AN INVESTIGATION INTO THE RISK MANAGEMENT STRATEGIES EMPLOYED TO MINIMISE TIME AND COST OVERRUNS IN PUBLIC SECTOR INVESTMENT PROJECTS: A CASE STUDY OF THE MINISTRY OF HIGHER AND TERTIARY EDUCATION

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GRADUATE SCHOOL OF MANAGEMENT

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DECLARATION

I, MOSES CHIGONYATI, do hereby declare that this dissertation is the result of my own investigation and research, except to the extent indicated in the acknowledgements, references and by comments included in the body of the report and that this dissertation has not been presented in part or in full for any other degree in any other University.

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With the support of my family and friends, this dissertation has been made possible. I thank them for their support and motivation.

Thank you to my loving wife who endured my long absence during the time I pursued this MBA Programme, doing anything in her power to help me succeed. May the Lord bless you in abundance.

I extend my sincere gratitude to my supervisor for the constant support, guidance, wisdom and patience throughout this process. Your insightful comments were enriching. I am grateful for your unconditional assistance.
ABSTRACT

Project time and cost overruns are recognised as the most common problems facing the Zimbabwean construction industry. Public sector investments projects, which are of a construction nature, have not been spared either. The primary objective of this study was to collect information so that an investigation of the risk management strategies being used to minimise project time and cost overruns in the Ministry of Higher and Tertiary Education can be determined.

Literature reviews showed that risk management is one of the critical knowledge areas that determine whether a project will conform to the quality standards, maintains its schedule baseline and remains within its budgetary allocation. It is therefore important for project implementing teams to enforce risk management strategies that work in order to achieve the project’s primary objectives. The project teams have to re-align the project’s objectives with the risks prevailing so that negative impacts are reduced. A case study of the Ministry of Higher and Tertiary Education public sector investment projects was used in this study where simple random sampling was used to select 180 potential respondents. Out of the 180 targeted respondents, only 130 responded thereby giving a response rate of 84%. A self-administered and structured questionnaire was used to collect data which was quantitatively analysed.

The study’s major findings are that those involved in public sector investment projects are generally aware of the risks encountered in the projects and have been employing risk response strategies especially through contract clauses. Effective risk management strategies have been found in this study, to minimise time and cost overruns in public sector projects.

The study recommended that the Ministry of Higher and Tertiary Education should put in place a formal risk management system, implement joint risk management, increase risk awareness in projects implementation and impart knowledge and skills on how to manage risks.
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<tr>
<td>ERM</td>
<td>Enterprise Risk Management</td>
</tr>
<tr>
<td>HIT</td>
<td>Harare Institute of Technology</td>
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<td>MHTE</td>
<td>Ministry of Higher and Tertiary Education</td>
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<td>PSIP</td>
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CHAPTER 1
INTRODUCTION AND BACKGROUND TO THE STUDY

1.0 Introduction
The purpose of this study is to investigate the risk management strategies that are being employed to minimise time and cost overruns in public sector investments projects (PSIP) implemented by the Ministry of Higher and Tertiary Education. The focus of this study will be on construction and rehabilitation of public sector investment projects. This chapter introduces the study by giving a background to the study, statement of the problem, research objectives, research questions, the hypothesis, justification and scope of the research.

1.1 Background to the Study
The construction industry is viewed as one of the most risky and challenging business sector with a very poor track record for managing risks (Mills, 2001). The industry is prone to numerous technical, socio-political and business risks. Major projects fail to meet schedule and cost baselines mostly because risks are either ignored or dealt with in a casual manner. According to Akintoye and Macleod (1997), the focus of attention in the construction industry has been risk primarily because of time and cost overruns and the failure to abide by the quality and operational requirements in projects implementation. There is need to proactively manage construction risks if the objectives and targets of a project are to be achieved (Goh et al, 2013).

The Government, in most developing countries, initiates infrastructural development projects and is by far the largest customer of the construction industry (Okpala and Aniekwu, 1988). However, the implementation of infrastructure projects in general by the Government and Government Agencies has been a major concern mainly due to either delayed or non-completion of projects and cost overruns. As highlighted by Flyvbjerg et al. (2003), project cost changes occur as a result of various related factors, all of which are associated with some form of risk. In the dynamic construction industry in general, risks are unavoidable (Tar and Carr, 2001; Forbes et al, 2008) but the important thing is that risks should be properly managed to achieve the project’s objectives. Proper risk management assist organisations in reducing the likelihood of potential threats and their possible impacts, and can also enhance the
likelihood of opportunities (Project Management Institute (PMI), 2013). Huge time and cost overruns in public sector investment projects can be attributed to inadequate risk management strategies.

Zimbabwe urgently needs infrastructure rehabilitation and development to revive its economy. This infrastructure includes buildings (government offices, houses, hospitals and schools), roads, water, sanitation, power and energy. Development of infrastructure is one of the most important activities that can boost earnings of various industries thereby increasing the gross domestic product (GDP) of a country (Ehsan et al, 2010). Year in, year out, the Government allocates a budget for infrastructure development. Most of this infrastructure comes in the form of public sector investment projects whose implementation is affected by various technical, environmental, socio-political and other unforeseen problems leading to time and cost overruns and compromised quality. Effective and efficient project management which include managing various risks has to be carried out from project inception to completion.

Different results have been obtained by a number of authors who have researched on time and cost overruns in different parts of the World. After conducting a study on global construction projects, Frame (1997), found out that 16% of 8000 projects were completed within budget, on time and within the quality standards specified. Hartley and Okamoto (1997), claim that in general, construction projects experience an increase in cost of about 33% on average. For construction projects in Tanzania, Salewi (2003) claims that averagely, the cost overrun is up to two times the original cost baseline. In a random sample of seven building construction projects implemented by the Government of Botswana, only one project was found to have been completed within budget but all seven had exceeded the schedule baseline (Dibonwe, 2008). The authors cite lack of or inadequate application of project management processes.

In Zimbabwe, examples of national projects that have exceeded the schedule baselines include the Dualisation of the Harare International Airport Road (Moyo,2015), CID Headquarters, ZIMDEF Headquarters, The Central Registry, Dualisation of the
Harare – Norton Road, Tokwe – Mukosi Dam, Rehabilitation of the Plumtree – Harare – Mutare Road to name but a few.

Projects carried out by the Ministry of Higher and Tertiary Education have not been spared either. Examples of such projects that have exceeded the cost and schedule baseline include but are not limited to:

Table 1.1: Time and Cost Overruns – MHTE Public Sector Investment Projects

<table>
<thead>
<tr>
<th>Name of project</th>
<th>Original Contract Value</th>
<th>Final Contract Value</th>
<th>Cost Overrun</th>
<th>Time Overrun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-purpose workshop construction at Harare Institute of Technology</td>
<td>$574,440.00</td>
<td>$757,320.00</td>
<td>31%</td>
<td>4 months</td>
</tr>
<tr>
<td>Refurbishment of students hostel at HIT</td>
<td>$608,862.90</td>
<td>$1,009,903.56</td>
<td>65%</td>
<td>20 months</td>
</tr>
<tr>
<td>Construction of a car park at HIT</td>
<td>$516,847.68</td>
<td>$548,203.95</td>
<td>6%</td>
<td>24 months</td>
</tr>
</tbody>
</table>

Given the statistics, one wonders whether effective risk management strategies are being applied by the project implementing organisations in these public sector investment projects. Effective and efficient risk management strategies can turn negative risks to opportunities thus enhancing the performance of projects and the organizations (Goh et al, 2013).

1.2背景

The public sector comprises of “government and all publicly controlled or publicly funded agencies, enterprises, and other entities that deliver public programs, goods, or services” (Institute of Internal Auditors, 2011). The government is at the core of the public sector followed by government agencies and public enterprises. To translate the nation’s long term plans into tangible programmes and projects, the Government of Zimbabwe uses the Public Sector Investment Programme as a budgeting and strategic planning tool. The Programme contains projects that support the socio-economic transformation agenda with a focus on sustainable development that will
improve the quality of life of citizens. These projects are implemented by various ministries, enterprises, agencies and other government entities.

As a starting point, the Ministry of Finance disburses funds to various Ministries and government agencies every financial year to enable them to implement public sector investment projects such as government offices, houses, hospitals, schools, water and sanitation facilities and roads through their project implementing units. The Ministry of Higher and Tertiary Education (MHTE) is one of the beneficiaries of such funds. The Ministry uses state institutions (Universities, Teachers’ Colleges, Technical and Vocational Training Centres), supervised by the Policy and Evaluation Unit at head office to implement construction and rehabilitation projects at these institutions. The projects, which include teaching and learning facilities as well as supporting infrastructure, are either implemented in house or outsourced to contractors and consultants.

1.3 Statement of the Problem

Public sector investment projects that are implemented by the Ministry of Higher and Tertiary Education are facing time and cost overruns. This is in spite of the continued budget allocations to the Institutions by Government. As an example US$17.2 million has been allocated in the 2015 financial year to seven universities and two technical and vocational training centres for implementation of public sector investment projects (Ministry of Finance and Economic Development Budget Estimates, 2015). The time and cost overruns may be attributed to lack of proper project risk management. This research therefore seeks to instigate the risk management strategies that are being used to minimize time and cost overruns in public sector investment projects implemented by the Ministry of Higher and Tertiary Education (MHTE).

1.4 Research Objectives

The study’s main objective is to find out the risk management strategies employed to minimise time and cost overruns in the public sector investment projects in the Ministry of Higher and Tertiary Education. Specifically, the objectives of the study are to:
(i) Establish the level of risk awareness and perception in the Ministry of Higher and Tertiary Education
(ii) Determine the major risks associated with time and cost overruns in the public sector investment projects.
(iii) Assess the impact of risks on the performance of public sector investment projects
(iv) Provide recommendations to the public sector investment programme on effective risk management strategies for minimising time and cost overruns.

1.5 Research Questions

The study’s main research question is: What are the risk management strategies being used to minimise time and cost overruns of public sector investment projects implemented by the Ministry of Higher and Tertiary Education (MHTE). The specific research questions are:
(i) What is the level of risk awareness and perception in the public sector investment projects?
(ii) What are the major risks associated with time and cost overruns?
(iii) What is the impact of risk management strategies on time and cost overruns?
(iv) What recommendations can be made to the public sector building industry on effective risk management strategies for minimising time and cost overruns?

1.6 Research Hypothesis

The study’s main hypothesis is:
- Risk management strategies are positively related to a reduction in time and cost overruns
- Internal and external risks cause time and cost overruns in public sector investment projects

1.7 Delimitations

The scope of this study is to investigate the risk management strategies employed to minimise time and cost overruns for public sector investment projects implemented by the Ministry of Higher and Tertiary Education. The following boundaries are going to be set for the study:
(i) The study will be limited to the public sector investment projects in Zimbabwe being implemented by the Ministry of Higher and Tertiary Education.

(ii) The research will not compare risk management strategies with other management strategies that can be utilised to minimise time and cost overruns.

(iii) The study will not compare risk management in the public sector with risk management practices in the private sector.

(iv) The usage of risk management strategies in minimising time and cost overruns in other sectors will not be assessed.

1.8 Limitations

The study is constrained in terms of time and financial resources and the ideal situation would have been to cover a number of institutions handling public sector investment projects. There is likely to be a high inclination of interviewee apathy in providing information about sensitive matters vital to the research, especially given that they are employed by the same Ministry and Agencies.

1.9 Assumptions of the Study

From observations made and newspaper reports about public sector investment projects exceeding cost and schedule baselines, the researcher is inclined to assume that the public sector building construction industry is not adequately planning risk management, identifying, analysing and controlling risks. In addition, the project implementing organisations might be using outdated or wrong risk management strategies to minimise time and cost overruns.

1.10 Justification of the Study

This study is important to the Ministry of Higher and Tertiary Education in many ways. In as much as risk management is important to the Public Sector Investment Projects, little is known regarding the public sector’s response to risks, let alone the techniques employed to manage the risks hence the need for this study. It is a first for Ministry in the area of public sector investments projects (PSIP). The study seeks to gather strategies that are currently being employed to avoid or minimise time and cost overruns in projects implemented by the public sector. It is perceived that there is a high failure rate of projects implementation in the public and private sector as a whole and the reasons are varied. The study shall assist similar institutions who are project
implementers in coming up with the appropriate risk management strategies for effective project implementation. It will also help organisations in grasping and accepting project management as a discipline that must be given attention to and help them to come up with strategies to mitigate similar challenges posed by their organisational projects.

The study need be carried out for it has direct and indirect benefits to stakeholders such as the public sector players, contractors, management, employees and the researcher. Furthermore, the study will add to the body of knowledge that is already there and this can be used to improve our institutions in managing projects.

1.11 Scope of the study

The aim of this research is to assess the impact of risk management strategies that are being used to minimise time and cost overruns in public sector investment projects implemented by the MHTE, therefore the research findings may not be generalised for other public sector investments projects implemented by other Government ministries or agents. Cross sectional data was used in the study and that data was collected at a single interval of time. The study was conducted in Harare starting off at the Ministry of Higher and Tertiary Education head office where records of public sector investment projects that have been implemented were obtained. In addition, information about the service providers (architects, engineers, quantity surveyors, project managers, contractors, sub-contractors, other stakeholders) was also obtained from MHTE head office.

1.12 Format of the Study

The dissertation consists of five chapters whose structures are as outlined below:

**Chapter 1** provides the introductory remarks to the study. It puts the problem that need to be investigated into context and includes various headings such as the background to the study, the study topic, its scope and the justification of why such a study should be carried out.

**Chapter 2** focuses on secondary research and provides a review of relevant literature. It evaluates all the information obtained from various sources and shows how the information will apply to this study. It is where the researcher shall compare and
contrast views obtained from other authors pertaining to efficiencies and deficiencies of performing projects in a functional organisation, constraints to implementing construction projects and the conceptual framework derived from the study.

**Chapter 3** covers the research methodology to be employed by the researcher for this study which includes sampling methods, data collection methods, theories and philosophies applicable to the study.

**Chapter 4** comprises of data presentation, analysis and interpretation of the research results.

**Chapter 5** consists of conclusions to the whole study and offers recommendations according to the researcher’s findings.

### 1.13 Chapter Summary

This chapter has established the need to investigate the risk management strategies that are being employed to minimise time and cost overruns in the public sector investment projects. The projects face threats from internal and external risks which need to be identified, categorised, analysed, responded to and controlled. The study looks at the risk awareness level of public projects implementing organisations, the risks facing the organisations, the impact of the risks and the strategies that are being used to minimise the impact of risks on time and cost overruns.
CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

The chapter reviews and discusses literature related to the current study which seeks to investigate the impact of risk management strategies employed to minimise time and cost overruns on public sector investment projects. Terms and concepts that will be used in the study are discussed first and this is followed by literature on risk categories, risk management processes, risk management frameworks and risk perception. The chapter concludes by looking at similar cases that have been researched and reported regionally and worldwide.

2.1 Terms and Concepts

2.1.1 Risk

The term risk has various meanings in business and everyday life (Niehaus, 2004). The general definition of risk as given by Cooper et al (2005:3) is that “risk is exposure to the consequences of uncertainty”. They add that risk “includes the possibility of loss or gain, or variation from a desired or planned outcome, as a consequence of the uncertainty associated with following a particular course of action”. These uncertainties are inherent in the public sector building construction industry and they cause significant time and cost overruns. Other authors define risk in terms of the probability and impact of an event happening or its severity, for example, according to Adams (1995:69), risk is defined as “the probability of an adverse future event multiplied by its magnitude”. The severity of a risk is appropriately captured by AbouRizk (2013) in the form of an equation expressed as:

\[
\text{Severity} = \text{Likelihood of Occurrence} \times \text{Magnitude of Impact}
\]

In the context of project management, the Project Management Institute (PMI) (2013:309) defines project risk as “an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality”. If the schedule, cost and quality of a project are not met, then the viability of that project has been impaired. The PMI’s definition is in close agreement with the definition proffered by Cooper et al (2005) who define project risk as the probability of an event occurring that will have an impact on project objectives.
2.1.2 Project Risk Management

PMI (2013, 309) defines project risk management as “the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project” with the objective of increasing the “likelihood and impact of positive events, and decreasing the likelihood and impact of negative events in the project”. According to Zhao and Lee (2010), risk management is the process which, when applied throughout the life cycle of a given project by analysing, identifying and responding to risks, controls and reduces or eliminates risks. On the other hand, Cooper et al (2005, 3), define project risk management as the “culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects”

From the definitions given by the authors above, it can be deduced that the objective of risk management is to enhance positive opportunities for a project while reducing or eliminating negative threats. Risk management is thus critical for the successful completion of a project. Andi (2006) points out that total elimination of risks in the construction industry is almost impossible. His view is also supported by Mak and Piken (2000) who agreed that since total elimination of risk is close to impossible, then the objective should be to transfer the risks from one party to the other through the use of contract clauses and to allocate them to the contractual parties, for example, through provision of insurance cover.

2.1.3 Enterprise Risk Management

COSO II (2004), define enterprise risk management (ERM) as a process that is driven by the board with the assistance of management across the enterprise in an effort to identify risks and manage them within their limits in order to achieve the organisation’s strategic objectives.

2.1.4 Risk Perception

According to Thomson et al (2003:25), risk perception refers “to people’s judgements and evaluations of hazards which they are or might be exposed to” and is generally influenced by beliefs, attitudes, personal judgement and feelings. The responses from individuals and groups to threats and their judgements are influenced by how they perceive risk (Slovic and Weber, 2002)
2.1.5 Cost and Time/Schedule Overruns

According to Sharma and Goyal (2014: p.140), cost overruns, in construction projects, are defined as “the excess of actual project costs over budgeted costs whilst time overruns refer to the difference between the actual time taken to complete an activity or a project and the original schedule baseline.

2.2 Risk and Uncertainty in Projects

2.2.1 Risks in Projects

Risk in the construction industry is a topical subject because of the high frequency of time and cost over-runs (Akintoye and Mcleod, 1997). From the inception stage to the close out phase, a project is faced by different type of risks (Mak and Piken, 2000). As an example, risks that are faced at the feasibility stage are different from those that are experienced during execution of the project. It therefore follows that a project goes through a number of phases that face a plethora of risks from inception to completion (Goral, 2007).

2.2.2 Uncertainties in Projects

According to Duckett (2004), a project is exposed to several unpredictable situations referred to as uncertainties. The author adds that these uncertainties are highest at the beginning of a project due to lack of detailed information and decrease as the project progresses reaching a minimum at the close out phase. Task uncertainty, organisation uncertainty and uncertainty concerning the relationship between the designs and the reality on the site of the works are some of the unpredictable situations as suggested by Kwakye (1997).

2.2.3 Risk and Project Phases

A typical project has a life cycle that can be divided into the feasibility stage, design phase, construction phase and the closing phase (Smith, 2006). The phases can be defined in different ways depending on a number of factors some of which are the scope of works, the project management team and form of contract. According to author, risk on a project is at its peak when the design phase is completed and construction is about to start. Errors made during the design stage start to emerge as the construction phase gets underway and designs have to be continually reviewed. Design errors and omissions are a big source of future risks.
2.3 Categories of Project Risks

The typical risks for a project can be distinguished according to individual project phases and the categories generally fall under political, cultural, economic, market, technical, environmental, social, contractual and legal risks (Bos C, 2012). According to PMI (2013), project risks can be categorized by (i) using the sources of risks, (ii) using the area of the project affected, (iii) any useful category like the project phase and, (iv) using root causes of the risk. Using the source as a means of categorisation, Thuyet et al (2007) divided risk into internal risks and external risks. In order to deal efficiently and effectively with risk, the project implementing organisations must first identify the internal risks, analyse them and then focus on the external risks (Antón et al, 2011). Alternatively, Wiguna and Scott (2006) suggest that risks can be classified into four categories: external and site condition risks, economic and financial risks, technical and contractual risks and managerial risks.

This study will examine and categorise the major risks that are inherent in public sector investment projects.

2.3.1 Internal Risks

According to Antón et al (2011), internal risks have their origin within the project and are usually within the control of the project management team. Internal risks are unique to a project and are caused by sources that are intrinsic to the project (Ehsan et al, 2010), for example the inability of a product to function as designed. The internal risks can be classified into the following groups (El-Sayegh, 2008): owner’s obligations, designers, contractors, sub-contractors and suppliers. The group of owner’s obligations when further sub-divided include the following sub-groups: payments to contractors, tightness of project schedules, inappropriate interventions, design changes, undefined scope of project, sudden bankruptcy and contract breaches (Antón et al, 2011). It is common in most public projects that payments are delayed beyond the agreed payment period thereby piling more financial difficulties on service providers and in turn creating a risk of cost and schedule overrun. Any delay in a project is a risk (Ogunbayo, 2014), which subsequently affects the project’s objectives of cost, schedule and quality.
The next group of internal risks are project designers. A lot of designs are issued for implementation with a lot of design flaws that start to be corrected during the construction phase of a project. The designs may be incomplete, incorrect or lacking some critical details (Antón et al., 2011). In addition, designs or drawings are often issued late after the request for additional information has been sent thereby introducing an additional risk (Kartam and Kartam, 2001). Most projects fail because technical risks, which according to Mahendra et al. (2013), are incomplete designs, inadequate specifications, inadequate site investigation, change in scope construction procedures, and insufficient resource availability, have not been addressed fully.

Risks associated with contractors are related and generally refer to quality, productivity, site accidents and qualified personnel (Antón et al., 2011). As an example, when an accident happens on site, the site is temporarily closed to allow for investigations, it affects employee morale, it affects all the equipment and may derail achievement of the target.

For sub-contractors, outsourcing can be a risky business where you might not be guaranteed of making profits. Poor performance by the sub-contractor can result in the whole project being delayed resulting in a breach of contract with the main contractor. On the other hand, poor performance by the main contractor can also affect the sub-contractor’s work.

The most common risks for suppliers are those that are related to the quality of the materials, delays in supply of the materials and pricing of the materials. According to Dey (2002), suppliers rank third in risk impact analysis according to contractors.

Ogunbayo (2014) citing Thuyet et al. (2007) refer to internal risks as “endogenous risks” that are classified into financial, design, contractual, construction, personal, involved parties and operational risks. Their classification is similar to that proposed by El-Sayegh above except that they have added financial, construction and operational risks. Construction risks refer to the difficulties that might be encountered by the project team in the actual implementation of the project whilst operational risks are those that may deter realisation of future income flows.
2.3.2 External Risks

Aleshin (2001) postulates that external risks have their origin from the macro-level and are not directly related to the construction process but rather have a high bearing on the successful achievement of the project’s objectives. External risks originate from sources that are external to the project scope and according to El-Salegh (2008), they can be classified into the following groups: political, economic, socio-cultural and natural.

Political risks which are closely linked to country risk include threats of war, employee strikes, changes in legislation, delays in approvals, corruption and bribery (Antón et al, 2011). Political risks by their nature are difficult to assess and affect all facets of a project from the inception stage to the close out phase (Wang and Chou, 2003). Their impact is usually borne by the client.

Socio-cultural risks emanate mainly as a result of cultural differences within the project management team or between the project management team and the community where the project is being implemented. As an example, there might be a cultural or language barrier with the community who are supposed to be beneficiaries of the project.

Natural hazards or environmental risks, such as natural disasters and unexpected weather conditions pose a great risk to the successful achievement of a project’s objectives. Natural hazards are also referred to as Acts of God.

The categories of external risks described above are not exhaustive. Other authors have come up with external risks that include but are not limited to delays in resolving contractual issues and disputes, lack of equity in the tendering process, local protection (indigenisation), interest groups, statutory requirements and resource availability. All these risks might have a direct bearing on the outcome of a project.

An attempt will be made to classify majors risks inherent in public sector investment projects implemented by the Ministry of Higher and Tertiary Education into external and internal risks.
2.4 The Risk Management Process

For the project implementing teams to reduce project risks, Godfrey (1996) suggests that the first step is to identify the risks. Once the risks have been identified, Kayis and Ahmed (2007) assert that it becomes easy for the project teams to analyse and address them. Apart from reducing or eliminating negative risks, risk management practices can also enhance positive opportunities as postulated by Baker et al (1999) by way of increasing or maximising profits.

Various government agencies, professional bodies and researchers have proposed several risk management processes as evidenced in the literature by Chapman (1997), Ward (1999), Tah and Carr (2001), Project Management Institute (2013), Australian/New Zealand Standards (AS/NZS) (2004), Taylor (2005), Han et al (2007), Office of Governance Commerce (OGC) UK (2002) and Association of Project Management (APM) (1997). In addition, professional bodies have designed systems that will overcome problems encountered during implementation of risk management processes. As an example, the Association of Project Management’s (APM) project risk analysis and management process consists of nine steps as follows: define, focus, identify, structure, ownership, estimate, evaluate, manage and plan (Chapman, 1997). On the other hand, PMI (2013) has a risk management process that comprises of six processes which are: risk planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response and risk monitoring and control. On the same footing ANS/NZS (2004) offered a similar risk management framework.

It can be seen that there are variations to the steps taken for risk management processes as presented by each of the three professional bodies APM, PMI and ANS/NZS cited above but what is common from the three is that risk management generally involves risk identification, risk analysis and risk response. All the risk management processes are iterative and should be applied at all stages in the life cycle of a project in a systematic and comprehensive manner to realise the project’s objectives (Goh et al, 2013). In addition, the right risk management tools and techniques should be selected and applied for a successful risk management implementation.
The following sections will explain the risk management processes according to PMI (2013) as outlined in the PMBOK Guide:

(i) Risk Management Planning

In construction, the risk management process begins with risk management planning when a project is conceived. The process involves determining and documenting the approach that will be used for all risk management activities in order to achieve the project’s objectives (PMI, 2013). Failure to achieve the project’s objectives, which are in most cases to deliver the project within time and budget and of the right quality, is in itself a risk that needs proper management. The output of the plan risk management process is a risk management plan which is vital to communicate with and obtain agreement and support from all project stakeholders. Risk planning ensures that sufficient resources and time are set aside for risk management activities.

(ii) Risk Identification

To be able to manage risks, the project management team has to be aware of them. Hayes et al (1986), Williams (1995) and Godfrey (1996), view risk identification as the first essential step in the risk management process. The entire risk management process, including the success of the whole process, relies heavily on the initial identification phase (Chapman, 1997). In a research carried out by Dawood (1998), it was found out that systematic risk management enables risks to be detected in the early stages of a project thereby eliminating the need to set up contingency plans to cover uncertainties. The process, according to PMI PMBOK Guide (2013), involves identifying risk sources as well as documenting the characteristics of the risks. All project stakeholders that include the project management team, customers, stakeholders and risk management experts should be involved in the risk identification activities so that they will be able to anticipate events. The process is iterative as new risks might evolve or emerge as the project progresses.

Risks that face the construction industry are varied and impact the industry in various ways. In the context of the public sector construction industry, the
objective is to deliver projects within the cost and schedule baselines. Anything that hampers the achievement of this objective should then be treated as a risk.

(iii) Qualitative Risk Analysis

After the identification of risks in a project, the next step will be to analyse or evaluate them in terms of the likelihood of occurrence and the impact on the objectives of the project with a view to prioritising them (PMI, 2013). This helps the project management team to concentrate their limited resources on high priority risks. Estimates of the probability of occurrence and impact are required for prioritisation and these are obtained from tools such as a probability – impact grid or a risk matrix. Once the probability – impact grid has been constructed, risks can then be classified into: risks with low priority, risks with high priority, risks to mitigate and risks to avoid (Barringer, 2006). Qualitative risk analysis is usually a quick and cost-effective way which is performed throughout the project life cycle and lays the foundation for the next risk management processes, quantitative risk analysis and risk response planning, if required. The public sector building construction industry, as evidenced by a lot of projects overrunning their planned cost and schedule baselines, is saddled with diverse risks which need to be prioritised.

(iv) Quantitative Risk Analysis

The process involves “numerically analysing the effect of identified risks on overall project objectives” (PMI, 2013:333). Quantitative risks analysis is performed on risks that have the potential to derail or impact on the project’s objectives as determined during prioritisation in the qualitative risk analysis process. Probability and impact scores are assigned to verbal expressions and multiplied together to get a value of severity (Construction Industry Institute (CII), 2012). Quantitative risk analysis can occur for both cost and schedule. The project manager can use expert judgement and experience in order to determine whether there is need to carry out this process or not as this process can be left out in instances where there is insufficient time and budget.
(v) Risk Response Planning

This is the stage at which options and actions to enhance opportunities and to reduce threats to project objectives are developed by the project team. This process addresses risks using their priority and includes assigning risk to owners who will take responsibility for each agreed-to and sponsored risk response. All risk responses should be realistic, appropriate, cost-effective, agreed upon by all parties involved and should be owned by a responsible person (PMI, 2013).

(vi) Risk monitoring and control

In order to determine any changes or unexpected outcomes throughout the project’s life cycle, the project team has to continually examine, review and observe risks (International Standards Organisation (ISO), 2009). PMI (2013:349) define risk control as “the process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project.” The project team has to monitor the effectiveness of the risk management strategies that have been put in place and during the process, identify, analyse and treat new risks as they emerge. Risk owners are expected to report on the progress of the risk treatments at regular intervals to the project manager.

In addition, PMI (2013) points out that the monitor and control risk process is important in that it determines whether (i) the project’s assumptions are still valid, (ii) an assessed risk has changed or can be retired, (iii) risk management policies and procedures are being adhered to, and (iv) contingency reserves for cost or schedule should be modified in line with the latest risk assessment.

This study examines the frequency of use of these risk management processes for public sector investments projects in the Ministry of Higher and Tertiary Education. The processes form a good framework for risk management.
Figure 2.1: The Project Risk Management Overview: Source: PMI PMBOK Guide (2013)
2.4.1 Common Risk Response Strategies

Risks include threats and opportunities that can affect a project’s success if they do occur. According to PMI (2013), there are possible ways or strategies of dealing with risks whether negative or positive. Strategies which deal with unacceptable or negative risks include:

- risk avoidance which can be achieved by changing the management plan or discontinuing an activity that generates the risk,
- risk transfer where the impact of a threat is transferred to a third party, for example, in construction projects, it might through an insurance for the works.
- Risk mitigation, where the project team acts in ways that reduce the likelihood of occurrence or impact of a risk,
- Risk acceptance, whereby the project team acknowledge and retain the risk without taking any action until the risk occurs.

On the other hand, there are strategies which deal with risks that have a positive impact on the project’s objectives. These positive risks can also be referred to as opportunities and available strategies to deal with them include exploiting, enhancing, sharing and accepting the opportunity.

This study investigates the risk management strategies that are being used to minimise time and cost overruns in public sector investment projects that are being implemented by MHTE with a focus on negative risks only.

2.4.2 Contingencies as a Risk Response Strategy

According to PMI (2013), contingency or fall back plans are designed to be used if certain events occur and include identified triggering events that set the plans in motion. An example of an event that can trigger use of contingency reserves is a missing milestone.

2.5 Enterprise Risk Management

Every organisation exists to provide value for its stakeholders despite the uncertainty that it faces (Committee of Sponsoring Organisations of the Treadway Commission (COSO), 2004). With uncertainty presenting both risk and opportunity, it is the duty of management to deal effectively and efficiently with risk and uncertainty in order to
create stakeholder value. It is therefore logical that an organisation should commit to addressing risk proactively and consistently throughout the project life cycle if it has to meet the project’s objectives (PMI, 2013). The project’s objectives are linked to an organisation’s vision, mission and strategies. The Ministry of Higher and Tertiary Education, can be viewed as an enterprise that implements public sector investment projects to create value for its stakeholders. The projects are used to drive the Ministry’s strategic objectives so that its vision and mission are realised. At the project implementation level, the strategic objectives are driven by senior management, the project management team and other project stakeholders.

2.5.1 Enterprise Risk Management Frameworks

Literature surveys reveal that there are several risk management frameworks that are linked to an organisation’s vision, mission and strategies can be utilised. Two of the most popular risk management frameworks that can be utilised by the Ministry of Higher and Tertiary Education are briefly discussed below:

2.5.1.1 The COSO Framework

In 2004, COSO issued the Enterprise Risk Management – Integrated Framework which expands on internal control and provides a more flexible and wide focus on enterprise risk management (COSO II, 2004). The goals of the framework are to increase risk awareness, identify enterprise risks, coordinate across business units, establish a common risk language and complete consistent risk information.

There are four categories of objectives that the COSO II framework addresses in an organisation, and these include:

- strategic objectives (high level goals aligned with the mission)
- operations (efficient and effective use of resources)
- reporting (reliability of reporting)
- compliance (compliance with applicable laws and regulations)

In addition to the four objectives highlighted above, the COSO II framework has eight other related components derived from how the management runs the entity. These components, according to Chikova (2011) citing COSO II 2004, are the internal
environment, objective setting, event identification, risk assessment, risk response and control activities.

Figure 2.2: COSO II Cube: Source: COSO Enterprise Risk Management.

2.5.1.2 The Hierarchy of Risk Framework

According to the New York Society of Security Analysis (2010), “hierarchy of risk is a risk management framework that channels risk events into three key dimensions: reputational risk, financial risk, and competitive impact risk”. The design of the hierarchy of risk framework is such that company boards have more time to focus on increasing shareholder value instead of focusing on operational issues. Using this framework, risks are viewed as events that require multiple dimensions of analysis. Risk reports are generated by the various business units and submitted to senior management where risk events are measured and analysed. Information is escalated through sub-committees and synthesized into reputational, financial and competitive impact risk. These three dimensions of risk are briefly discussed below:
(i) Reputational risk: is a sum total of the various risks emanating from the business units. It is a subjective assessment of the potential effects that a risk event can create to an organisation. According to Stuller (2009), many firms view reputational risk as a communication and public relations issue while research has shown that reputation is an intangible asset that has a huge bearing on market value. The Ministry of Higher and Tertiary Education is prone to reputational risk if its projects have time and cost overruns.

(ii) Financial risk: this is an analysis of a risk event’s expected financial impact and includes legal costs, operational expenses, and expected gains in market share. Financial risks faced by the Ministry of Higher and Tertiary Education in public sector investment projects implementation result from inadequate risk management practices.

(iii) Impact risk: impact risk reveals the key competitive advantage that a firm deploys to create shareholder value. A firm has to identify its key risks with regard to its competitive advantage in the industry. As an example, for a low-cost producer, operational risk may be critical while a regulatory risk may take precedent in a highly regulated financial sector.

The hierarchy of risks approach synthesizes an organisation’s reputational, financial, and competitive impact risks and evaluates that synthesis against the organisation’s strategic goals and objectives. This approach may be useful to the Ministry of Higher and Tertiary Education especially on public sector investment projects as it shows that different risks faced by different departments ultimately have an impact on the organisation’s strategic objectives.
2.6 Technical Risk Assessment versus a Psychological Perception

As already highlighted in the previous sections of this Chapter, risk is an integral part of the project’s life cycle from inception to completion. It is not possible to eliminate all risk but the aim should be to reduce the likelihood and impact. In project management and other technical fields, risk can be defined in terms of probability of occurrence and impact (Baan and Klijn, 2004). According to the authors, this definition has the effect of forcing the risk management team to compare project risks based on either the probability alone or the probability multiplied by the impact thereby ignoring the psychological perspective of risk. According to Slovic et al. (2002), risk judgement can only be effective if it is guided by emotion and feeling. RIVM’s observations in 2003 (cited in Baan and Klijn 2004) are that other people
look at more qualitative aspects like risk perception, equity, degree of risk control and gains to be expected when individually judging risks. It therefore means that there is a large difference in how the organisation as a whole view risks as compared to individuals’ views on risk.

2.6.1 Risk Perception and Awareness

According to PMI (2013:311), individuals and groups adopt attitudes driven by perception, tolerances and other biases towards risks and this influences the way they respond to risks. The Institute adds that risk responses reflect an organisation or an individual’s perceived balance between risk taking and risk avoidance. Individuals perceive risks differently (Liu and Cheung, 1994). Thus, what a project manager perceives as a major risk might not be perceived in the same view by a contractor or a project team member.

For risks to be communicated properly, the first step is to get a comprehensive understanding of how people perceive risks, how people evaluate risks and why risk perception varies from individual to individual. In addition, the authors point out that it is important to know what concerns the people involved and why, so that these views can be used for decision making.

In studies in the area of risk perception, the consensus findings are that individuals perceive risks partly based on “the characteristics of the situation that cannot be solely described by the probability of occurrences or the quantifications of outcomes” (Schwarzkopf, 2006:329).

2.6.1.1 The Psychological Perspective of Risk

According to Baan and Klijn (2004:116), perception and acceptance of risk depends on the socio-cultural framework, the characteristics of a risk, extent of freedom of exposure, the degree of control of the risk, its impact and the amount at stake. The following diagram presents an outline of an individual’s cognition of risks and the resulting risk behaviour as postulated by Flinterman et al in 2000 (cited in Baan and Klijn, 2004).
There are various studies that have been carried out to establish factors that explain the differences in individual risk perception and acceptance. From a list of 27 factors that were drafted by Sjöberg and Drottz-Sjöberg (1994), 10 relate to risk characteristics, 11 to the social-cultural context and 6 to personal advantages. Baan and Klijn (2004:116), highlight that personality is key to understanding an individual’s risk perception. The authors add that it is difficult to consider personality in risk assessment and cite Weber et al’s 2002 report where females were found to judge risks as more severe than what men would say. The media and social processes like strong social networks have been identified by the same authors as influencing the perception and acceptance of risks by individuals.

The most utilised approach to the study of risk perception is the psychometric paradigm that “encompasses a theoretical framework that assumes risk is subjectively defined by individuals who may be influenced by a wide array of psychological, social, institutional and cultural factors” (Slovic, 2000:23). The author adds that many of these factors together with their interrelationships can be quantified and fashioned to portray the responses of individuals and societies to threats confronting them. Having bought into the idea that risk perceptions were quantifiable, various research studies started focusing on the cultural and national differences that may influence perception of risk (Thomson et al, 2003).
2.6.1.2 The Cultural Perspective of Risk

The cultural approach takes the view that risk is a societal and cultural creation. The idea is to discover what different attributes of social life draw certain responses to threats. There are major differences in risk perceptions in different countries depending on the social, political and economic emphasis of those countries (Thomson et al, 2003).

Sjöberg’s observations in 2000 (cited in Thomson et al 2003) were that Bulgarians’ risk perceptions were higher than those of the Swedish on a number of issues to do with risk in pregnancy and child birth, crime, food irradiation, x – rays, fertilisers and antibiotics. The author suggests that the huge difference in risk perception between the two countries was attributable to the difference in the political, social and economic situations where the Swedish were considered to be affluent, knowledgeable, democratic welfare state with high life expectancy and low crime at the time of the study.

On a similar study on gender differences by Sjöberg et al in 2000 (cited in Thomson et al 2003), it was found a large difference emerged between ratings given by men and women in Romania. Women had higher ratings for risks than men and the difference was attributed to the social roles, status and biological differences. This study is also similar to the one carried out by Flyn et al (1994) in the United States of America on the perceptions of environmental health risks on white and non – white persons. Their results showed that white women’s ratings on risk perception were higher than those of white men. No gender difference was evident for risk perception by non – whites. The authors concluded that socio-political factors such as power, status, alienation and trust were at play in determining risk perception and acceptance.

From the literature survey, it is evident that risk perception and awareness by the project stakeholders is an important aspect in the successful implementation of a risk management process. The Ministry of Higher and Tertiary Education engages project implementation teams comprised of team members with different socio-cultural and professional backgrounds whose risk perception is varied. Project stakeholders’ risk perception has a bearing on risk planning, identification, analysis, response strategies
and monitoring and control processes. This study has considered the risk awareness and perception of the various stakeholders that implement projects on behalf of MHTE.

2.7 Risks, Cost and Time Overruns Scenario Regionally and Worldwide

Sambasivan and Soon cited in Ramanathan et al (2013) state that causes of delays and cost overruns in construction projects can be country or region specific. For the categories/source of the delays and cost overruns, each study has different rankings. Whilst the rankings of the sources of risk may be different for each country or region studied, the sources of the risks are general the same as can be construed from the following cases studies.

2.7.1 Cost Management Strategies Employed by Zimbabwean Building Contractors

In a study conducted by Chigara et al (2013) on a target population of thirty Zimbabwean building contractors who handle medium to large projects, it was found out that contractors used costs reports, variance analysis, cost value reconciliation, cost estimating and budgeting on projects as strategies for managing cost. Despite the presence of these strategies, the authors found out that most of the projects that had been executed by these contractors had cost overruns. Challenges observed had to do with lack of or weak implementation of cost management strategies due to organisational, labour and materials issues. The authors recommend contractors to pay extra attention to sources of the risks associated with cost overruns.

2.7.2 Risk Affecting Time and Cost Overruns in Indonesian Building Projects

Wiguna and Scott (2006), identified thirty risk factors from literature reviews which they found to fall into four major categories namely: external and site condition risks, economic and financial risks, technical and contractual risks and managerial risks. To identify what were perceived to be the most significant risk factors in the Indonesian building construction industry in each risk category, the authors conducted a survey on 22 building projects and requested participants to rank the 30 risks in order of their importance. Their results showed that the most critical risk factors affecting project time and cost were increased costs, design changes by client, defective designs, delayed payment for works certified complete, adverse weather conditions and poor
quality works. The authors do not provide the risk management strategies that can be used to counter these threats.

2.7.3 Risks Affecting Time and Cost in the Middle East North Africa (MENA) Construction Projects

In an effort to aid multinational construction companies to complete their projects with the original time and cost baselines, Al-Sabah et al (2012) carried out a study to identify and assess significant risks facing the MENA construction industry from multinational companies’ perspective. Seventy four risk factors were identified through intensive literature reviews, contract reviews and open-ended questionnaires distributed to contractors, project managers, engineers, architects and suppliers. The authors grouped the risks into internal and external risks. It emerged from the authors’ research findings that political, social, natural, design, financial and maintenance risks were lowly ranked while legal, construction and management risks were moderate. Economic risks were ranked high on the project cost and moderately on the project schedule. Strategies to reduce the impact of the risks were not provided by authors who suggest that that area can be a topic for future research.

2.7.4 Cost Performance of Public Projects in Botswana

In a study undertaken by Chimwaso (2000) on ten public building projects in Botswana, seven of them had cost overruns. By sending out questionnaires to forty six professionals who dealt with public construction projects, the author identified eighteen factors as reasons behind the overruns and nine of the factors were regarded significant as established by other authors elsewhere. Six of the eighteen factors are as follows:

- incomplete designs at tender stage.
- additional works at the client’s request.
- technical omissions and errors at design stage.
- adjustments of prime cost and provisional sums.
- contractual claims (extension of time with costs), and
- labour and material prices fluctuations.

All the factors identified in Chimwaso’s research are common sources of risks for construction projects. The author ends his research by giving recommendations on
how some of the factors causing cost overruns on building projects can be mitigated. However, decisive and more precise recommendations could have been made if reference had been made to proven project management processes like the PMI (2013) risk management processes.

2.7.5 Cost and Time Overruns of the 2010 FIFA World Cup Stadia in South Africa

Baloyi and Baker (2011) citing Dell’Apa (2008) highlight that while stadia were completed on time for the FIFA World Cup; some were behind schedule for the Confederations Cup in 2009 which was going to be a test for the stadia’s readiness for the World Cup. In addition, all stadia had cost overruns.

The authors carried out a survey with a target population comprising of professionals like consultants, contractors and clients that were involved in the 2010 World Cup stadia construction. Their findings were that there were eighteen factors causing cost overruns on the 2010 FIFA World Cup stadia. After analysis ten of the factors were found to contribute to more than 85% of cost overruns. The top ten ranked factors were: increase in material cost, inaccurate material estimates, shortage of skilled labour, late contract award by client, project complexity, labour cost increases, inaccurate quantity measurements, variance between winning bid and consultant’s estimate, change orders and shortage of labour.

Thirty four factors that caused schedule slippage for the 2010 FIFA World stadia were analysed and the top ten were: incomplete drawings, design changes, client’s slow decision making, late issuing of instructions, shortage of skilled labour, poor planning and scheduling, labour disputes and strikes, shortage of manpower, change orders, poor communication and delay in approvals (Baloyi and Baker, 2011).

The authors conclude that their findings on factors causing time and cost overruns on the 2010 FIFA World Cup infrastructure are similar to those found in literature by other authors. These factors are also similar to those causing time and cost overruns on global projects. Most of their factors were categorised as external, client related and contractor related. It is worth noting that these same factors have already been identified in previous sections of this Chapter as sources of projects risk.
2.7.6 Delays and Cost Overruns in Uganda’s Public Sector Construction Projects

Alinaitwe et al (2013) asserts that the Ugandan construction industry makes a significant contribution to the economy with approximately 12% of the gross domestic product coming from the construction industry. The authors lament that there exist a problem of time and cost overruns that occur during the construction phase of projects in the Ugandan public sector projects. They conducted a survey that was involved architects, engineers, quantity surveyors, contractors and government officials working on public sector projects as respondents. Five critical causes of cost and schedule slippage were found out to be project scope changes, delayed payments to contractors, poor monitoring and control, high inflation and high interest rates. The authors recommend stakeholders in the construction industry in Uganda to employ sound project management principles so that scope changes, time and cost overruns are minimised.

2.7.7 Cost Overruns in Construction Projects in Malaysia

Rahman et al(2013) investigated critical factors causing time and cost overruns in large projects in Malaysia. After statistically evaluating 262 samples that were valid using the relative importance method on 35 causative factors, significant factors causing time and cost overruns in large projects in Malaysia’s construction sector were found out to be material price fluctuation, contractors’ cash flow and financial problems and poor site management and supervision.

However, the paper is silent on the ways of reducing the impact of the identified causes. From the project management’s stand point, all causes identified by Raman et al (2013) are sources of risks. As an example, fluctuation of prices of material in the construction sector is a known risk. Generally this risk is mitigated in the pricing of tenders or by arranging procurement contracts and advance material purchases. In most contracts a provisional sum is provided for variation of prices of material and labour. The standard civil engineering contract conditions namely FIDIC (International Federation of Consulting Engineers),(1999) requires provisions for escalation in the price of materials and labour in the General Conditions of Contract.
2.8 A Successful Project

Frimpong et al (2003) point out that a successful project is one that conforms to its technical specifications or quality, maintains its schedule baseline and remains within its budgetary allocation. Holt (1983), presents a case study of a project that was only three months beyond schedule and several million Pounds under budget of the total contract sum. The author claims that the project’s success was achieved through determined application of fundamental project management principles one of them being effective project risk management.

2.9 Barriers to Effective Risk Management

Choudhry and Iqbal (2013) carried out an empirical survey based study of risk management in the Pakistan construction industry. They concluded that the main barriers of implementing an effective risk management are a lack of formal risk management systems and the lack of a mechanism that allows joint risk management by the parties involved in project. Their research also revealed that organisations practice risk management at some level, sometimes unknowingly, with varying degrees of expertise. The authors suggest that risk management is best practiced with clear aims and objectives, sound policies and procedures as well as risk management best practices. This study will establish whether a formal risk management system exists in the Ministry of Higher and Tertiary Education for public sector investment projects.

2.10 Summary

In this chapter secondary research was undertaken in the form of a literature review. Relevant literature from previous studies related to the topical one was reviewed and used to discuss topics such as categories of risk, risk management processes and risk perception and enterprise risk management frameworks. Conclusions from the Chapter are that risk perceptions of the individuals involved in project implementation have to be taken aboard when carrying out risk management. Literature on enterprise risk management showed that enterprise risks have an impact on the vision, mission and strategic objectives of an organisation. Finally the Chapter concluded by looking at similar cases that have been studied elsewhere. In the next chapter the research methodology will be presented, underlining how data collection and data analysis will be done.
CHAPTER 3
RESEARCH METHODOLOGY

3.0 Introduction

According to Struwig and Stead (2001:3), research is distinguished from information gathering and decision making in that there are some important procedures that need to be observed in conducting the research. Saunders et al (2009) point out that research is something that people undertake in a systematic way in order to increase their knowledge. It therefore follows that, the research methodology and design is important in the research process. This chapter presents information on the methodology used to carry out the research. It outlines the research philosophy, research design, sampling method, data collection procedures and how data was processed, analysed and presented.

3.1 Research Philosophy

Although there are several research philosophies, Saunders et al (2009), highlight that the main research philosophies are positivism and phenomenology. This research uses the quantitative(positivism) approach.

3.1.1 Positivist Approach

Al-Habil (2014:949) theorises that positivism is “premised on the desire to draw a distinction between discovery and validation, the belief in neutral observations, value free ideal of unity of scientific knowledge, and belief in the methodological unity of sciences”. The author adds that, in order to achieve objectivity, neutrality and rationality, the researcher’s values, ideologies, perceptions and ideas should not influence the explanation and prediction of certain phenomena. This position is also supported by Sanders et al (2009) who asserts that the positivism approach is objective, value free, deductive and employs empirical methods. The basic reasoning of this approach is that the researcher is expected to disengage himself/herself from the matters of his/her study and has to rely on scientific knowledge or skills to make resolutions and recommendations. In other words, the role of the researcher should be independent of the subject under study. Positivism has a deductive approach where the theoretical position is developed prior to collection of data. A hypothesis has been set for this study and data collected to test the hypothesis.
The positivism approach has been criticised by other researchers. Crossan (2003) argues that the approach does not provide the means to fully examine human beings and their behaviours. The author points out that human beings are subject to many influences on behaviour, feelings, perceptions and attitudes that positivists would not be comfortable with.

3.1.2 Research Approach

Saunders et al (2009) points out that there are two main research approaches namely deductive and inductive. The deductive approach was adopted for this study as the research involves formulating a hypothesis and testing the hypothesis to prove what the existing theory says.

3.2 Research Design

Having selected the preferred methodology above, the next step is to develop the research design. A research design refers to “the specification of methods and procedures for acquiring the information needed.” (Shajahan, 2009:24). Cooper and Schindler (2003:146) refer to it as “the blueprint for the collection, measurement and analysis of data”. Saunders et al (2009) add that the research design answers the research questions and differs from tactics which focus on “the finer details of data collection and analysis.”

A research design structures the research to illustrate how all the major components of the research project, the samples or groups, measures, treatments or programmes, and methods work together in addressing the central research questions. Shajahan (2009:32) indicates that a good research design should contain a clear statement of the research problem; the procedures and techniques to be used to gather information; the population to be studied and the methods to be used to process and analyse data. The author alludes that research design is the strategy of the study, and it is also a plan by which the strategy will be carried out. The common theme coming from the above cited authors is that, the research design is the plan for the study and it provides the overall framework for collecting research data.

Saunders et al (2007:133), Polonsky and Waller (2005:84) classified research design into the three categories as follows:
(i) Exploratory research design: this research design focuses on the researcher investigating and understanding a problem by reviewing available literature, talking to subject experts and conducting focus group discussions.

(ii) Descriptive research design: it focuses on portraying profiles of persons, events or situations. It can either be qualitative or quantitative in nature and involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data (Glass, 1984). Descriptive research involves either longitudinal design or cross-sectional design. There are three main types of descriptive methods namely observational methods, case-study methods and survey methods.

(iii) Explanatory or causal research design: this design focuses on understanding the cause-and-effect relationships between variables. They are similar to laboratory experiments and are often referred to as experimental designs and involve three phases, namely observational design, statistical design and operational design.

For the purpose of this study a descriptive research design was used with a cross-sectional one-shot study of a sample of the population at a specific time. The method is suitable for this study as it can be used for quantitative data and presents a unique means of data collection through surveys.

3.3 Sampling Strategy

A population refers to the full group of potential participants that the researcher wants to study. When data is collected from the entire population, this is known as census (Saunders et al, 2009). However, while a population may be very general, researchers rarely have access to every member of a population, (Field, 2005:3) In order to make the research process more manageable and cost effective, a subset or group representing the characteristics of the population may be drawn. This subset of items is referred to as a sample. Samples enable the researcher to draw conclusions (Shajahan, 2009:65) and make inferences (Field, 2005:3) about the characteristics of the total group of interest. In addition, Shajahan (2009:65) points out that a good sample design must have the following characteristics:

(i) must result in a representative sample,
(ii) must only contain a small sampling error,
(iii) must be feasible in accordance with funds available,
(iv) must be able to control systematic bias, and
(v) must be able to generalize results with confidence.

Three main advantages presented by sampling are low cost, timeliness and increased data accuracy (Wegner, 2007). The time required to collect data using sampling is less than what it would take if the whole population was to be considered. Data processing and analysis is also carried out faster since fewer items are being considered. The reduction in time needed to collect, process and analyse data leads to significant cost savings. In addition, better control over data collection is achievable when using a sample rather than a census with more accurate and cleaner data being produced from the sample.

However, sampling has its own shortcomings the main ones being lack of representativeness of the sample and insufficient sample sizes. These two have a bearing on the research results and have to be dealt with carefully from the onset.

This study will focus on respondents involved in public sector investment projects namely project managers, architects, engineers, quantity surveyors, contractors, estate agents and civil servants. Although the research is intended to reflect on public sector investments projects implemented by the Ministry of Higher and Tertiary Education country wide, the majority of the participants will be drawn from Harare. Records of contractors, consultants and other stakeholders who have participated in implementation of public sector investment projects were obtained from MHTE Planning Unit in Harare.

3.4 Sampling

In this research, the main objective is to investigate the risk management strategies that are being used to minimise time and cost overruns in the public sector investment projects. It is not possible to survey the whole population of stakeholders who are involved in public sector investment projects as it would be expensive and time consuming. Thus, a sample was drawn to solicit views of the key people involved in
the projects. This was achieved by using a sampling technique that ensured reasonable representation of the target population.

3.5 Sampling Method

There are various sampling techniques available for use in research all of which can be categorised into two types; probability sampling and non-probability sampling (Saunders et al, 2009). This study considered the probability or random sampling technique. This method statistically approximates the characteristics of the population from the sample, with each sample member being selected from the target population on a random basis, that is, by chance. Methods of probability sampling include simple random sampling, stratified random sampling, cluster sampling and systematic sampling (Struwig and Stead, 2001, Shajahan, 2009).

For non-probability sampling, the main selection criteria is based on personal judgement of the researcher and convenience. Convenience sampling, judgemental sampling, quota and snowball sampling are the four main non-probability based sampling methods (Wegner, 2007). A brief description of the non-random and random sampling techniques are given in the following sections:

3.5.1 Non-Random Sampling Techniques

Convenience sampling

The convenience sampling method is reliant on the availability of subjects, that is, if they happen to be in the right place (Rubin and Babbie, 2011). Sampling units are selected to suit the convenience of the researcher. Further, it is applied where other sampling methods may not be feasible for a particular type of study or population.

Judgemental or Purposive sampling

Judgemental sampling (purposive sampling) is when the researcher uses personal judgement to draw a sample (Saunders et al, 2009). Each member in the population does not have an equal chance of being selected therefore this method does not produce a random sample.

Quota Sampling

The aim of quota sampling is to produce a sample that reflects a population in terms of the relative proportions of people in different categories, such as gender, ethnicity
or age groups. The population is first divided into segments and a quota of observations is collected from each drawn segment (Saunders, et al, 2009). The process of respondent selection is non-random thus introducing bias in the sampling.

**Snowball Sampling**

Each identified member of the target population is requested to identify other sampling units belonging to the same target group. The method is normally used to reach a target population where sampling units are difficult to find (Wegner, 2007).

3.5.2 **Random Sampling Techniques**

**Simple Random Sampling**

Under simple random sampling, each member of the population has an equal and independent chance of being selected for consideration. This method is suitably used when the target population is assumed to be homogeneous so that different sample groups within the target population are likely to come up with similar responses. Simple random sampling entails selecting the sample at random from the sampling frame using either random numbers, tables or a computer. Simple random is best used when the researcher has an accurate and easily accessible sampling frame which lists the entire population. It is not suitable for a geographically dispersed population since the subjects will also be dispersed.

**Stratified Sampling**

Stratified sampling is where the population is divided into two or more relevant and significant segments or strata based on attributes. As an example, the group can be divided by age, colour or locations. The basis for sub – division must be known before sampling takes place. The division is carried out until population elements within each stratum are relatively homogeneous. It is used for target populations that are heterogeneous, that is, populations with a variety of attributes. A random sample is then drawn from each stratum (Saunders et al, 2009) in proportion to the relative size of each stratum in the population.

Stakeholders that are involved in public sector investment projects can be grouped into civil servants, contractors and consultants in various fields. To solicit for their views on strategies that are being used to minimise time and cost overruns, simple
random sampling was used to arrive at the target population. Samples from each group were randomly selected to ensure the various categories of respondents are given due attention in the research and as a way of reducing bias.

3.6 Determining the sample size

Saunders et al (2009) highlight that the following factors influence the size of a sample for a study:

- The confidence one has in their data, that is, the level of certainty that the characteristics of the collected data will represent the characteristics of the total population.
- Types of analysis that the researcher will undertake, in particular, the number of categories into which data is subdivided, as many statistical techniques have minimum threshold of data cases for each cell.
- The margin of error that the researcher can tolerate, specifically, the accuracy required for any estimate made from the sample.

The sample size is important, as generalizations made from data gathered from a sample, is based on probability. If the sample is too small, the data may not characterize the total population and the sampling error (the degree to which a sample might differ from the population) increases. Saunders et al (2009) point out that probability sampling is a compromise between accuracy of data and investment in terms of time and money.

In determining the sample size of the population for this study, the researcher considered the size of the population, proximity, time and cost. The researcher’s targeted population comprised of one hundred and eighty (180) respondents drawn from various construction professionals such as consultants, contractors, real estate agents and civil servants.

3.7 Sample Design

Lohr (2010) explains that a perfect sample would be like a “scaled down” version of the population, mirroring every characteristic of the whole population. However, for complicated populations, a perfect sample does not exist. The researcher used the list of architects, engineers, quantity surveyors, project managers, real estate practitioners, contractors and civil servants involved with the sector as the sampling frame.
### Table 3.1 Sample Frame of Respondents

<table>
<thead>
<tr>
<th>Category</th>
<th>Sample Size</th>
<th>Percentage of sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Managers</td>
<td>15</td>
<td>8%</td>
</tr>
<tr>
<td>Architects</td>
<td>25</td>
<td>13%</td>
</tr>
<tr>
<td>Engineers</td>
<td>55</td>
<td>30%</td>
</tr>
<tr>
<td>Quantity Surveyors</td>
<td>45</td>
<td>25%</td>
</tr>
<tr>
<td>Contractors</td>
<td>20</td>
<td>11%</td>
</tr>
<tr>
<td>Real Estate Agents</td>
<td>10</td>
<td>5%</td>
</tr>
<tr>
<td>MHTE Employees</td>
<td>10</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>180</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

### 3.8 Research Instruments

Risk management strategies employed by an organisation to minimise cost and schedule overruns can be observed and measured. There are various instruments that a researcher can use to gather information. The instruments include but are not limited to interviews, questionnaires, focus group discussions, observations and experiments. For the purposes of this study, questionnaires were used to gather data.

#### 3.8.1 Questionnaires

In this research process a structured questionnaire was used as the tool to collect primary data from enlisted respondents. The questionnaire was designed to provide data that is required in investigating risk management strategies currently being employed in public sector investment projects. Mauso and Bramble (1999) describe a questionnaire as a data collection technique in which each respondent is requested to respond to the same questions in a pre-arranged sequence. Shajahan (2009) points out that questionnaires are the most commonly used and sometimes misused research instruments. They are flexible; may be used for a variety of topics; allows for varying sample sizes and may be administered in various ways. Cooper and Schindler (2003) recommend the following three conditions for a successful questionnaire:

1. participants must have the necessary information,
(2) participants must understand their role in providing accurate information, and
(3) participants must be motivated to co-operate.

For this study, the questionnaire was designed to provide data to find answers to the research questions and to realize the research objectives set at the beginning of the study. To ensure validity, reliability, and a good response rate, the design of the questionnaire is an important component. Most of the questions comprised of close ended questions and respondents were required to answer by choosing one option from a selection of presented alternatives. Such questionnaires are easy to complete (Shajahan 2009) and are likely to increase the response rate and ensure validity and reliability.

The structured questionnaire had sections on the background characteristics of respondents, risk awareness questions, major risks and impact of the major risks. The risk items in the questionnaire were obtained from a catalogue of risks facing the construction industry as revealed by literature surveys. For frequency of occurrence of risk, impact of risk and strategies in use, a ranking scale was provided for respondents to rate. The probability that the risks will occur was measured as low, medium and high which was later converted into a scale of 1 to 5.

In administering the questions, the researcher sent both hard and soft copies of the questionnaires to selected respondents who were given a week to return them due to the limited time. In some cases, face to face interviews were carried out with respondents while filling in the questionnaire on their behalf to cut on time.

3.9 Data Collection

3.9.1 Unit of Analysis

In order to carry out an assessment of the risk management strategies that are being employed to minimise time and cost overruns, the principal unit of analysis for this study was the Ministry of Higher and Tertiary Education.

3.9.2 Data Types

Primary data was collected using structured questionnaires from targeted respondents who had been involved in public sector investments projects. In addition, secondary
data was sourced from text books, academic journals, newspapers and published reports.

3.9.3 Data Collection Procedure

The researcher sought permission from the relevant authorities of the target population before conducting the interviews. An introductory letter was written and sent to the respondents to alert them of the impending study in advance and appointments made for face to face interviews. Participants were also assured that confidentiality and anonymity would be maintained.

3.10 Data Analysis

The purpose of analyzing data is to organise it in a way so that meaningful inferences can be made (Saunders et al 2007). Prior to the information technology age, data was analysed manually. However, with the advent of modern technology, a range of spreadsheets and more advanced statistical analysis software packages are available. These include Minitab, SAS, SPSS and Statview.

For this study, the quantitative data analysis method was used. The Statistical Package for Social Sciences (SPSS) version 21 was used for quantitative data analysis. The researcher firstly confirmed whether returned questionnaires were completed in accordance with the researcher’s instructions. Incomplete questionnaires were discarded. Thereafter, each question was broken down into a simple quota system and answers denominated and recorded using a Microsoft Excel spreadsheet. The data was then input into SPSS for processing.

3.10.1 Reliability Test

Reliability refers to the degree of consistency of a measure, that is, the tendency to obtain the same results if the measure was to be repeated by using the same subjects under the same conditions (Ross, 2005:77). Reliability is ensured when the research instrument is error free. In order to assess reliability, Saunders et al (2009) suggests asking the following questions: (1) will the measure yield the same results on other occasions, (2) will similar observations be reached by other observers, and (3) is there transparency in how sense was made from the raw data?
Cronbach’s (1951) alpha test of reliability was used in this study to estimate the internal consistency of instrument. A range of 0.6 to 0.8 is generally accepted for Cronbach alpha as values significantly lower indicate an unreliable scale (Field, 2013).

3.10.2 Piloting and Pre-testing the Questionnaire

Before administering a questionnaire to the target population, a pilot study has to be undertaken to ensure that the research instrument functions as a whole (Bryman & Bell, 2003). The authors add that pilot tests help the researcher to find out the length of time required to complete the questionnaire, clarity of instructions, ambiguity of questions and uneasiness of questions.

For this study, a pilot study was conducted to test the reliability and internal consistency of the survey instrument by sending out 10 questionnaires to respondents who were randomly selected. Cronbach alpha for the pilot test was 0.725. To eliminate bias, interviewees were also assured of confidentiality of the information they were giving.

3.10.3 Validity Test

Validity, according to Siniscalco, and Auriat as quoted in Ross (2005:77), refers to the degree to which a question measures what it was actually intended to measure. Validity is ensured when the methods, approaches and techniques actually relate to or measure the issues that are being explored in the study and “the findings are really about what they appear to be about.” (Saunders et al, 2009). In determining validity, researchers ask a series of questions and look for answers in researches done by others.

3.10.4 Hypothesis Testing

In this study, the Chi-Square statistic was used by the researcher to test statistical independence of the relationship between risk perception and background characteristics of respondents. The test is suitably used when the research data under consideration is categorical. In this study, risk ranking is categorical with a scale of 1 to 5 where 1 stands for negligible and 5 stands for severe.
In order to perform the Chi-Square test, Cochrain (1952) highlights that the following conditions have to be met:

(i) sampling method should be simple random
(ii) Each population is at least 10 times as large as its respective sample
(iii) Variables under study should be categorical
(iv) if sample data are displayed in a contingency table, the expected frequency count for each cell of the table is at least 5.

3.11 Risk Matrix

A risk matrix is a graphical tool which combines the probability of an event occurring and the impact of the event if it occurs. In this study, risk matrices were constructed for responses on impact and likelihood of risk.

3.12 Ethical Considerations

There are important ethical considerations that a researcher must adhere to when undertaking a research. According to Graeutter and Forzano (2012), consideration of ethical issues is integral to the research process. Researchers have two basic ethical responsibilities:

- to the individuals, both human and non-human, who participate in their research studies
- to the discipline of science, the need to be accurate and honest in the reporting of their research

Researchers must be competent to undertake a particular study, and must be honest, fair and respectful of respondents (Struwig and Stead, 2001). In addition, researchers should always be mindful of cultural and individual differences of respondents and should not discriminate against them as a result of this.

In this study, respondents were informed of the purpose of the study and that their participation was voluntary. No respondent was compelled to participate. The right to privacy is a fundamental precept of research and respondents were guaranteed confidentiality. This was upheld as respondents were asked to complete the questionnaires anonymously and were not required to provide their names. As a
result, it is envisaged that no participant would be negatively impacted on as a result of participating in this research.

A summary of the findings and recommendations would be shared with the public sector organisations involved in implementing projects, so that they may make some important decisions on how to improve risk management practices within their respective organisations.

3.13 Conclusion

This research followed the positivism philosophy and the deductive approach since a hypothesis had been set. It is crucial that the quantitative research approach selected maintains the credibility and objectiveness of the data. The sampling strategy, data collection instrument and data analysis were also explained. In the next chapter the findings by way of descriptive and inferential analysis will be presented. These findings will be discussed in conjunction with the secondary research and the objectives of the study.
CHAPTER 4

FINDINGS AND DISCUSSION

4.0 Introduction

This chapter focuses on the presentation, analysis, interpretation and discussion of the research findings on the risk management strategies that are being implemented to minimise time and cost overruns of public sector investments projects. The analysis used data that was collected using structured questionnaires. Reliability and the relationships between variables like the respondent’s background, major risks ratings, impact of selected risks and response strategies are tested in this chapter.

4.1 Response Rate

Table 4.1: Education level, experience and response rate

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Experience</th>
<th>Total</th>
<th>Targeted</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 5 years</td>
<td>6 to 10 years</td>
<td>11 to 15 years</td>
<td>15 to 20 years</td>
</tr>
<tr>
<td>Certificate</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Diploma</td>
<td>4</td>
<td>17</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Bachelor's Degree</td>
<td>7</td>
<td>17</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Master's Degree</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>Post Grad.</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>36</td>
<td>46</td>
<td>27</td>
</tr>
</tbody>
</table>

A total of 180 questionnaires were distributed to respondents who had participated and had knowledge of public sector investment projects implementation. Project managers, architects, engineers, quantity surveyors, contractors and real estate agents were the targeted respondents. Out of the 180 that were distributed, 151 questionnaires were returned translating to a response rate of 84%.
The minimum response rate, according to Johnson and Wislar (2012), is 60% thus 84% response rate obtained for this study is high enough to warrant reliability and validity of findings. The overall high response rate might be attributed to the fact that the researcher is acquainted to most of the respondents. In addition, vigorous follow ups were made to get the questionnaires back. The highest number (75) of professionals targeted were those with degree programs, since this encompasses the technocrats who are acquainted with risk management knowledge.

4.2 Findings and Discussions

4.2.1 Gender and Profession of respondents

Table 4.2: Gender and profession of respondents

<table>
<thead>
<tr>
<th>Gender</th>
<th>Profession</th>
<th>Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Project Manager</td>
<td>19</td>
<td>12.6%</td>
</tr>
<tr>
<td>Male</td>
<td>Architect</td>
<td>13</td>
<td>8.6%</td>
</tr>
<tr>
<td></td>
<td>Engineer</td>
<td>35</td>
<td>23.2%</td>
</tr>
<tr>
<td></td>
<td>Quantity Survey</td>
<td>13</td>
<td>8.6%</td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td>11</td>
<td>7.3%</td>
</tr>
<tr>
<td></td>
<td>Real Estate Agent</td>
<td>11</td>
<td>7.3%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>4</td>
<td>2.6%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>106</td>
<td>70.2%</td>
</tr>
<tr>
<td>Female</td>
<td>Project Manager</td>
<td>11</td>
<td>7.3%</td>
</tr>
<tr>
<td></td>
<td>Architect</td>
<td>0</td>
<td>.0%</td>
</tr>
<tr>
<td></td>
<td>Engineer</td>
<td>8</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>Quantity Survey</td>
<td>7</td>
<td>4.6%</td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td>7</td>
<td>4.6%</td>
</tr>
<tr>
<td></td>
<td>Real Estate Agent</td>
<td>8</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>4</td>
<td>2.6%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>45</td>
<td>29.8%</td>
</tr>
<tr>
<td>Total</td>
<td>Project Manager</td>
<td>30</td>
<td>19.9%</td>
</tr>
<tr>
<td></td>
<td>Architect</td>
<td>13</td>
<td>8.6%</td>
</tr>
<tr>
<td></td>
<td>Engineer</td>
<td>43</td>
<td>28.5%</td>
</tr>
<tr>
<td></td>
<td>Quantity Survey</td>
<td>20</td>
<td>13.2%</td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td>18</td>
<td>11.9%</td>
</tr>
<tr>
<td></td>
<td>Real Estate Agent</td>
<td>19</td>
<td>12.6%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>8</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>151</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

There were more male respondents (70.2%) than the female respondents (29.8%) and this is due the built environment or the engineering sector which is dominated by male professionals. However, the proportion of female employees gives a fair representation of the working environment. The highest number of professionals were engineers (28.5%) followed by project managers (19.9%), who seemed to have more knowledge of risk management than the other professionals. This gave credibility and guaranteed the validity of the results. However, other strategic experts who are architects (8.6%), quantity surveyors (13.2%), contractors (11.9%) and real estate agents (12.6%), participated in the research thus giving the research a wide breadth of views and dimensions.
4.2.2 Years of Professional Experience

Table 4.3 Age and Experience Demographics

<table>
<thead>
<tr>
<th>Age</th>
<th>Experience</th>
<th>0 to 5 years</th>
<th>6 to 10 years</th>
<th>11 to 15 years</th>
<th>15 to 20 years</th>
<th>More than 21</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 30</td>
<td>Count</td>
<td>16</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>% of Total</td>
<td></td>
<td>10.6%</td>
<td>1.3%</td>
<td>2.0%</td>
<td>.0%</td>
<td>.0%</td>
<td>13.9%</td>
</tr>
<tr>
<td>30 - 39</td>
<td>Count</td>
<td>3</td>
<td>28</td>
<td>29</td>
<td>4</td>
<td>0</td>
<td>64</td>
</tr>
<tr>
<td>% of Total</td>
<td></td>
<td>2.0%</td>
<td>18.5%</td>
<td>19.2%</td>
<td>2.6%</td>
<td>.0%</td>
<td>42.4%</td>
</tr>
<tr>
<td>40-49</td>
<td>Count</td>
<td>0</td>
<td>6</td>
<td>11</td>
<td>13</td>
<td>14</td>
<td>44</td>
</tr>
<tr>
<td>% of Total</td>
<td></td>
<td>.0%</td>
<td>4.0%</td>
<td>7.3%</td>
<td>8.6%</td>
<td>9.3%</td>
<td>29.1%</td>
</tr>
<tr>
<td>50 and Above</td>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>10</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>% of Total</td>
<td></td>
<td>.0%</td>
<td>.0%</td>
<td>2.0%</td>
<td>6.6%</td>
<td>6.0%</td>
<td>14.6%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>19</td>
<td>36</td>
<td>46</td>
<td>27</td>
<td>23</td>
<td>151</td>
</tr>
<tr>
<td>% of Total</td>
<td></td>
<td>12.6%</td>
<td>23.8%</td>
<td>30.5%</td>
<td>17.9%</td>
<td>15.2%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The highest response rate was from those with 11 to 15 years of experience. This can be attributed to the fact that respondents in this group are quite experienced and fully appreciate benefits that might be derived from a research of this nature.

4.2.3 Age and Experience

From Table 4.3, the majority of the respondents were from the 30 to 39 years age group, which comprises 42.2%, followed by the 40-49 years age group which has 29.1%. This shows that the data collected has high validity because most of it was collected from mature employees who understand the importance of research. The majority (30.5%) of the respondents has 11 to 15 years of experience, and 17.9% have 15-20 years’ experience, whilst 15.2% have more than 21 years of experience. The class of the respondents in terms of age and experience guarantees the depth of knowledge of risk, scope, schedule, cost, and quality required for the research.
4.3 Level of risk awareness and perception in the Ministry of Higher and Tertiary Education

![Knowledge of risk encountered in the Public Sector Projects](image)

**Figure 4.1**

There were 15 questions which sought to establish the level of risk awareness and perception in the Ministry of Higher and Tertiary Education within the target population. From the results shown in Figure 4.1 above, 47.7% of the respondents had a good knowledge of risks inherent in public sector investment projects implemented by the Ministry of Higher and Tertiary Education as shown by Figure 4.1 whilst 27.2% had a very good knowledge. Only 4% and 2% had bad and very bad knowledge of risks encountered in public sector investment projects respectively.

As indicated by the study results, the majority had been informed about risks encountered in PSIPs in MHTE. The common source of information on risks facing the Ministry was from supervisors/managers followed by workshops.
4.4 Risk as An Integral Part of Projects

Table 4.4: Cross-tabulation profession and risk management as an integral part of projects

<table>
<thead>
<tr>
<th>Profession</th>
<th>Count</th>
<th>Risk Management is Integral part of Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Project Manager</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>% within Profession</td>
<td></td>
<td>60.0%</td>
</tr>
<tr>
<td>Architect</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>% within Profession</td>
<td></td>
<td>69.2%</td>
</tr>
<tr>
<td>Engineer</td>
<td>43</td>
<td>24</td>
</tr>
<tr>
<td>% within Profession</td>
<td></td>
<td>55.8%</td>
</tr>
<tr>
<td>Quantity Survey</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td>% within Profession</td>
<td></td>
<td>65.0%</td>
</tr>
<tr>
<td>Contractor</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>% within Profession</td>
<td></td>
<td>55.6%</td>
</tr>
<tr>
<td>Real Estate Agent</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>% within Profession</td>
<td></td>
<td>100.0%</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>% within Profession</td>
<td></td>
<td>.0%</td>
</tr>
<tr>
<td>Total</td>
<td>151</td>
<td>93</td>
</tr>
<tr>
<td>% within Profession</td>
<td></td>
<td>61.6%</td>
</tr>
</tbody>
</table>

From the study, sixty percent (60%) of project managers, 69.2% of architects, 55.8% of engineers and 65% of quantity surveyors have indicated that risk management has been an integral part of projects that they had worked on. On average, all professions unanimously agree that risk management has been an integral part of the projects that they have worked on. Some of the respondents, during face to face interviews, indicated that although risk was an integral part of projects they had implemented, they had hardly enforced the risk management principles and practices on those projects. This can be attributed to the fact that project risk management is a fairly new concept in the Zimbabwean construction industry and few organizations carry out risk management for their projects. Table 4.4 above shows the responses according to professional backgrounds.
Table 4.5: Chi-Square and Cramer’s V Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>28.371a</td>
<td>6</td>
<td>.000</td>
</tr>
<tr>
<td>Cramer’s V</td>
<td>.433</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

The Pearson chi-square p-value = 0.000 < 0.05, and the Cramer’s V = 0.433, which shows that there is a fairly strong relationship between the profession and the perception on how risk management is an integral part of project implementation. It shows that quantity surveyors, engineers and project managers have high a regard for risk management as an integral part of projects.

4.5 Major Risks Associated with Time and Cost Overruns in PSIPs

The following hypothesis was set:

\( H_0 \): Risk management strategies are positively related to a reduction in time and cost overruns

\( H_1 \): Risk management strategies are not positively related to a reduction in time and cost overruns

4.5.1 Reliability Analysis

There were 10 questions which sought to determine the major risks associated with time and cost overruns in public sector investment projects. The Cronbach’s alpha value for the items was 0.798. A range of 0.6 to 0.8 is generally accepted for Cronbach alpha as values significantly lower indicate an unreliable scale (Field, 2013).

4.5.2 Major Risks Rankings
4.5.2.1 Design Errors and Omissions

Figure 4.2

The majority of the respondents indicated that design errors and omissions have been a major source of risk. From the results, 28.5% have highlighted that is occasional, 12.6% view it as slightly frequent, 14.6% have highlighted that it is frequent, and 28.5% have said that it is frequently occurring. The findings supports existing literature that points out design errors and omissions are a big source of future risks (Ogunbayo, 2014). Figure 4.2 displays the findings.
Figure 4.3: Unfavourable weather conditions

The majority of the respondents have highlighted that adverse weather conditions are a major source of risk with 35.1% saying it is occasional, 21.2% think it is slightly frequent, and 4% highlighted that it is frequent, whilst 21.2% have shown that it frequently occurs (Figure 4.3). According to Carr (2001), natural hazards or environmental risks, such as natural disasters and unexpected weather conditions pose a great risk to the successful achievement of a project’s objectives.

4.5.2.3 Safety, Health and Environmental Issues

Most of the respondents have highlighted that safety, health and the environment is a major risk. From the results, 49.7% have highlighted that safety and health are an extremely high source of risk, 15.9% highlighted that it is a significant source, 19.2% view it as a moderate source of risk. This finding tallies with studies done by Flyn et
al (1994) in the United States of America where environmental health risks were a major source of risk.

![Safety, Health and Environmental Issues](Image)

**Figure 4.4: Safety, Health and Environmental Issues**

### 4.5.2.4 Testing of Hypothesis One

If the p value is less than 0.05, the null hypothesis is accepted which was the case with this study’s findings (Table 4.5). There is therefore sufficient evidence that risk management strategies are positively related to a reduction in time and cost overruns in public sector investment projects.
4.6 Impact of Risks on the Performance of PSIPs

The following hypothesis was set:

H₀: There is evidence to suggest that time and cost overruns in public sector investment projects are caused by internal and external risks.

H₁: There is no evidence that time and cost overruns of public sector investment projects are caused by internal and external risks.

There were 10 questions which sort to assess the impact of risks on the performance of public sector investment projects. The Cronbach’s alpha value was 0.888, which falls in the acceptable range of 0.7 to 0.9 (Field, 2013).

4.6.1 Impact of Inadequately Defined Roles and Responsibilities

![Inadequately defined roles and responsibility has an impact on conflicting roles and responsibilities](image)

**Figure 4.5: Inadequately Defined Roles and Responsibilities**
The majority of the respondents have highlighted that inadequately defined roles and responsibility have an impact on roles and responsibility. From the results, 43% have highlighted that the impact is extremely severe, 32.5% have highlighted that it is significant, 18.5% have highlighted that the impact is minor. Sambasivan and Soon cited in Ramanathan et al (2013) states that inadequately defined roles and responsibility have a severe impact and leads to conflicting roles and responsibilities.

4.6.2 Impact of Inadequate Site Investigations

The majority of the respondents have highlighted that inadequate site investigation has an impact on the scope changes and inaccurate estimates. From the findings, 45.7% have highlighted that the impact is extremely high, 18.5% view the impact as significant, whilst 20.5% said it is moderate. Inadequate site investigation is a major source of risk that can impair the successful implementation of a project as supported by studies carried out by Holt (2003).

**Figure 4.6: Inadequate Site Investigations**
4.6.3 Impact of Design errors and Omissions

From the results, 30.0% of the project managers said the impact is moderate, 40% view it as significantly high whilst 30% said it is extremely high. Sixty percent (60%) of the quantity surveyors and 38.5% of architect have highlighted that the impact is extreme. The architects, engineers and quantity surveyors in general view that the impact is extremely high.

Table 4.6: Impact of Design Errors and Omissions

<table>
<thead>
<tr>
<th>Profession vs. Design errors and omissions has on design changes Cross-tabulation</th>
<th>Design errors and Omissions has impact on design changes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Impact</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>% within Profession</td>
</tr>
<tr>
<td>Architect</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>% within Profession</td>
</tr>
<tr>
<td>Engineer</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>% within Profession</td>
</tr>
<tr>
<td>Quantity Survey</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>% within Profession</td>
</tr>
<tr>
<td>Contractor</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>% within Profession</td>
</tr>
<tr>
<td>Real Estate Agent</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>% within Profession</td>
</tr>
<tr>
<td>Other</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>% within Profession</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>% within Profession</td>
</tr>
</tbody>
</table>
4.6.4 Testing of Hypothesis Two

H₀: There is evidence to suggest that time and cost overruns in public sector investment projects are caused by internal and external risks.

H₁: There is no evidence that time and cost overruns of public sector investment projects are caused by internal and external risks.

**Table 4.7: Chi-Square and Cramer’s V Tests**

<table>
<thead>
<tr>
<th>Chi-Square and Cramer’s V Tests</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>70.560*</td>
<td>24</td>
<td>.000</td>
</tr>
<tr>
<td>Cramer’s V</td>
<td>.342</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

The Pearson chi-square p-value = 0.000 < 0.05, and the Cramer’s V = 0.342, which reflect that there is a relationship between internal and external risks and time and cost overruns in public sector investment projects. The null hypothesis was accepted and the research has shown that internal and external risks have an impact on time and cost overruns experienced in public sector investment projects.

4.7 Impact Ranking and Probability of Major Risks

Table 4.8 shows the rankings in terms of impact of the major risks. The risk of delayed payments to service providers has a high probability of occurrence and its impact on schedule slippage and contractual claims is high. This means that the Ministry of Higher and Tertiary Education in most cases delayed payments to service providers. According to (Glass, 1984) delayed payment for works certified is a critical risk. From the results, this claim is supported in that the risks which have high probability of occurrence are delayed client approvals, scope changes and requirements.
The risk of inadequate site investigation is low and its respective impact is also low on time and cost overruns. This means that this risk is not a major risk and has no severe consequences. Wiguna and Scott (2006) suggest that site condition risk is a minor risk which can easily be overcome.

Table 4.9: Risk probability and impact matrix

<table>
<thead>
<tr>
<th>Probability</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
</tr>
<tr>
<td>L</td>
<td>2</td>
</tr>
<tr>
<td>M</td>
<td>5</td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>
This risk of design errors and omissions, and the risk of severe weather conditions have low probability of occurrence but however their impacts have high and medium consequences and the risk management committee must take them seriously to mitigate their respective impacts. The risk of scope changes and requirements, and the risk of delayed client approvals have a high probability of occurrence with a medium impact. Table 4.9 is a simple probability impact matrix for the risks under consideration in this study.

### 4.8 Rating of Risk Response Strategies

There were 10 questions which sort to rank risk response strategies commonly used in public sector investment projects. The cronbach’s alpha value for the items was 0.770, which falls in the acceptable range of 0.7 to 0.9 Field, 2013).

The new ranking of risks in order of importance is shown in Table 4.8. Request for performance bonds (73.5%), retaining a certain percentage of fees due (70.2%) and transference of risks through contract clauses and insurance (58.3%) are the common strategies being used to minimise overruns. A run through of State Procurement tender documents shows that these three items are now a permanent feature of most contracts. These strategies put pressure on the contracting parties to perform.

On the other end, the least used risk response strategies in public sector investment projects according to this study are pre-purchase of materials and thorough investigation of sub-surface conditions. The majority of the respondents (39.1%) have never used purchase of materials in advance to avoid price escalations as a risk response strategy. This might be attributed to the fact that State Procurement Regulations no longer allow procuring entities to purchase materials in advances or to give a contractor a pre-purchase facility.

On thorough site investigations, 25.8% only familiarised with site conditions before submission of tender. The low figure may be attributed to the high costs associated with making a thorough site investigation where a lot of tests have to be carried out. Project implementing teams resort to providing contingency sums for the unseen that could have been revealed by thorough site investigations.
On provision of contingency sums as a risk response strategy, the majority which is 41.7% have always provided contingency sums for any eventualities. The reason behind the high figure may be that a lot project implementing teams are not carry out a thorough risk assessment exercise and they would provide contingency sums for the unseen than leave it to chance. Other risk management strategies are moderately used in minimising time and cost overruns as illustrated in Table 4.8.

Table 4.10: Rating of Risk Response Strategies

<table>
<thead>
<tr>
<th>Risk strategy</th>
<th>Always</th>
<th>Often</th>
<th>Usually</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request for performance bonds from service providers</td>
<td>73.5%</td>
<td>4.6%</td>
<td>8.6%</td>
<td>9.3%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Retain a certain percentage of money on each payment certificate (retention)</td>
<td>70.2%</td>
<td>13.2%</td>
<td>7.9%</td>
<td>8.6%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Transfer risks to third parties through use of contract clauses and insurance</td>
<td>58.3%</td>
<td>12.6%</td>
<td>16.6%</td>
<td>6.6%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Familiarise with site conditions before submission of tender</td>
<td>46.4%</td>
<td>17.9%</td>
<td>16.6%</td>
<td>17.9%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Providing contingency sums for any eventualities</td>
<td>41.7%</td>
<td>15.2%</td>
<td>14.6%</td>
<td>15.2%</td>
<td>13.2%</td>
</tr>
<tr>
<td>Charge liquidated damages for time overruns</td>
<td>37.7%</td>
<td>7.3%</td>
<td>29.1%</td>
<td>16.6%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Request for a certain category of contractors to bid for the works</td>
<td>34.4%</td>
<td>17.9%</td>
<td>37.1%</td>
<td>7.9%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Enter into joint ventures (to share risk)</td>
<td>27.8%</td>
<td>4.6%</td>
<td>12.6%</td>
<td>26.5%</td>
<td>28.5%</td>
</tr>
<tr>
<td>Thorough investigation of subsurface conditions</td>
<td>25.8%</td>
<td>22.5%</td>
<td>25.2%</td>
<td>26.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Purchase materials in advance (to avoid price escalation)</td>
<td>15.9%</td>
<td>2.6%</td>
<td>17.9%</td>
<td>24.5%</td>
<td>39.1%</td>
</tr>
</tbody>
</table>

4.9 Utilisation of Risk Management Strategic Strategies

Out of the five project risk management processes rated by the respondents, the majority (27.2%) always performs risk management planning in their projects and 29.1% identified risks in projects. The other risk management processes namely risk analysis, risk evaluation and risk monitoring and control are hardly carried out.
Table 4.11: Utilisation of Risk Management Strategies

<table>
<thead>
<tr>
<th>Question</th>
<th>Always</th>
<th>Often</th>
<th>Usually</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Risk planning</td>
<td>27.2%</td>
<td>7.9%</td>
<td>19.9%</td>
<td>25.8%</td>
<td>19.2%</td>
</tr>
<tr>
<td>2. Risk identification</td>
<td>10.6%</td>
<td>29.1%</td>
<td>10.6%</td>
<td>40.4%</td>
<td>9.3%</td>
</tr>
<tr>
<td>3. Risk analysis</td>
<td>12.6%</td>
<td>18.5%</td>
<td>23.2%</td>
<td>29.1%</td>
<td>16.6%</td>
</tr>
<tr>
<td>4. Risk evaluation</td>
<td>14.6%</td>
<td>7.9%</td>
<td>21.2%</td>
<td>31.1%</td>
<td>25.2%</td>
</tr>
<tr>
<td>5. Risk monitoring and control</td>
<td>17.2%</td>
<td>13.2%</td>
<td>5.3%</td>
<td>32.5%</td>
<td>31.8%</td>
</tr>
</tbody>
</table>

4.10 Chapter Summary

An analysis of the research findings and discussions was presented in this chapter. Tables and figures were used as the means of presentation. The major findings were that those implementing public sector investment projects are aware of the risks associated with the projects and they appreciate the impact of those risks on the projects. In addition, the Ministry of Higher and Tertiary Education is currently employing some of the risk response strategies. These risk response strategies are mostly incorporated into tender documents. Risk management strategies, in this study, have been found to have a positive relation to a reduction in time and cost overruns in public sector investment projects. The next chapter presents the conclusions and the recommendations.
CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the conclusion and the recommendations based on the research findings. The conclusions will be derived from the research objectives and is based on chapter 4 results. The author hopes that the research findings and conclusions will add to the body of knowledge and also can be a solution to risk management problems in public sector investment projects implemented by the Ministry of Higher and Tertiary Education.

5.1 Conclusions to Research Objectives

The research conclusion is derived from the research findings from chapter four, and are based on objectives which are stated in chapter one. The aim of the research was to investigate the risk management strategies employed to minimise time and cost overruns in public sector investment projects in the Ministry of Higher and Tertiary Education. The following are the findings of the study.

5.1.1 The level of risk awareness and perception in the Ministry of Higher and Tertiary Education

This study concluded that most of the stakeholders involved in public sector investment projects are aware of the inherent risk and the majority acknowledge that risk management is an integral part of the project implementation. Generally all professions unanimously agreed that risk management is an integral part of the project implementation. The number of professionals with knowledge of risks encountered in the public sector investment projects is high and there is an appreciation of project risk management.

5.1.2 The major risks associated with time and cost overruns in the public sector investment projects

The majority of the respondents have indicated that design errors and omissions have been a major source of risk. The majority of the respondents also highlighted that unfavourable weather conditions are a major source of risk. Technical professionals such as architects, engineers and quantity surveyors in general view that design errors and omissions have an extreme impact. In conclusion, all of the ten selected
risks associated with time and cost overruns in the public sector investment projects affect public sector investment projects as well.

5.1.3 The impact of risks on the performance of public sector investment projects
The majority of the respondents including engineers and project managers have highlighted that inadequately defined roles and responsibility have an impact on time and cost overruns. Most professionals highlighted that inadequate site investigations have an impact on scope changes and inaccurate estimates, whilst some cited design errors and omissions as having severe impact on design changes.

5.1.4 Risk management strategies in the public sector investment projects
The study concluded that pre-purchasing of materials is no longer preferable as a risk management strategy in public sector investment projects. This might be due to high pilferage of the materials when they are stored in advance at site. However, most contracts have always provided contingency sums for any eventualities, and have transferred risks to third parties through use of contract clauses and insurance. Some have avoided risk by changing the management plan or discontinuing an activity that generates the risk. Performance bonds from service providers are a major risk management strategy as evidenced by results of this study. Familiarisation with site conditions before submission of tender seems to be ignored by most professionals who have participated in public sector projects. A large number of respondents agree that they have always charged liquidated damages for time overruns.

5.2 Recommendations to the public sector investment programme on effective risk management strategies.

5.2.1 Put in place a formal risk management system
Although risk management is being practiced at a certain level in organisations, it is unsystematic, disorganised and informal. In this situation risks may be overlooked and mismanaged. A proper risk management system has to be put in place by the Ministry of Higher and Tertiary Education including sound policies and procedures.
5.2.2 Implement joint risk management
The Ministry of Higher and Tertiary Education has to put in place a joint risk management framework that involves all stakeholders so that risks arising from service providers are managed. This approach will avoid transferring risks to the service providers through contract clauses. Ignoring this principle results in endless disputes and claims.

5.2.3 Impart knowledge and skills to manage risk
There is clear lack of knowledge and techniques on managing risks and this is one area which needs to be addressed by the Ministry of Higher and Tertiary Education. The Ministry does not have dedicated risk managers and most of the projects implementing teams do not have risk management knowledge. It is time the Ministry engages risk management practitioners so that the right knowledge, tools and techniques are imparted to project management professionals.

5.2.4 Increase risk awareness in public sector investment projects
Risk management is fairly new in public sector investment projects and the Ministry of Higher and Tertiary Education should carry out risk management workshops and awareness campaigns to sensitise the project implementing teams about project risk management so that stakeholders become aware and knowledgeable about risks.

5.2.5 Project scope management
To ensure that scope changes do not occur, The Ministry of Higher and Tertiary Education should adequately define the scope of works and need to efficiently manage scope so as to stay with budget, within schedule and quality of the project.

5.2.6 Close monitoring, evaluation and enforcement or risk management practices
Having a risk management system in place alone is not enough for the Ministry of Higher and Tertiary Education. The Ministry should closely monitor the risk management processes and carry out an evaluation to check whether the system is properly working. It has to ensure also, that the correct risk management strategies are being enforced. It is important that risks associated with time and cost overruns are always identified at each and every stage of the project as new risks emerge and old
ones may no longer be threats. The risks should then be assessed and analysed and responded to accordingly.

5.3 Research Limitations and Area of further study
This research was limited to the Ministry of Higher and Tertiary Education’s public sector investment projects only therefore recommendations made in this research are applicable to the Ministry only. Further research can be extended to the construction industry in Zimbabwe as a whole.
REFERENCES


Bos C. (2012). Risk Assessment of Port Investment Projects. Erasmus University


The Institute of Internal Auditors, (2011). Supplemental Guidance: Public Sector Definition


APPENDICES

APPENDIX I: QUESTIONNAIRE

Dear Sir/Madam

RE: MBA RESEARCH QUESTIONNAIRE

Dissertation Topic: An investigation into the risk management strategies employed to minimise time and cost overruns: A case study of Zimbabwe’s Public Sector Investment Projects.

Thank you for accepting to participate in this research which seeks to investigate risk management strategies that are being used to minimise time and cost overruns in the Public Sector Investment Projects in partial fulfilment of the Masters of Business Administration Degree Programme at the Graduate School of Management of the University of Zimbabwe.

In this survey, your participation is voluntary and you are kindly requested to answer this questionnaire honestly and objectively. There are no wrong or right answers. The information that you are going to provide will be treated in the strictest confidence. The results of this survey are completely anonymous therefore do not write your name or any personal details on this questionnaire. Pick only one answer for each question by indicating your response with a tick (✓) on the appropriate response option.

Once again, thank you for valuable participation

Yours Faithfully

Moses Chigonyati

SECTION A: DEMOGRAPHIC INFORMATION

1. Gender
   - Male
   - Female

2. Your age
   - (a) under 30
   - (b) 30-39
   - (c) 40 – 49
   - (d) 50 and above

3. Level of education
   - Certificate
   - Diploma
   - Bachelor’s Degree
4. What is your profession?  
- Project Manager
- Architect
- Engineer
- Quantity Surveyor
- Contractor
- Real Estate Agent
- Other (Please specify) ........................................

5. How many years of professional experience do you have?  
- 0 to 5
- 6 to 10
- 11 to 15
- 15 to 20
- More than 21

SECTION B: RISK AWARENESS AND PERCEPTION

6. How do you rate your knowledge of risks facing the Public Sector Investment Projects?  

<p>| | | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Very bad</td>
<td>Bad</td>
<td>Neither bad nor good</td>
<td>Good</td>
<td>Very good</td>
</tr>
</tbody>
</table>

7. Have you ever been informed about risks encountered in the Public Sector Investment Projects?  
   1=Yes, 2=No

8. If yes in question 6, what was the source of the information?  
   1=Supervisor/Manager, 2=Read pamphlet, 3= Other (specify) .................................

9. In your experience, has risk management been an integral part of the projects that you have worked on?  
   1=Yes, 2=No
10. Rate the significance of the following in terms of time and cost overruns of public sector investment projects?

1= Very High, 2= High, 3= Moderate, 4= Low, 5= Very Low

<table>
<thead>
<tr>
<th>Ref</th>
<th>DESCRIPTION</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Thorough investigation of sub-surface conditions may reduce risk of overruns</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>b</td>
<td>Estimation of the schedule baseline should be accompanied by risk assessment</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Estimation of the cost baseline should be accompanied by risk assessment</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>Provision of contingency for the unforeseen may reduce risk of cost overruns</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>Application of project management processes may reduce risk of overruns</td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>Assessing of the work breakdown structure may reduce the risk of overruns</td>
<td></td>
</tr>
<tr>
<td>g</td>
<td>Adhering to safety, health &amp; environmental rules and regulations may reduce the risk of overruns</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>h</td>
<td>Assessing the resource capability of prospective contractors before award may reduce overruns</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>i</td>
<td>Ensuring resources as detailed in the contractual schedule are available on site may reduce the risk of overruns</td>
<td></td>
</tr>
<tr>
<td>j</td>
<td>Keeping track of the schedule baseline may reduce the risk of schedule slippage</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Others (please specify below)
SECTION C: MAJOR RISKS

11. How would you rate the relative frequency of the following risks and their probability of occurrence on public sector investment projects?

1=Rare,  2=Occasional,  3=Slightly Frequent,  4=Frequent,  5 = Frequently Occurring

<table>
<thead>
<tr>
<th>Ref</th>
<th>RISK</th>
<th>RATING</th>
<th>Probability of risk occurring (L= Low, M=Medium, H=High)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>a</td>
<td>Inadequately defined roles and responsibilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Inadequate site investigations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Design errors and omissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>Scope changes and requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>Delayed client approvals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>Inexperienced service providers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g</td>
<td>Unfavourable weather conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h</td>
<td>Delayed payments to service providers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i</td>
<td>Increased material and labour cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j</td>
<td>Safety, health and the environment (SHE) issues</td>
<td></td>
<td></td>
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<td></td>
<td>Others (please specify below)</td>
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</table>
SECTION D: IMPACT OF MAJOR RISKS ON PUBLIC SECTOR INVESTMENT PROJECTS

12. On a 5 point scale, how would you rate the impact of the following risks on Public Sector Investment Projects?

1= No Impact,  2= Minor,  3= Moderate,  4= Significant,  5= Extremely High

<table>
<thead>
<tr>
<th>RISK</th>
<th>IMPACT</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Inadequately defined roles and responsibilities</td>
<td>Conflicting roles and responsibilities</td>
<td></td>
</tr>
<tr>
<td>b Inadequate site investigation</td>
<td>Scopes changes, inaccurate estimates</td>
<td></td>
</tr>
<tr>
<td>c Design errors and omissions</td>
<td>Design changes</td>
<td></td>
</tr>
<tr>
<td>d Scope changes and requirements</td>
<td>Scope creep, time and cost overruns</td>
<td></td>
</tr>
<tr>
<td>e Delayed client approvals</td>
<td>Schedule slippage</td>
<td></td>
</tr>
<tr>
<td>f Inexperienced service providers</td>
<td>Comprised quality of works</td>
<td></td>
</tr>
<tr>
<td>g Severe weather conditions</td>
<td>Schedule slippage</td>
<td></td>
</tr>
<tr>
<td>h Delayed payments to service providers</td>
<td>Schedule slippage, contractual claims</td>
<td></td>
</tr>
<tr>
<td>i Increased material and labour cost</td>
<td>Cost overruns</td>
<td></td>
</tr>
<tr>
<td>j Safety, health and the environment (SHE) issues</td>
<td>Contravention of SHE regulations, time and cost overruns</td>
<td></td>
</tr>
<tr>
<td>Others (please specify below)</td>
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</tbody>
</table>

78
SECTION D: RISK MANAGEMENT STRATEGIES

13. Rate how often the following strategies have been used to minimise time and cost overruns on public sector investment projects that you have worked on?

1=Always  2=Often,  3= Usually,  4=Sometimes,  5=Never

<table>
<thead>
<tr>
<th>Ref</th>
<th>RISK STRATEGY</th>
<th>RATING</th>
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<tbody>
<tr>
<td>a</td>
<td>Purchase materials in advance (to avoid price escalation)</td>
<td></td>
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<tr>
<td>b</td>
<td>Providing contingency sums for any eventualities</td>
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<tr>
<td>c</td>
<td>Transfer risks to third parties through use of contract clauses and insurance</td>
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</tr>
<tr>
<td>d</td>
<td>Enter into joint ventures (to share risk)</td>
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<td>e</td>
<td>Request for performance bonds from service providers</td>
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<tr>
<td>f</td>
<td>Retain a certain percentage of money on each payment certificate (retention)</td>
<td></td>
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<tr>
<td>g</td>
<td>Familiarise with site conditions before submission of tender</td>
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<tr>
<td>h</td>
<td>Thorough investigation of sub-surface conditions (to reduce risk of the unforeseen)</td>
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</tr>
<tr>
<td>i</td>
<td>Request for a certain category of contractors to bid for the works</td>
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<td>j</td>
<td>Charge liquidated damages for time overruns</td>
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<td></td>
<td>Others (please specify below)</td>
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</tbody>
</table>

THANK YOU!

14. How often do you perform the following to minimise risks, which might cause time and cost overruns in public sector investment projects?

1= Always  2= Often,  3= Usually,  4= Sometimes,  5= Never

a. Risk planning:

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b. Risk identification:

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c. Risk analysis:

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d. Risk evaluation:

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e. Risk monitoring and control:

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THANK YOU!