarded as successful when

research and development (R&D) output is commercialised. In addition to the BRM framework, the study revealed that innovation projects complexity can be well managed by making use of the BRM framework.

In studying the application of BRM of publicly funded innovation projects, study discovered that some of the attributes which led to failure of innovation projects were:

- i. Lack of industry partner to commercialise project output;
- ii. Lack of technical expertise;
- iii. Unsuitable infrastructure for commercialisation of research output;
- iv. Lack of communication amongst project stakeholders;
- v. Ineffective monitoring and evaluation in projects;
- vi. Inadequate funding for further commercialisation support; and
- vii. Lack of top management support.

## **5.6 Conclusion**

The use of BRM framework in assessing project is essential for the realisation of project benefits. The study interrogated the use of BRM framework in assessing publicly funded innovation projects. The study established that benefits realisation is essential in order to meet project stakeholders' expectations. Projects should be able to create value in order to make positive impact. Innovation projects are uncertain and complex, which then calls for the use of BRM framework for each project undertaken to realise full benefits. The use of BRM assists in identifying tangible and intangible benefits that can be achieved from the project.

## **5.7 Recommendation**

The DSI needs to move towards the modern way of defining project success without solely focusing on the triple constraints. It is recommended that the DSI should adopt BRM framework as a standardised tool to ensure that project benefits are achieved. A number of projects are undertaken and gets completed without any benefits realisation. The BRM framework should be an integral part of project management domain within the DSI to ensure benefit realisation of publicly funded projects. There

is also a need to have a standardised approach towards project management to ensure that techniques and tools are used in an effective manner.

The DSI should establish the PMO office as to ensure that there is centralised office that will provide guidance and tools for undertaking projects. The PMO will induct project managers on the current process that need to be adhered to.

In future, the study should also expand its scope to include private funded innovation projects so to understand how benefits are realised and what factors are in place for such realisation. The expansion of the research will help ascertain if the framework can be applicable in privately funded innovation projects.

The study should expand its populations to include other government departments which are involved with innovation projects. Innovation projects tend to include other government departments, for instance the DSI focuses on support for R&D project and while the Department of Trade, Industry and Competition look into commercialisation of such R&D outcomes (innovations). However, the study has noted role of these sister departments limitation in comparison to the DSI.

The study found that there were certain innovation projects which were regarded a failure towards the completion phase but certain component was regards a success. This another area that need to be further unpacked as to have overview understanding of such projects and generate new knowledge. The framework should look into cases of this nature as part of future research.

In future the study should investigate the factors behind innovation projects failure and its complexity. Innovation projects need to be assessed on an individual rather than a generic basis and this should be unpacked by a future study.

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