Information Systems Capability Framework for South African Mining Firms

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ABSTRACT

Information systems capability is considered one of a firm's most valuable assets as it is what enables organisations to perform and achieve business goals. Scholars emphasise that the key to transforming a business into a successful entity is through its information systems capability. The relevance of this thesis is in addressing a current information systems capability key issue by conceptualising a framework, in the context of South African mining firms. The research argument driving the present study was that information systems (IS) value is derived when there is an integration of appropriate competencies, skills, leadership, experience, infrastructure, human resources, and stakeholder relationships. Consequently, information systems capability was studied by looking at how both technology and human resources, as well as the leadership and external resource dependency elements, play a role within mining firms.

The research problem is that, although mining firms invest millions of Rands in information technologies and systems, they hardly realise the IT value and a tangible return-on-investment. In this thesis, it is inferred that the challenge lies in a misaligned information systems leadership, resources, and competencies; that is, information systems capability. The thesis argues that a mine's information system capability pays off if it is aligned within the specific context in which a mine functions and operates, hence a need for a South African context specific framework.

Triangulating three theoretical lenses - Information technology capability model, Upper echelon theory, and Resource dependency theory - the goal of the present study was to conceptualise an information systems capability framework, in the context of mining firms operating in South Africa. The study followed an interpretivist research philosophy with a case study as a research strategy. Data were collected through semi-structured interviews and organizational documents to profoundly understand how information systems capability manifests in a typical South African mining firm. Thematic and content analysis were the methods used to derive meanings out of the collected data.

The study findings suggest that a sound information systems capability and information technology value could be derived when there is an integration of appropriate competencies, skills, leadership, experience, infrastructure, human resources and stakeholder relationships. The framework conceptualised shows the theoretical, practical, and contextual contributions of this thesis. That is, the framework addresses how Information Systems capability and Information Technology value may be derived, in the context of a South African mining firm.

Keywords: IS capability, IT value, Resource dependency, Upper Echelon Theory, IT leadership, South African mining firm

PEER-REVIEWED PUBLICATIONS FROM THE STUDY

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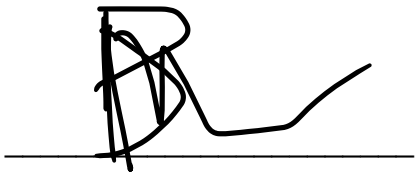
DECLARATION

I, **Phumzile Dorcus Mogoale,** hereby declares the content of this thesis is my work and except as indicated in the acknowledgments, the text, and the references. All sources cited and used have been acknowledged and referenced. This thesis is submitted in fulfilment of the requirements for the degree of Doctor of Philosophy at the North West University Business School, South Africa. The thesis has never been submitted to any institute for a degree or examination purposes.



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LIST OF ACRONYMS AND ABBREVIATIONS

ACT Absorptive Capacity

CA Competitive Advantage

CEO Chief Executive Officer

CIO Chief Information Officer

CoBIT Control Objective for Information and related Technology

COO Chief Operation Officer

FSP Financial Service Providers

GDP Gross Domestic Product

HOE Head of Department

ICT Information and Communication Industry

ICTA Information and Communication Technology Authority

IRERC The Institutional Research Ethics Regulatory Committee

IS Information Systems

ISACA Information Systems Audit and Control Association

ISO International Organisation for Standardisation

IT Information Technology

ITC Information Technology Capability

ITG Information Technology Governance

ITGI Information Technology Governance Institute

ITIL Information Technology Infrastructure Library

JSE Johannesburg Stock Exchange

KPMG Klynveld Peat Marwick Goerdeler

MDP Market Driven Perspective

NDP National Development Plan

NWU Northwest University

PGM Platinum Group Metals

Ph. D Doctor of Philosophy

POP Perceived Organisational Performance

RBT Resource-Based Theory

RDT Resource Dependency Theory

REC Research Ethics Committee

SA South Africa

SLA Service Level Agreement

SCAS Sustainable Competitive Advantage

SIC Standard Industrial Classification

SISP Strategic Information System Planning

SMEs Small and Medium Enterprises

UET Upper Echelon Theory

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1. Introduction

The relevance of this thesis is in addressing a current information systems capability business key issue. To address the issue, the purpose of the present study was to explore and describe information systems capability within South African mining firms and to subsequently conceptualise a context-sensitive framework.

The significant of the present study is in determining ways to improve information systems capability so that a tangible return on investment could be realised from the heavy investments. That is, the present study addresses a business information systems key issue - information technology value and the return on investment, within mining firms operating in South Africa. Ross *et al.* (1996a) and Bhardwaj (2000) introduced the concept of IT capability. Bhardwaj (2000) defines IT capability as controlling the efficient use and deployment of IT-based resources with other resources and capabilities.

Many firms have created and extensively implemented IT capabilities to gather, process, retain, and retrieve information (Galliers et al., 2020). As a result, IT capability is recognised as a key element for achieving effective performance in a workplace. Studies on IT capability has shown that, organisations that acknowledged the value of IT capability gain competitive advantage over its competitors (Santhanam & Hartono, 2003; Aral & Weill, 2007; Bhardwaj, 2000; Mithas *et al.*, 2011; Muhanna & Stoel, 2010; Awamleh & Ertugan, 2021). Competitive advantage occurs when products or services defeat competitors within the same sector, and it is the driving force behind many companies' success (Hadj et al., 2020). It is at the heart of any firm to outperform others in the same competitive arena to retain more revenue.

South African mining firms tend to invest heavily in information systems (IS) and technologies. Thus, it is important to know how the increasing investment in IT have translate into better management and performance of firms leading to corporate results (Chang *et al.*, 2018). Nevertheless, for mines to use IT systems to achieve a competitive advantage, practitioners and leaders need capability and knowledge. Researchers in this

study focussed on the analysis of existing IT capabilities such as human resources, technology resources, competencies and skills, as well as leadership for mining firms in South Africa.

This introductory chapter is structured as follows: the background to the field of study is discussed by reviewing the literature on concepts making up the research topic. The background to the research problem follows, including the location of the study and the context, the challenges and issues, and the knowledge gaps. This is followed by the problem statement, the research argument, the research questions, and the study objectives.

1.1 Background to the field of study

This section reviews existing literature on the concepts making up the information systems capability research area. This is to help the reader understand the thesis title and the field studied.

In the pursuit to establish and maintain a competitive edge, businesses increasingly are becoming dependent on Information and technology (IT). As access to new and better technologies are rapidly becoming available to organisations, there is a need for more skilled and experience IT personnel who have the knowledge in the implementation and application of IT for an organisation to remain competitive. Chang *et al.* (2018) in a study explained that mining firms are increasingly investing heavily in information systems and technologies to achieve competitiveness. However, increasing investments in IS by mining firms in South Africa have not translates into improved corporate results. As the IS expenditure for mining firms in South Africa increases, organisation needs a superior IS capability framework to guide the implementation IT systems.

The present study investigates information systems capability in South African mining firms so as to create value from the investment in IT. Information Technology capability has been acknowledged as a tool for an organisation to achieve superior organisational performance over its competitors. Lim *et al.* (2012) emphasise that the backgrounds of IS capability are still under-researched this study aims to bridge this knowledge gap and contribute to existing literature on IS capability in the context of mining firms of South Africa.

Aral and Weill (2007) state that the level of competitiveness in a sector in which a company operate is often dictated by the type of IT systems available, how the IT system is implemented, and the magnitude of the value produced. Additionally, not only are IT systems operational in the organization, or how the IT systems are executed, but the scale of the value provided for competitive advantage that leads to brand loyalty as customers choose greater value products and services that contribute to brand loyalty (Attaran & Deb, 2018). As such, IT investment by an organisation maybe argued to be an additional factor of production to the traditional factor of production (land, labour, capital and entrepreneurs) to enhance its capabilities and improved performance in the particular setting in which the organisation operates. But the differences between IS capability and managing the traditional factors of production to achieve operational and performance efficiency is unclear. Furthermore, there have not been any conceptual framework developed to explain this gap. Therefore, the present study investigated the connection between IT capability, business results, and IT value.

1.1.1. Key concepts defining IS Capability

Information Systems capability consist of various areas and concepts. This sub-section reviews the concepts of IT, governance, strategic information systems planning, and capability.

Information Technology

Information technologies enables business operations. Hardware, software, data types, and communications networks are all examples of information technology (Samimi, 2020). However, the usage of information technology has grown beyond hardware and software (Gashi, 2020). Opportunities such as worldwide communications are made easier by information technologies. Using IT in most organisations involves investing heavily in IT systems. Investing on IT systems, IT governance goes hand in hand to ensure organisation reap the benefits of their investment. IT governance ensures investments in IT are properly managed for the organisation to derive returns on investment, performance and operational efficiencies and capability. Gu *et al.* (2008) emphasise that for the business to get returns from its IT investment, the organisation must implement a framework for IT governance. IT governance was stressed further on calls for the implementation of formal approaches at the highest level in the company, involving structures, processes, and

relational practices for generating business value from IT investments (Scalabrin *et al*., 2021). Studies on IT governance approached are extensively studied within the strategic management literature. The most important significant of IT governance is making choices about the IT spend. Weil (2004) reports that top-performing enterprises who have acquired the right IT system to enhance management and operations have had a 40% more return on investments than enterprises that have not implemented IT governance. Applied IT governance expectations for IT are easily met and IT risks are mitigated (Ebert et al., 2020).

In this present study, information technology is a combination of people, data, software's, hardware's, and procedures that enables business operations while IT governance is when IT components are properly managed for the organisation to derive returns on investment and functions effectively.

Information systems capability

Ross *et al.* (1996a) and Bharadwaj (2000) explained IS capabilities as the ability of an organisation in controlling the efficient use and deployment of IT-based resources in alignment with other resources and capabilities. Researchers have further explained that, by using IS capabilities, organisations can adjust their business operation processes effectively in a short space of time and gain a competitive advantage. As such, IS capability plays a key role about the competitive advantage (Aral & Weill, 2007; Bharadwaj, 2000; Mithas, Ramasubbu & Sambamurthy, 2011; Muhanna & Stoel, 2010; Santhanam & Hartono, 2003; Wang & Alam, 2007) of a firm. Lim *et al.* (2012) further elaborate on the role senior IT executives play to help the organisation's IS capability and found that they are at the nerve centre of modern organisation competitiveness and performance.

In the present study, IS capability is the integration of appropriate competencies, skills, leadership, experience, infrastructure, human resources, and stakeholder relationships, properly managed to assist the organisation to perform and achieve its business goals.

The concept of governance

Dlalisa (2009) defines governance as a complicated construct that incorporates transparency, access to information, openness, attentiveness, social equality, responsibility, whistleblowing, and declassification, to avoid malfeasance, dereliction of duty, patronage, embezzlement, scams, and ineptitude in the public sector. Yet, his

definition was aimed at the management of public services. Governance in this study is defined along the lines of the United Nations Economic and Social Commission for Asia and the Pacific (2008) as the system of decision-making and the means to implement laws. The definition of governance varies based on the scale of political debate. Some would urge and defined governance as "rules, processes, and behaviour that identify interests, manage resources, and exercise authority (Addink, 2019)." The requirement for governance is simply generated at the organizational management level for its employees and processes for providing service. Implementing governance is in the best interests of the firm.

Information technology governance

IT governance is also known as "enterprise governance of IT" or "corporate governance of IT" in some organizations. Information Technology Governance (IT governance) is derived from corporate governance and the focus is on the governance of IT within organisations and the alignment of IT with the business processes through corporate governance (Damianides, 2005). Information Technology governance is defined by the IT Governance Institute (2003) as the procedures that assure a firm's optimal use of tools to meet its objectives. Other researchers have described IT governance as a process by which decisions are made around IT (Symon, 2005) but Cadre and Moir (2009) explained that IT governance is the process of maximising the value of IT initiatives via effective interaction and coordination between both the firm and its executives, as well as their policies. According to current research, IT governance is a centre point area of corporate governance concerned with an organization's IT assets (Caluwe and De Haes, 2019).

In this thesis, the definition by Cadre and Moir (2009) was adopted in combination with the definition of IT Governance Institute (2003). The definition of IT Governance in this thesis includes the management, institutional arrangements, and processes that enables the IT system in used. Therefore, IT governance can be a driving tool that organisations use to control their IT investments, decisions, standards, and protocols.

As a result, to build effective IT governance, several guidelines and models must be used based on company requirements and capacity (Chang *et al.*, 2016). Alreemy *et al.* (2016) also advocate for the usage of various benchmarks to create effective IT governance. It is critical to evaluate the company's strengths and weaknesses and to carefully adopt the

right elements of quality management principles and conventions (Bhattacharjya & Chang, 2006).

In the present study, IT governance is a tool that organisations use to control their IT investments, decisions, standards, and protocols. The tool is a combination of IT components which when are properly managed the organisation can derive returns on investment and functions effectively.

IT leadership

Leadership helps an organisation and its employees to accomplish objectives and get where they should be (Crafford *et al.*, 2006; Gallup, 2017). Leaders in organisations are responsible for addressing the problems faced within and outside an organisations' because the working environment is continually changing technological and competitive world. This is true because, technologies now serve as the primary metrics for evaluating leadership initiatives and identifying market future opportunities (Mahdi, 2019).

As such, IT leaders in firms are the drivers of IT capabilities on a continuous basis to ensure a firm's performance. However, technological advancement in the IT is ever changing, globalised and organisation operating in an unstable financial and social environment needs IS capabilities that respond to their contextual situation to stay competitive. According to Wijewardena *et al.* (2014), IT leaders must be innovative and introduce IS capabilities that assist with management actions such as communication, empowerment, motivation, and accountability to enhance a firm's competitive advantage over its rivals. Lim *et al.* (2011) stated that, IT capability adds much more to a firm's success in companies with expert executive IT managers. These managers as leaders are key drivers to the regeneration of IT competence within the organisation. The study analyses the influence of senior management and executives concerning with regard to existing information systems capability in conceptualising the IS capability framework for mining firms in South Africa.

In the present study, IT leaders and overall firm leadership are the drivers of the organisations and its capabilities to continuously ensure the firm's performance.

Strategic information system planning

Strategic information systems planning (SISP) is a crucial component of the business since it fits information technology with organizational structure, enabling firms to achieve their intended goals (Lynn *et al*., 2021). According to Lynn *et al.* (2021), there is significant pressure to adopt new technology, which increases the requirement for SISP. Technologies emerge daily hence the increase for SISP is needed. Executives and management of organizations' information systems must play a critical role in SISP (Hermanson et al., 2020). Studies defined SISP as the method for selecting and implementing applications for information systems (IS) to accomplish an organisation goal (Grover & Segars, 2005; Newkirk, Lederer & Srinivasan, 2003; Newkirk, Lederer & Johnson, 2008). In this thesis, Strategic Information System Planning (SISP) entails closing the gap between the Information System (IS) plan and the business plan. The Information System (IS) plan and the business plan must be aligned in content as they complement one another (Newkirk *et al.*, 2008).

Walsham (2006) explained that the existence of distinct social, political and SISP environments makes it unlikely for a universal IS that is effective for developing and developed countries. Therefore, it is important for IT leaders in an organisation to develop a SISP that is contextual to mining firms in South Africa.

In the present study, SISP enables firms to achieve their intended goals by aligning IS plan and the business plan suitable to the organisational context. The goal of this study is conceptualised information systems capability framework can assist in a context relevant to aligning SISP for mining firms in South Africa and Africa at large.

1.2. Background to the Research Problem

This section provides a background to the research problem and indicates the root of the problem that gave motivation to the present study. This background assists in contextualising the problem, identifying the knowledge gaps, the scope of the problem and the extent to which previous related studies in this domain have bridged or not bridged the knowledge gaps.

In businesses, information systems are essential. Because IS enables organisation employees to carry out their daily tasks, and these assist leaders in addressing the everyday tasks carried out within their business. As a result, businesses may use

information systems to monitor the everyday operation of their enterprises and to make informed decisions (Lynn and Emanue, 2021). In South Africa mining firms need to manage their resources and processes to obtain maximum benefit from the investments in information systems and capability processes. As a result, mines are investing heavily in IS and IT technologies but hardly realise proportionate value from their investment. Though IT governance plays a role in a firm's IS capability, studies by Van Grembergen & De Haes (2009); Wilkin *et al.,* (2012) have shown that IT governance has a positive impact on the development of IS capabilities in a firm. Furthermore, IT governance allows both IT and business executives to facilitate IT/business integration and derive benefits from IT that enabled business performance (Van Grembergen & De Haes, 2009; Wilkin, 2012).

According to Heroux & Fortin (2014); Van Grembergen and De Haes (2009); Weill and Ross (2004), effective IT governance enables firms to create IT capability and IT capabilities in turn drives a firm performance. In their study, these authors refer to IT governance as a firm's governance mechanisms that enable both organisation management and IT personnel to execute their responsibilities. The support of IT-related decision-making and the creation of business value from IT-enabled business investments may led to competitive edge of a firm over it rivals. Information Technology governance focuses on the management and assessment of strategic IT resources. The primary goal is to assured investments in IT generate appropriate business value while seeking to mitigate risks generally associated with IT operations (De Haes & Van Grembergen, 2005).

1.2.1. Context and Study location

In this section, the study location and the context of South African mines in relation to information systems capabilities are discussed.

South Africa has a wealth of natural resources, and its mining industry plays a pivotal role in the country's gross domestic production (GDP) and drives economic growth. South Africa has 96% of the world's total platinum group metal (PGM) reserves, as well as 7% chromium, 26% manganese, 26% vanadium, and 11% gold reserves (South African Mineral Industry, 2016). The country is a major producer and distributor of a variety of minerals and provides an attractive capital market. The mining industry in South Africa thus contribute significantly to the growth of the South African economy and have been doing so for the past 150 years. The mining sector further plays a significant role in the continent

in the form of exports and tax revenues that brings the much-needed foreign currencies to sustain economic growth and poverty reduction.

The mining sector at the turn of the nineteenth century was the foundation of the Johannesburg Stock Exchange (JSE), which still accounts for one-third of its market cap. Besides the direct contribution, the indirect contribution of mining through its forward and backward linkages have led to growth the Gross Domestic Product (GDP) of South Africa. The mining sector directly contributes between 15% and 20% of the country’s GDP. The industry has been acknowledged by the government for its job creation potential.

A report by the Chamber of Mines (2016) indicates that, South Africa globally is the largest chromium producer and the second-largest producer of Ilmenite, Palladium, Rutile and Zirconium. Besides, the country is the world's third-largest coal exporter and China is the leading consumer of chromium and ferrochromium product for the production of stainless steel.

African Mining IQ currently listed 548 mines in South Africa as of January 2022 (African mining iQ, 2021). There are about 22 different minerals extracted within South African mines - 11 mines produce Chrome, 132 produce coal, 6 mines produce copper, 48 mines produce Diamond, Emerald 1, 2 mines produce Fluorspar, 3 mines produce Ilmenite, 86 mines produce gold, 95 are for Industrial Iron Ore 21, Lead 1, Manganese 17, Nickel 9, PGM 91, Phosphate 2, Rare Earth Minerals/Metals are 5, Silica 1, Tin 2, Vanadium 5, Uranium 8, only 1 mine produces Zinc and 1 mine produces Zircon. Figure 1 shows the overall mineral population per province.

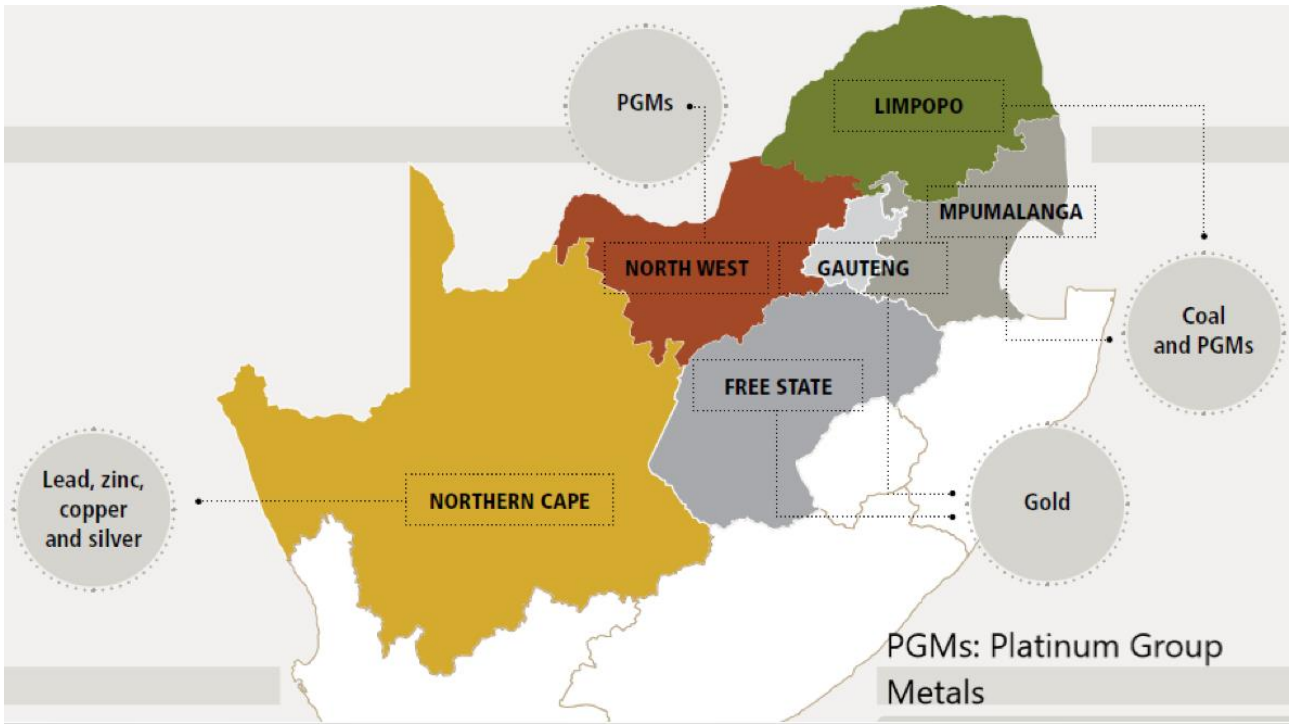

Figure 1: Overview of South African Mining per province (Chamber of Mines, 2016)

The present study purposively selected Platinum Group Metals (PGMs) mining firms in the Limpopo Province of South Africa as the study location. Currently, in total, they are 91 mines, 30 are currently in operational, 26 are in various phases of development and the remaining ones can come back to development phases in future (*Ibid*, 2016). The PGMs commodity basket includes five elements and ranked in order of production volumes are: "platinum (49.6%), palladium (29.4%), ruthenium (11%), rhodium (7.4%), and iridium (2.6%)" (Minerals Council South Africa, 2021). PGM mines are only produced in Limpopo, Northwest, and Mpumalanga Province of SA.

1.2.2. Challenges and Issues

There are studies on IS Capability; however,most of these studies are mainly theoretical rather than empirical in design and are not about mining firms environments. Thus, mining firms constantly lack the right knowledge and skills to improve capability. The knowledge and skill challenges remain because there is no known framework that may help the mining firms to understand the industry drivers and how to design relevant corporate policies that applies to their operational context. This is evident in most mining firms where IS capability issues tend to be misinterpreted, and this is a serious challenge since IS capability enables an organisation to drive its goals and acheive competitiveness.

1.2.3. Knowledge Gaps and Motivation for the study

The present study envisaged to contribute theoretically, methodologically, practically, and contextually by bridging the knowledge gaps discussed in this subsection. The identified knowledge gaps are discussed as follows:

1.2.3.1 Practical knowledge gap

Previous research have addressed IS capability. However, most of these studies are mainly theoretical rather than empirical in design and are not contextualised to mining settings. This study identified a gap in the literature on IS capability that calls for more consideration of the setting in which technologies and systems are adopted and deployed in South African mining firms. Information systems challenges facing SA mines are substantial. The challenges tend to lie in the practical knowledge and skills of mining firm's leaders and IT personnel. This is observed to be true as implementation of IS capability on the mining firms is often misinterpreted. This study sought to conceptualise a framework that supports and informs practical methods of enhancing information systems capability. The study argues that IS capability of an organisations pays off if it corresponds appropriately to the particular setting in which the mining firm works and operates.

1.2.3.2 Theoretical knowledge gap

There is no known study that triangulates the theories of Resource dependency, IT capability, and Upper Echelon to explore and describe information systems capability in South African mining firms. The present study is therefore envisaged to add a different theoretical perspective to the IS capability research field. Chae et al. (2018) have examined the effect of IT capabilities (ITCs) in SMEs in terms of information technology capability's role and firm performance. They found that, it is the responsibilities of IT executives to enhance a firm's ability to gain competitive advantage through IT capability (Lim et al., 2012) over its competitors. Furthermore, Muhanna and Stoel (2010) have studied how investors value IT by investigating the value relevance of IS capability and IT spending across industries while Bai et al. (2011) study focussed on a multi-agent modeling and simulation for the evolution of enterprise IT capability. They found that, IS capability has been highlighted in strategic literature as a significant source of competitive advantages.

However, these authors agree that IS capability development and evolution in the ever-changing company setting is a continuous process (Bai et al. 2011). Shababi and Ziari (2021), conducted recent research on "the impact of organizational acceleration and information technology capabilities on performance with the function of innovation capacity moderator in the banking industry." The research was a case study of a particular banking sector in the Iranian province of Mazandaran that cannot be assumed adequate to adopt by any organisation due to diverse industries and technology.

The above studies have revealed that they are gaps when it comes to IS capability framework contextualised to the context of South African mining firms. The present study assumes a well-developed, context relevant IS capability framework is an indispensable analytical tool for the enhancement of mining firms in South Africa to remain competitive.

1.2.3.3 Methodological knowledge gap

The theoretical studies contextualised to mining environments still under-researched. Most studies in IS capability often follow the positivism philosophy with a survey research strategy. Survey studies do not tend to bring out the how, when, and why a phenomenon exist. To bridge this knowledge gap, this present study used a case study research strategy to gain a deeper knowledge of the IS capability phenomena in a real-world setting. An interpretivism philosophy and a case study research strategy, through interviews and observations, adds an in-depth knowledge of the IS capability phenomenon, and provides a thorough description of how things happen in a natural setting and context.

1.2.3.4 Contextual knowledge gap

South Africa is classified as a developing country. There is no known IS capability framework conceptualised sensitive to the context of South African mining firms. South Africa is unique politically, socially, educationally, and economically. It is, thus, possible that IS capability frameworks which work in other countries, notably developed countries, may not necessarily work as expected in South Africa and its mining firms. Therefore, there is a need for an information systems capability framework that is sensitive to that uniqueness.

1.3. Problem statement

Although South African mining firms invest heavily in technologies, applications, and systems, they tend to struggle to derive value from the investments. It is inferred that this is due to IT-business misalignment and the lack of a contextualised information systems capability framework that mining firms could draw from. The research problem is linked to the absence of understanding where, when, what, and how to have an appropriate IS capability that could enable the mining firm business. The information systems business administration problem is that although IS capability is deemed necessary for increased organisational performance, its value is often not well understood nor appreciated within mining firms. SA mines need an IS capability framework that may inform practice to improve business efficiency and effectiveness.

Although literature (examples, Aral & Weill, 2007; Bhardwaj, 2000; Mithas et al., 2011; Muhanna & Stoel, 2010; Santhanam & Hartono, 2003), have shown that organisations that acknowledge the value of IS capability have competitive advantage over their competitors, there are no known studies that may inform the “know-how” and the “know what” regarding IS capabilities particularly within South African mining industry. To this point, the present study sought to bridge this knowledge gaps by conceptualising a contextualised IS capability framework.

1.4. Research Argument

For mines to operate effectively, the study urges that there is a need for an efficient information systems capability. This includes a need for technological and human resources and knowledgeable business and IT leadership. The study argues that a contextualised and efficient IS capability framework may aid and enhance a mining firm performance through a derived IT value.

Research works have been conducted on IS capability. However, most research is mainly theoretical and little empirical studies has been conducted in the context of mining firms. The present study bridges this knowledge gap by providing an information systems capability framework for mining firms, in the context of South Africa. Lim et al. (2012), claim that the contextualised backgrounds of IS capability are still under-researched. Thus, the present study was intended to fill this gap and contribute to the literature and further understating of IS capability, in the context of mining.

1.5. Study purpose

The purpose of the study was to explore and describe IS capability in the context of South African mining firms.

1.6. Research goal and Objectives

The goal of the present study was to conceptualise an information systems capability framework in the context of South African mining firms. To archive the goal, the study objectives were as follows.

1.6.1. Study Objectives

1. To understand the current IT and business resources in South African mining firms.
2. To explore and describe how information systems capability manifests in South African mining firms.
3. Explore and describe the influence of Resource Dependency on a South African mining firm's information systems capability.
4. To describe, using Upper Echelon theory as a lens, the influence of leadership on building IS capability in a South African mining firm.
5. To determine a framework for improving information systems capability in South African firms.

1.6.2. Primary Research question

The primary research question driving this study was: *How should South African firms improve and optimise information systems capability?*

The research questions of this study were:

1) What is the nature of information technologies and business resources in South African firms?
2) How does information systems capability manifests in a South African mining firm?
3) How does Resource Dependency influence a South African mining firms' information systems capability?

4) Using the Upper Echelon theory as a lens, how does leadership influence information systems capability in a South African mining firm?

5) How can South African mining firms improve information systems capability?

The following section succinctly addresses how the thesis contributes to the theoretical and practical body of knowledge.

1.7. Envisaged Thesis Contribution

It is an undisputed fact that the great business schools of the world are those institutions that not only transmit knowledge but also create knowledge through academic research and share the newly acquired knowledge to relevant stakeholders. How this thesis originally contributes theoretically, practically, and contextually to the body of knowledge is described in detail in the last chapter of the thesis.

1.8. Significance of this study

Literature review revealed some knowledge gaps within the existing IS capability frameworks. For example, existing frameworks are generally conceptualised from the western context and not in the context of South African mining firms. Therefore, the current study undertook to conceptualise an IS capability framework context-sensitive to South African mining firms, to close this identified knowledge gap.

The conceptualised framework may be used to address IS capability issues and challenges and as such, may be used as a way to contribute towards deriving the business value from IT/IS investments.

1.9. Delimitation of the study

The purpose of the study was to explore and describe IS capability in the South African mining firms. Although IS capability is an outcome of IT governance and IT management, the study does not focus on IT governance and the various frameworks that are employable. In this study, the emphasise was studying the IS capabilities such as human resources, technology resources, competencies and skills, resource dependency as well as leadership as they manifest within mining firms in South Africa. The study did not analyse the actual technologies, systems nor applications.

1.10. Thesis layout

The rest of the thesis is outlined as follows:

Chapter 2: Survey of Scholarship and Theoretical Foundations; this chapter surveys and reviews literature that informed the present study. Key concepts making up the field studied are reviewed. Related works are also reviewed.

Chapter 3: Theoretical Frameworks and the conceptual research framework; the chapter discusses the information systems models, and theories underpinning the present study. The conceptual research framework guiding the conduct of the study is provided.

Chapter 4: Research Methodology; this chapter outlines the research methodology followed in conducting the present study. The research philosophy, the research approach, the research strategy, and the research design are discussed.

Chapter 5: Data Analysis and Discussion of findings; this chapter follows the thematic analysis technique to analyse the collected data. The findings of the study are then discussed.

Chapter 6: Interpretation of Findings and the IS capability Framework; this chapter interprets the findings discussed in chapter five. Informed by the interpretations, an information systems capability framework is then provided.

Chapter 7: Evaluation of the research and contribution; Evaluation of the Research, Recommendations, Thesis Contribution, and Conclusion are discussed in this last chapter, the research journey is reflected upon. The recommendations and the contributions of the thesis are articulated. Then, the thesis is concluded.

1.11. Summary of the Chapter

This chapter introduced the thesis and gave the background to the research problem by identifying knowledge gaps. The next chapter reviews literature and surveys the information systems capability scholarship.

CHAPTER TWO

SURVEY OF SCHOLARSHIP AND THEORETICAL FOUNDATION

The previous chapter introduced the thesis and gave the background to the research problem being addressed. This chapter surveys the existing scholarship by reviewing the literature on concepts that gave foundation to the present study. The survey of existing scholarship is covered by the main section that is 2.1 related works. Key terms characterising information systems capability are discussed, as well as previous studies whose works are related to the present study.

2. Significance of IS Capability

Over the years, numerous researchers have studied information system capability. In strategic information systems management literature, IS capability is a major source of competitive advantages, although IS capabilities are often not well defined, and developed in today's evolving corporate climate (Bai *et al.* 2011). Understanding the impact of IS capability is a critical issue for many researchers in Information Systems, thus, there is a wealth of IT capability literature (Chae *et al.* 2014; Bhardwaj, 2000; Mithas *et al.* 2011; Nakata *et al.* 2008). The usage of the term IS capability varies though. Some researchers argue and define it as the ability of the IT role to efficiently meet business needs; it is the key to turning an organisation into a profitable entity (Kim et. al., 2012). Bhardwaj (2000) defines IT capability in conjunction with other resources and capability to control the efficient use and deployment of IT-based resources.

Literature shows that organisations that have recognised the value of there IS capabilities have a more competitive advantage than their competitors Aral & Weill 2007; Bhardwaj, 2000; Mithas *et al.* 2011; Muhanna & Stoel, 2010; Santhanam & Hartono, 2003). This present study recognises the use of IS capability and the level at which mining firms can understand, and realise the value of IT. Accordingly, the present study looks at a mining firm as a case study because aspects of IS capability, though not well understood, are important for the firm to efficiently operate and remain competitive.

The study focused not only at the IT resources of the mining firm but also at the leadership that drives IT capability. According to Lim *et al.* (2012), leading IT executives who use their

platform to promote a superb and long-lasting IT competency offer a far bigger difference to their firm than IT executives who create an excellent but short-lived IT potential. Any firm needs to construct the knowledge and expertise of its IT personnel. Bharadwaj (2000) notes that, if firms succeed in creating superior IT capabilities, they can enjoy a superior financial performance. He argued that firm-specific IT resources such as IT infrastructure, human IT resources, and IT-enabled intangibles create enterprise-wide IT capabilities. From a resource-based perspective, most scholars agree that the ability to integrate other organisational resources through the use and disposition of one's own IT resources is IT capability (*Ibid*, 2000). While the term IS capabilities carries a lot of weight in terms of resources of an organisation. Resources of an organisation are combinations of tangible and intangible resources.

According to Kim *et al.* (2015), in this era of technological renaissance, organisational IT systems are essential in influencing institutions' adaptability to change, thereby boosting and conserving the effectiveness of the institutions' functions in a diverse and evolving corporate world. The next section addresses information technology capability frameworks and prior studies that relate to the present study.

2.1. Related Works

This section surveys available and published studies, and this is done to gain more insight into IS capability, and subsequently, to have a foundation for the present study. The following surveys describe scholarship on works done so far, regarding the field of study, the nature of the work, the points addressed, and the outcome of those studies. Addressing related studies add a significant value in the development of the framework the study instead to conceptualise.

2.1.1 IS Capability on Firm Performance

The impact of Information System Capabilities on corporate performance is discussed in this section. The influence of IS capability on corporate performance has been investigated in several research. Bharadwaj (2000) identifies numerous examples of positive connections between IT capabilities and organisational performance (2000). However, some studies did not find any significant relationship. Chae *et al.* (2014) recognises that some of the influences have little meaning and that the size of an organisation and the

sector in which it operates contributes to its performance. The following subsection focuses on related studies addressing IT capabilities and organisational performance.

1. Erkmen *et al.* (2020) addressed the impact of long-term IT capabilities on company performance, as well as the mediating effects of the technological environment. Their study considered IT capability to be a three-dimensional construct: IT managerial capability, technical IT capability, and human support, building on studies by Kim *et al.* (2012) and Garrison *et al.* (2015). The work focused on sustainable IT capability to create value from IT investment. Erkmen *et al.* (2020) argue that sustainable IT capability makes a substantial contribution to firm efficiency, both quantitatively and qualitatively, along with an innovative climate, with a moderating impact on the relationship between IT capability, and firm performance. To test their hypotheses, data were collected from 221 IT business managers encompassed at the top 500 list of the Turkish Information and Communication Technology Authority (ICTA).

   The study followed a hierarchical approach by Chin *et al.* (2013) to test the hypothesis. The research model (Figure 2) is shown below.

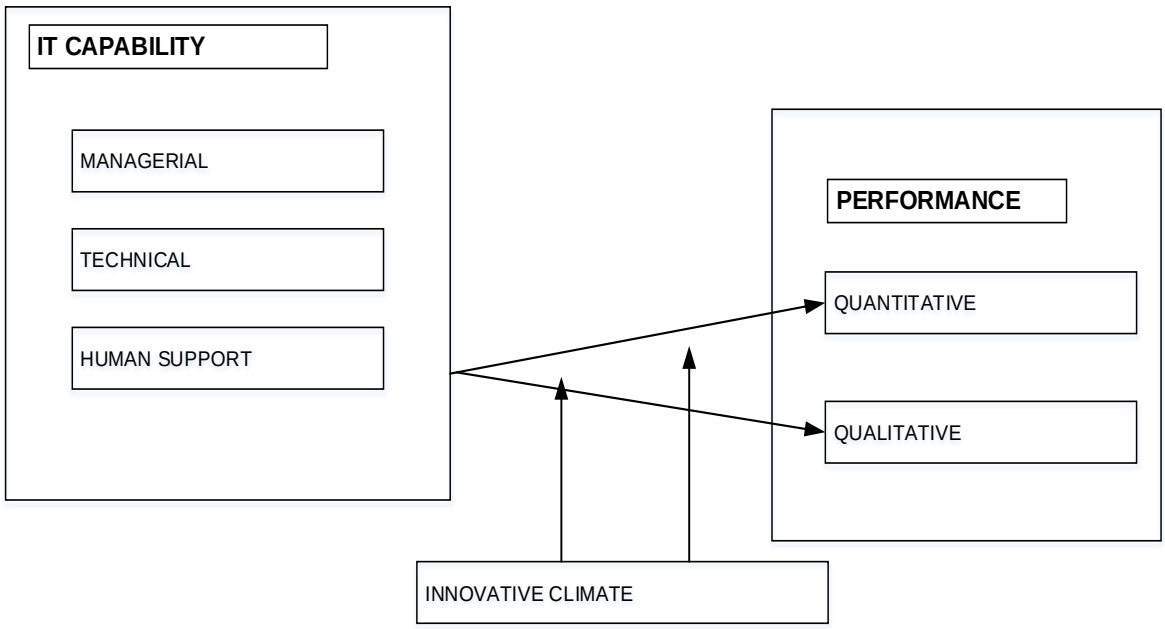

Figure 2: Erkmen *et al.* (2020) research model

The study was limited to three IT capabilities: the technical, the managerial, and the human-based viewpoints adopted by Kim *et al.* (2012) and Garrison *et al.* (2015). In IT-related performance research, these three capacities are the most popular and therefore, the most extensive.

Table 1: Research IT capabilities studied (Erkmen et al., 2020)

IT Capabilities	Definition	Assets include(s)
Technical IT Capability	The capacity to quickly adopt alternatives, and efficiently, making it possible for an organisation to successfully introduce new technology into existing infrastructure (Garrison *et al.* 2015).	Physical and intangible IT assets like technological expertise, firm-specific know-how, and problem-solving processes, form the backbone of a company's overall IT resources (software, hardware, records, databases, and networks) including computing, and networking systems, and mutual technological frameworks, and databases.
Managerial IT Capability:	This refers to the degree to which IT managers have the appropriate business experience, and technological expertise to anticipate and successfully exploit promising technologies in aligning corporate processes with organisational priorities (Kim *et al.*, 2012; Garrison *et al.*, 2015) .	Intangible assets. Foresight, market knowledge, and IT know-how help IT managers to maximise their beneficial IT efforts.
Human Capital Support	Represents the technical capabilities, and skills of IT staff required to carry out delegated duties.	IT assets like abilities or knowledge.

Two associated analyses from the Resource-Based View (RBV), and Market-Driven Viewpoint (MDP) perspectives were discussed in relation to their significance on IT capabilities. The RBV emerges from studies on strategic management, and it underlines the value of company-specific resources, including skills. RBV originates from Penrose (1959), where a company is identified as a resource cluster. Penrose implies that a company's growth and progress are both encouraged and driven by a strategic search to make the most of the knowledge and resources at hand The required resources and expertise are related to the assets, capabilities, systems, methods, information, and know-how that an organisation acquires. The MDP viewpoint is based on Porter's (1980) framework for business strategy. The framework emphasises the role of the organisation, and the market in identifying competitive regulations, and in shaping the system that could apply to a company. According to Porter (1991), the secret to competitive success is the opportunity to put the company in competition in the market. In the same context, Porter's (1980) framework points out that resources are not value-added on their own. Rather, their worth relates in particular to how well they suit the context of the market, and how well they help a specific plan with the goal of either entering a desirable sector or establishing a good competitive position within an established industry.

As a result, Erkmen *et al.* (2020) surmise that efficient IT capabilities, such as technology and management IT skills, greater IT capabilities, enable organisations to make good decisions about IT expenditure, IT financing, and IT expansion, resulting in increased profitability, performance, effective promotional strategies, enhanced productivity, and excellent customer service. In their study (Erkmen *et al.*, 2020), the hypotheses tested were:

Hypothesis 1: *IT Capabilities: (a) technical IT capability, (b) managerial IT capability, and (c) human capital support will be positively related to quantitative firm performance;*

Hypothesis 2: *IT Capabilities: (a) technical IT capability, (b) managerial IT capability, and (c) human capital support will be positively related to qualitative firm performance;*

Hypothesis 3: *Innovative climate moderates the relationships between IT capabilities (a) technical IT capability, (b) managerial IT capability, and (c) human capital support and quantitative firm performance;*

Hypothesis 4: *Innovative climate moderates the relationships between IT capabilities (a) technical IT capability, (b) managerial IT capability, and (c) human capital support and qualitative firm performance.*

Multi-item scales were taken from previous experiments to quantify each component during hypothesis testing. Each component was measured using a 5-point Likert scale from "strongly disagree" (1) to "strongly agree" (5). The three-dimensional construction, consisting of managerial capability, technical capability, and support for human capital, was used as an exogenous component. Five items for IT management capability, and five items for technical IT capability are taken from Han *et al.*'s (2008) study. To assess funding for human capital, a scale of four elements from Günsel and Tükel (2011) was followed. The performance scale developed by Alpay *et al.* (2008) that consists of eight elements comparing the qualitative, and quantitative success of the firms was used. Then, innovative climate as a moderating element was calculated using 12 Gümü¸so˘glu, and ˙Ilsev's (2009) adjusted items.

The cross-section model was used for a self-reported survey, which gathered data from top or middle-line managers, employed in a range of major IT companies based in Istanbul and Ankara, Turkey. Firms in the study category were initially picked from the top 500 firm ranking estimates for Turkey 2016; 177 of the top 500 ICT firms were based in Istanbul and127 of them were in Ankara. The general manager of each firm was conducted by telephone, and the purpose of the report was explained. Of the 304 companies approached, 92 took part in the analysis of the study. An online edition of the questionnaire was submitted to the 92 businesses via e-mail. Only 243 participants responded to the questionnaire. After a diligent review, all responses with incomplete data were dropped, leaving 221 responses for analysis.

The study results showed that managerial IT capability, and technological IT capability have positive impacts on quantitative firm efficiency. The results do not provide any data to support the association between human resource support, and

quantitative company efficiency. H1 is also partially supported. Besides, the results showed that all aspects of IT capability, such as managerial IT capability, technical IT capability, and human capital support, have been strongly correlated with qualitative firm success, and are completely endorsed by H2. The two-step building technique was used to resolve the observations on the moderating impact of the innovative climate. The results showed positive relations between technical IT capability, and quantitative firm performance, thus, H3 was slightly supported. Positive relationship results between managerial IT capability, technical IT capability, and qualitative firm output were observed; H4 was thus partially endorsed.

The study's findings revealed that quantitative organisations' management, and technological IT capabilities had a significant impact on organisational performance. According to an RBV perspective, the quantitative effectiveness of IT human investment capital, as well as how effectively IT investments and technical devices are administered, has an influence on the perceptible output of corporate organisations. According to the results, funding for human capital does not seem to have a substantial impact on quantitative efficiency. The results show that all aspects of IT capability such as IT management, technical IT, and Human support are favourably related to qualitative firm results. The findings further explain the resource-based view that services such as IT capability are valuable tools for the benefit of companies.

2. Chae *et al.* (2018) examines how the industry is affecting IS capability, and an organisation’s performance in connection. The position and function of business, as well as the relationship between IT performance and competitive advantage, were investigated. The goal of their study followed Chae *et al.*'s (2014) study in understanding IT capability, and firm performance, contradictory findings, and their possible causes.

   These researchers reviewed relevant literature, and set three inconclusive evidence hypotheses, which were: “There is a significant difference in profits and costs between the firms with superior IT capability, and the control companies in the transforming industry; There is no significant difference in profits, and costs between the firms with superior IT capability, and the control companies in the informate

industry; There are no significant differences in profits, and cost between the firms with superior IT capability, and the control companies in the automate industry ".

The matched sample comparison group was used as a method to test inclusive hypotheses. Through the usage of the samples, the study examined whether IT leaders show competitive advantages in different industrial settings. The industry setting examined was Transform, Informate, and Automate industries. A two-step process was used. Step 1: for every IT leader, firms that have a four-digit Standard Industrial Classification (SIC) code should be in the same industry as IT leaders, and average sales should be 70 to 130% between 1996 to 2000. Control firms with five-year average sales of the prior five years are chosen. Step 2: if there was no firm match in step 1, then two or three-digit SIC codes are used.

The findings of the hypothesis tests, which were undertaken using matching control companies based on the firm's industry, confirmed the following. For the transforming industry, results indicated the presence of a significant difference between the IT leader group, and the Control Group. That is, the control group performed better than the IT group. For the Informate industry, results showed no performance difference between the IT leader group, and the control group. For the Automate industry, results showed no differences in firm performance between the IT leaders, and the control firms. However, the researchers emphasised that automate industry's role in IT is not important as compared to the transform, and the informate industry.

The study of Chae *et al.* (2018) was directed at three industries. The findings revealed that the influence of IS capabilities on company performance differs based on the sector. The researchers indicated that the industry's critical role necessitates a greater focus on the context in which IT is embraced and implemented.

3. Using the year 2000 results, Chae *et al.* (2014) re-examines the correlation between IT practices and firm performance. Despite this, there was no discernible link between IT capabilities, and company performance in the investigation. It was true because the IT leading companies did not demonstrate better financial results than the control companies. Between 1991 and 2007, data were used to classify potential causes between the IT leader, and the control group. Chae *et al.* (2014) emphasises

that easy access to outsourcing enables firms to substantially reduce the time at the expense of IS development, making IT capabilities more accessible for less experienced firms. Their study, therefore, investigated whether IT leadership in the 2000s is still an important factor in assessing company success as it was in the 1990s, and if so, how did the benefits of IT leadership shift from the beginning of the 1990s to the 2000s?

The researchers examined and re-examined what other researchers have scientifically studied in the 1990s. Studies by Bharadwaj (2000), Santhanam and Hartono (2003) determine whether a genuine depiction of determining companies with superior IT capacity or IT leaders exhibiting higher performance than their peers is still held by IT executives in the 2000s. Bharadwaj (2000), used a resource-based view and match sample method to test whether enhanced IT ability is linked to higher business performance among IT leaders. The performance of companies with outstanding IT capabilities was contrasted to that of regulated companies. Data were chosen from 1991 to 1994 from InformationWeek 500. The findings revealed that IT leaders outperformed their peers in terms of earnings and expenditures.

Santhanam and Hartono (2003) did a follow-up investigation to prove this. As a control sample, they used average outcome indicators from all companies in the sector. This is unlike Bharadwaj (2000) who used control companies from Standard & Poor's Compustat database. Their findings align with those of Bharadwaj (2003).

Chae *et al.*'s (2014) study extends and updates Bharadwaj (2000), Santhanam, and Hartono's (2003) studies. The summary and comparisons between the studies are shown in Table 3.

Table 2: Comparison of studies between the early 1990s and 2000 (Chae *et al.* 2014)

Studies	Sample	Control Groups	Measures
Bharadwaj (2000)	IT leader from 1991-1994 InformationWeek 500	IT Leader versus control company of similar size, and industry	Business performance measured by profit, and cost ratio from 1991 to 1994

Santhanam and Hartono (2003)	IT leaders a from 1991-1994 InformationWeek 500 listing	IT leaders versus the industry average	Business performance is measured by the profit and cost ratio from 1991 to 1994. Sustainability of superior business performance from 1995 to 1997.
Chae *et al.* (2014)	IT leaders selected from 2001-2004 InformationWeek 500	IT leaders versus control companies of similar size, and industry	Business performance is measured by the profit and cost ratio from 2001 to 2004. Sustainability of superior business performance from 2005 to 2007.

To experimentally test hypotheses, Chae *et al.* (2014) employs a matched sampling group design technique (Figure 2). As a treatment sample, they used IT leaders with exceptional IT skills. The control sample was made up of companies that were paired to the treatment sample due to size, and sector. The average performance evaluations of IT leader businesses were then contrasted with the paired firms' average benchmarks. Two thousand (2000) companies listed on InformationWeek 500 from 2001 to 2004 were chosen. About 561 companies were restricted to IT leaders' sample to those that were listed at least twice in the InformationWeek 500 from 2001 to 2004. Out of 561 IT leaders, only 296 had comparable IT leaders.

H1's findings, which revealed that IT leaders were related with greater profit ratios, were unconfirmed, whereas H2's findings were marginally endorsed. From 2005 to 2007, H3 and H4 IT leaders did not have a greater profit ratio or a lower cost ratio than control firms. Neither of the hypotheses H5, H6, H7, or H8 could be backed. The results contradicted those of earlier studies. That is, they discovered no link between IT executives and a greater profit margin. There was also no link between IT capability and firm performance. A contradiction to their findings was also observed. Furthermore, the researcher implies that their findings do not speak to correlations between IT capabilities and business effectiveness that no longer matter, which opened numerous questions worth addressing in future research.

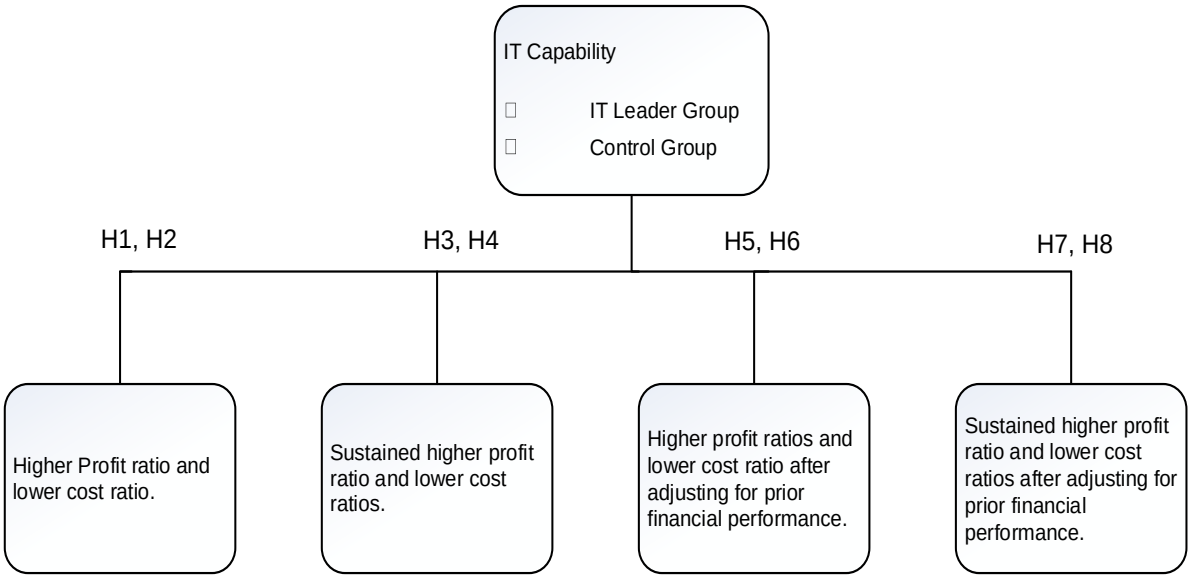

Figure 3: Hypothesis (Chae *et al.*, 2014)

4. Pu Liu et al. (2013) undertook a meta-analysis of the association between IT capability and performance outcomes. The researcher showed that company efficiency is substantially influenced by IT capabilities. However, this meta-analysis study investigates the association between the two variables, IT aptitudes, and company performance. A quantitative method was used. A meta-analysis tool to summarise, evaluate, and analyse data was used for data analysis.

   Hypothesise tests were;

   Hypothesis1: "*Will IT capability have a significant influence on firm performance*"?

   Hypothesis2: "*Will the differentiation existing in measuring the type of IT capability have a significant influence on the relationship between IT capability, and firm performance"*?

   Hypothesis3: "*Will the difference that exists in measuring the type of firm performance have a significant influence on the relationship between IT capability, and firm performance*"?

   Hypothesis4: "*Will the differentiation of data sources have a significant influence on the relationship between IT capability, and firm performance*"?

Hypothesis5: “Will *the pyramid culture have a greater influence on the relationship between IT capability, and firm performance*”?

Table 3: Distribution of effect sizes (PU Liu et al. 2013)

Moderating variables	Factors of Variables	Code	No. of effect sizes	Total number	Percent
IT capability measurement type	horizontal type	0	9	81	11.1%
	longitudinal type	1	72		88.9%
firm performance measurement type	financial performance	0	29	81	35.8%
	non-financial performance	1	52		64.2%
data source difference	primary data	0	71	81	87.7%
	second data	1	10		12.3%
Cultural differences	market type	0	26	64	40.6%
	family/ machine type	1	31		48.5%
	pyramid type	2	7		10.9%
	None	none	17	-	-

Of the 81 impact sizes of the 45 previous comparative studies performed on a meta-analysis, the findings of the experiment revealed that IT capacity has a significant influence on organisational profitability (P<0.01), which is why the meta-analytical findings favour the H1 hypothesis. IT capability has a more important impact on firm performance where the method of IT capability assessment is a statistical method (P<0.05), and the type of firm output measurement is a non-financial type (P<0.01). Consequently, the results reveal that H2 and H3 are supported while H4 is not supported. The findings suggest that IT capacity has a more important impact on firm performance where the type of measurement of IT capability is empirical (P<0.01), the type of measurement of firm output is non-financial (P<0.05), and the type of culture is in pyramid form (P<0.01). It was also supported by H5.

Based on the findings, IT capability has a significant impact on corporate performance. Not only does the interpretation explain the differences in theoretical analysis of IT power, but also, it has a far-reaching functional meaning. The study

indicates that strong IT Power provides businesses with a sustainable competitive advantage that increases firm efficiency. The study suggests that to boost the competitiveness of firms, managers must unmistakably encourage the development of IT skills and aggressively advocate the use of a blend of IT infrastructure, critical applications, and expertise.5. Nakata *et al.* (2008) conduct a study on the Complex Input of IT Capability to Business Performance. The purpose of the study was to explore a more complex collection of relationships between IT capabilities, and business performance. The study's emphasis was on customer orientation that looked at the firm level to define, evaluate, recognise, and address customer needs. Customer focus has been used as a mediator between company success, and IT capability. Moderators used were the Information systems (IS) service quality, and intra-organisation trust. The research question posed to exam IT capability's contribution to business performance were "If there is an indirect relationship through customer orientation, and if IT capability has an interactive relationship with IS service quality and intra-organisation trust''?

A model of Socio-Technical View (STV) was developed. A sample of senior executives across a wide variety of companies and sectors produced and tested the model. The study emphasised the conceptualisation of STV following research in the British coal mining industry. STV is important because it recognised the interconnection between technological and social factors as well as the technology's sequential impact.

The STV theory has three core premises namely: organisations are socio-technical systems rather than exclusively or pre-dominantly social or technical; both dimensions are different and interconnected-independent in that they are discrete, and distinct from each other, yet coupled in that their integration allows inputs to be converted into valuable output. Lastly, organisational operations and results are best when both social and technological elements are high.

Elements constructed from the STV theory are IT Capability, Customer orientation, IS service Quality, Intra-organisational Trust, and Business performance (see Table 4).

Table 4: Constructed elements of STV theory (Nakata *et al.*, 2008)

Key Constructs	**Adopted interpretation from:**	**Definition**
IT Capability	Bakos and Treacy (1985)	Defined IT capability "as the ability of a computer system - the collection of computers, and related technologies in an organisation - to store, process, and communicate information".
Customer Orientation	Drucker (1954)	"The firm-level ability to identify, analyse, understand, and meet customer needs".
IS service quality	Pitt *et al.* (1995)	"Define IS service quality as the degree to which services provided by IS specialists to systems users exhibit desired properties, including reliability, timeliness, and appropriateness".
Intra-organisational Trust	Huff and Kelley (2003)	"Defined as the positive expectations that workers across the organisation have about one an- other's abilities, actions, and motives".
Business Performance	Brady and Cronin, (2001); Morgan and Piercy (1996	"Business performance as comprising two dimensions - market performance, and financial performance".

The hypothesis tested for the study are as follows.

Hypothesis 1 tested for IT Capability, and Customer Orientation: IT capability is positively related to customer orientation.

Hypothesis 2 tested for IT Capability and IS Service Quality: 2: IS service quality strengthens the positive relationship between IT capability, and customer orientation.

Hypothesis 3 tested for IT Capability, and Intra- organisational Trust: Intra-organisational trust strengthens the positive relationship between IT capability, and customer orientation.

Hypothesis 4 tested for Customer Orientation, and Business Performance: 4: Customer orientation is positively related to business: a) market performance, and b) financial performance.

Hypothesis 5 tested for IT Capability, and Business Performance: IT capability is positively related to a) market performance, and b) financial performance, but indirectly through customer orientation.

Sample and data were collected from the Dun and Bradstreet database of Strategic Business Units (SBU) in the regions of the United States.

Sample selection and data collection were categorised (Table 5). The chosen survey identified senior marketing executives in every SBU as primary informants.

Table 5: Sample selection.

1471 SBU Directory	**Sizes**	**Type**	**Industries**
	100 to 20 000 employees.	Industrial and Consumers.	510 SIC codes.

Questionnaires, along with a letter detailing the study, were sent to the listed participants. A total of 206 replies were received from the third email at a response rate of 14 percent. Out of 206 replies, only 189 were usable. A 7-point discrepancy/agree Likert scale was used. Control mechanisms were firm scale, type of consumer, and segment of the business. The test was conducted using LISREL 8. A two-step approach to structural equation modelling, followed by the calculation of a measurement function utilising a confirmatory component analysis (CFA).

The outcome of the analysis of the theory tested the following:

Table 6: Hypothesis test results.

Hypothesis	Tested for:	Results
H1	IT capability is positively related to customer orientation.	The standardised path coefficient y_{11} was .25, and statistically significant.
H2	IS service quality strengthening the positive relationship between IT capability, and customer orientation.	The coefficient y_{11} =.00 was not significant.
H3	Intra-organisational trust strengthens the positive relationship between IT capability, and customer orientation.	The path coefficient for the interaction y_{15} was statistically significant at 0.35.
H4	Customer orientation is positively related to business: a) market performance, and b) financial performance.	The path to market performance, $ß_{21}$, was statistically significant at .70, as was the path to financial performance, $ß_{31}$, at .38.
H5	IT capability is positively related to a) market performance, and b) financial performance, but indirectly through customer orientation.	The respective coefficients for the indirect effects of IT capability through customer orientation were .17 ($p < .01$) on market performance, and .09 ($p < .01$) on financial performance. As both paths were statistically significant, Hypothesis 5 was supported.

The results of the study showed that IT capability has an indirect connection to business success by customer orientation and intersects with intra-organisational confidence in forecasting customer orientation of these attributes. The study sought to support the argument that higher IT capability contributes strongly to the broader competitors, and financial performance.

5. Li *et al.* (2006) analyse IT aptitude and its influence on the performance of an organisation and suggested an integrated system that offers latecomers a path to enhance its performance, and efficiency. The study's purpose was to provide a better insight into the interaction between IT capabilities, governance, and competitive edge. They "examined the connections between IT capability, and organisational capability, explored possible relationships between information synergy, innovativeness, and firm performance, developed and presented a framework that shows the dynamics of corporate performance (Figure 2)." Two mediators were implemented to make the relationship between company competence, and accomplishment more feasible, namely knowledge synergy and innovation. Therefore, innovation has been regarded as a factor of pre-performance.

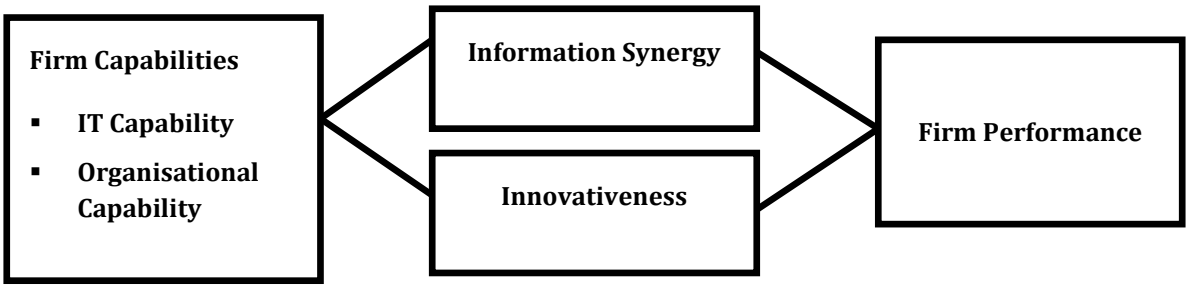

Figure 4: Research Framework (Li *et al.*, 2006)

The scholars have taken the IT capability classification of Tippins and Sohi (2003) after a great deal of research into relevant studies. The IT capability is divided into three dimensions: knowledge of IT technology, the use of IT processes, and capabilities of IT. Therefore, because of Teece *et al.* (1997) and Sambamurthy *et al.* (2003), the organisational capability aspect was adapted. The conceptualised dimensions are process reach, process richness, agility, positional assets, knowledge reach, knowledge richness, and entrepreneurial alertness. Information synergy represents three dimensions: information dissemination, information responsiveness, and shared interpretation. Innovativeness includes five distinct dimensions: product, process, personnel, service, and technology constructed through existing literature together with intangible aspects, such as process, personnel, and services.

Some scholars proposed a complete research structure based on their current literature (Figure 3). Their framework sought to build an interconnected model that openly links IT, and capabilities with the dynamics of organisational performance.

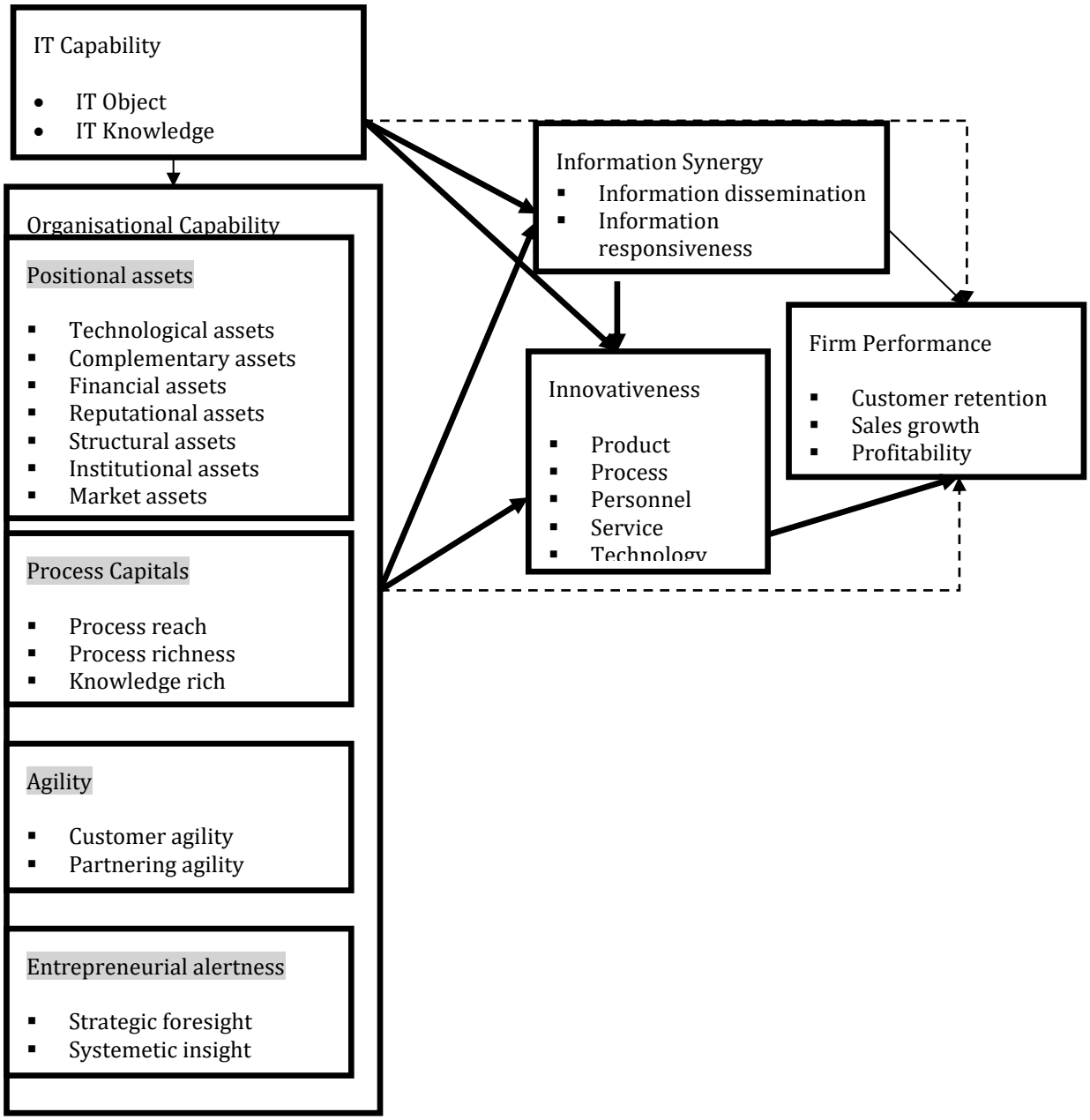

Figure 5: IS capability Framework (Li *et al.*, 2006)

The results of the study have shown no significant direct effect on organisational performance, nor on the IT capability, and organisational capability. The conceptual framework of the study identifies IT, and organisational components, and illustrates how the variables that affect organisational performance interact. As a result, the framework

serves in the industrialised, and non-industrialised contexts in building capability, and accumulating for newcomer enterprises.

2.1.2 IT Capability on Small and Medium Enterprises

This section addresses Information Technology Capabilities on Small and Medium Enterprises (SMEs).

1. Lew sook Ling (2017) steers research in Malaysia. The study intended to examine the influence of IT Capabilities on SMEs, and large enterprises. Addressing this study on SMEs gave the study elements of how to articulate and propose a framework. The study proposed a research framework for SMEs, and huge firm to improve business performance. The objective of the study was to examine the role of IT capabilities for organisational competitive advantage (CA) in a competitive environment. Two questions addressed in the study were, "How do IT capabilities relate to competitive advantage, and how does employee size influence the impact of organisational competitive advantage?".

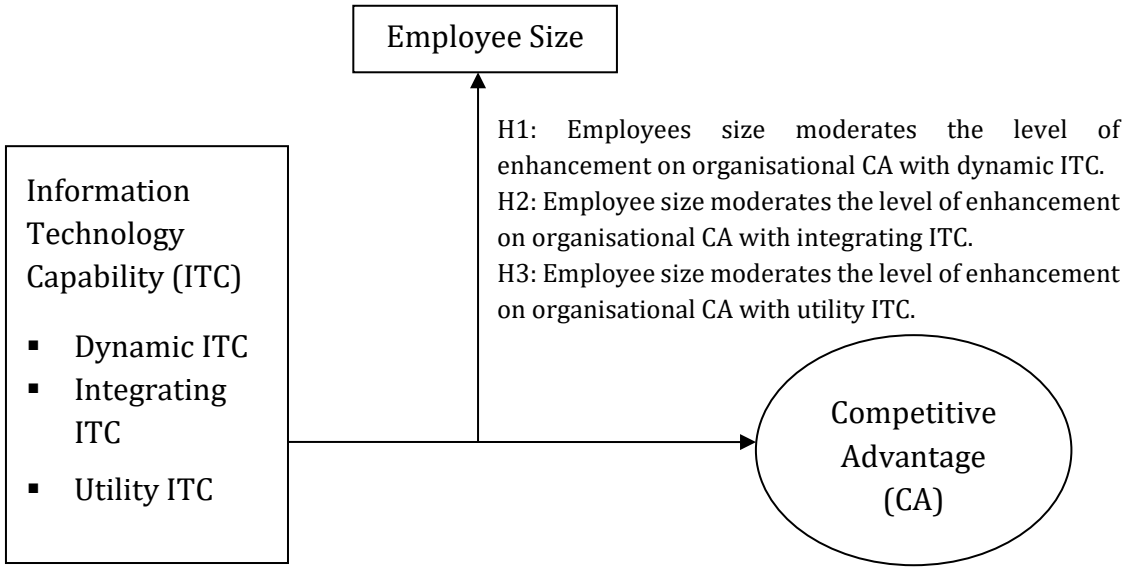

Figure 6: Research model (Lew Sook Ling, 2017)

A quantitative research approach was used in the study. A questionnaire was distributed to 500 local companies in Malaysia. Thus, the study was carried out within local companies in Malaysia. Data were analysed using structural equation

modelling. A five-point Likert scale ranging from one (strongly disagree) to five (strongly agree) was used. Constructs were measured as follows (Table 3):

Table 7: IT Capability, and Organisational Competitive Advantage measures (Lew Sook Ling, 2017).

Information Technology Capability			Organisational Competitive Advantage
Dynamic ITC	Integrating ITC	Utility ITC	
3	3	6	18

About 295 responses were received. Hyphothesis1, Hypothesis2, and Hyphothesis3 were preserved in the SME study while H1 and H2 were supported in the large enterprises' study. The results proved that the dynamic, integrating, and utility capabilities accounted for 60.9% of the variance in the CA in SMEs. The dynamic and integrating capabilities accounted for 67.8% of the variance in the CA of large enterprises. Recommendations made in the study of SMEs to enhance CA is that workflow automation systems can be used to enhance speedy integration capability. Together with corporate portals, it can also be adopted to enhance the integration capability of SMEs by combining data, telecommunication, hardware, and software from different departments' databases.

2.1.3 IT Capability Framework for Financial Service Providers

This section addresses the IT capabilities for digital transformation in South African Financial Service Providers (FSP).

1. Michael *et al.* (2020) study IT capability for digital transformation in South African Financial Services Providers (FSPs). IT capability model and Technological, Organisational, and Environmental (TOE) framework were the underpinned theories used to understand how South African FSPs experience digital transformation. According to Michael *et al.* (2020) digital transformation is a methodical process that is not well understood within the South African FSPs' context. South Africa (SA) is

categorised as a developing country. For that reason, researchers emphasised that what works in other developed countries may not work within the context of SA.

The study followed an interpretive research philosophy to analyse and understand the digital transformation processes in South African FSPs. The study sought to understand the current status quo regarding how FSP in SA conducts digital business from their subjective experiences.

An inductive approach was followed with an idea to attach meanings to elements as brought out during the interviews, and observations as data collection methods. A descriptive qualitative research approach was chosen to explore and describe IT capability, and the digital transformation process. A conceptual research framework was informed by the Digital Orchestra Framework (GCDBM, 2015-2017), Digital Transformation Framework (Matt *et al.*, 2015), Digital Reinvention Framework (Berman *et al.*, 2016), Capabilities Framework for Information Technology (Karimi, Somers, *et al.*, 2007), and the Organisational and Environmental Technology Framework (Depietro, Wiarda, *et al.*, 1990).

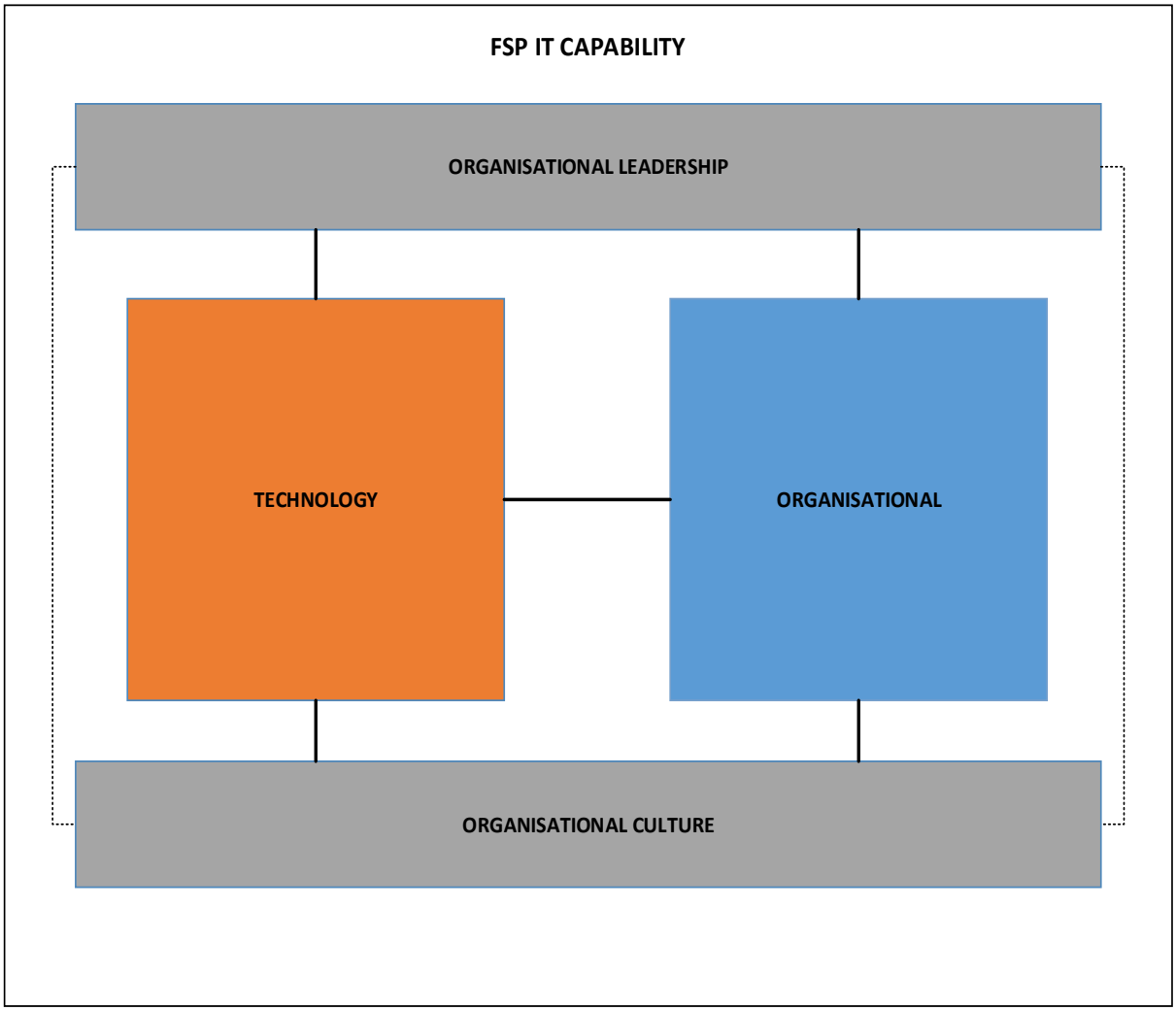

Figure 7: IT Capability framework for Digital Transformation in South African Financial Service Providers (Modiba *et al.*, 2020).

The Modiba *et al*. (2020) study emphasises that one of the first things to change is the culture of micro-managing. It is noted that micro-management is not feasible in the FSPs, merely because work is not where FSP employees are, but work is what FSP employees do. This means that technology should be utilised to allow FSP employees to work from anywhere. In the technological context, the framework stresses that systems should be built in a manner that when one fails, the functionality must be moved to another available system, and customers are less impacted. On the state of digitalisation, the framework posits that FSP must ensure that people have access to user-friendly digital solutions ranging from self-service capabilities to people management solutions enabled through integrated global systems.

The elements of the framework are characterised in Table 8.

Table 8: Elements of Digital Transformation Framework (Modiba *et al.*, 2020).

CRITICAL FACTORS	ELEMENTS
Organisation Leadership	Role of leadership, Client focus, Employee engagement, Employee development, and training/Coaching
Organisational Culture	Micromanaging, Changes from the leadership perspective, Changing mindset, Collaboration opportunity, Alignment to objectives, Autonomy, Information sharing, and Visibility of vision.
Technology	FSP Skills, and Competencies, FSP Measure performance, Digitisation, Banking platforms, Cloud Computing, Artificial intelligence, Design thinking, Data privacy, and security Digital currencies, and blockchain technology, Technical Skills development, Cybersecurity, Technology adoption, Enterprise technology, and System Integration.
Organisational	FSP People, FSP Description, FSP Strategy, FSP Leadership, FSP Structure, FSP Digital transformation, FSP Digitisation Level, FSP Business activities, Value creation model, Partnership, Change Management, Business activities, and outputs, Global disruption, Regulations Financial inclusion, Infrastructure development, Financial Outcome, Impact, FSP Performance indicators (Net promoter score (NPS), and Client satisfaction index (CSI).

The preceding sections looked at previous, and related studies on IT capability. This was intended to inform and give a foundation for the conceptual study outline for the present research in South African mining firms.

2.2 Summary of the Chapter

This chapter surveyed the scholarship by reviewing literature on IT Capability and related studies. The table below summarises the reviewed related studies on IT capability as well as showing knowledge gaps, which the present study sought to bridge.

Table 9: Summary of IT Capability-related studies.

No.	Topic	Authors Year published	Methodology	Main Findings	Knowledge gap
1)	The Role of Innovative Climate in the Relationship between Sustainable IT Capability, and Firm Performance	Erkmen, Günsel and Altındağ, (2020).	Cross-sectional design. A self-reported survey that collected data from top middle-line managers, working in a sample of large-sized companies.operating in the ITC industry in Istanbul, and Ankara, Turkey.	The findings of the study indicated that both managerial, and technical IT capabilities have a substantial effect on the success of quantitative firms. It can be concluded from an RBV that by quantitative efficiency, the human capital, and resources of IT as well as how efficiently IT resources, and technological equipment are handled, have an impact on the observable production of business organisations.	The study was limited to capabilities as technical, managerial, and human-based perspectives following studies by Kim *et al.* (2012), and Garrison *et al.* (2015). The study was conducted in a specific industrial context, the IT sector.
2)	Information technology capability, and firm performance: Role of industry, Infor	Chae, Koh, and Park (2018).	Matched sample comparison. IT leaders in three different industrial settings	The findings were that the impact of IT capability on firm performance varies by industry type.	The role of the industry was contextualised, and limited to three different industrial settings (Transform,

	mation, and Management.		(Transform, Informate, and Automate industries).		Informate, and Automate industries).
3)	Information Technology Capability, and Firm Performance: Contradictory Findings and Their Possible Causes.	Chae, Koh, and Prybutok, (2014).	Matched sample comparison. IT leaders from 1991 – 1994 InformationWeek 500 listing. IT leaders selected from 2001 – 2004 InformationWeek 500.	The study found that IT leaders are not associated with a higher profit ratio. Neither does a relationship between IT capability, and business performance exist.	The study was limited to IT leaders with superior IT capability as a treatment sample. The control sample was composed of the firms matched to the treatment sample based on similar size and industry.
4)	The Complex Contribution of Information Technology Capability to Business Performance.	Nakata, Zhu, and Kraimer (2008).	Sample and data were collected from the Dun and Bradstreet database of Strategic Business Units (SBU), located in the regions of the U.S. Survey identified senior marketing executives in every SBU as primary informants.	The study showed that IT capability has an indirect relationship to business success by customer orientation and intersects with intra-organisational trust in the forecasting of customer orientation.	Limitations are cross-sectional data used, making it difficult to confirm the casual ordering of variables.
5)	A framework for investigating the impact of	Li, Chen, and Huang (2006).	Comparison study.	Results of the study have shown no significant direct effect on	The study was based on the experiences of various researchers from

	IT capability, and organisational capability on firm performance in the late industrialising context.			organisational performance, nor on the IT capability, and organisational capability.	industrialised countries.
6)	Impacts Of Information Technology Capabilities on Small and Medium Enterprises (SMEs), and Large Enterprises. Journal of Innovation Management in Small & Medium Enterprises.	Lew Sook Ling (2017).	A quantitative study was followed to test the study. Tests were conducted using a pilot study, with questionnaires distributed to 500 domestic companies.	The results proved that the dynamic, integration, and utility capabilities account for 60.9% of the variance in the CA of SMEs. The dynamic and integration capabilities account for 67.8% of the variance in the CA of large enterprises.	Conducted the study for SMEs, and large enterprises in the Malaysian context.
7)	IT Capability Framework for Digital Transformation in South African Financial Services Providers.	Modiba, Kekwaletswe and Komane (2020).	A descriptive qualitative, and inductive approach was followed. The population for the case study was the FSPs from South Africa, who are part of the financial banking industry.	Technology should be utilised to allow FSP employees to work anywhere. In the technological context, systems should be built in a manner that when one fails, the functionality must be moved to another available system and customers be less impacted. In the state of Digitalisation, the FSP must ensure that people have access to user-	The focus areas of the study were FSP, and SA context.

				friendly digital solutions ranging from self-service capabilities to people management solutions enabled through integrated global systems.

The next chapter discusses Information Systems (IS) theories underpinning the present study.

CHAPTER THREE

INFORMATION SYSTEMS THEORIES AND THE CONCEPTUAL RESEARCH FRAMEWORK

The previous chapter, chapter 2, reviewed the literature on IT capability and related studies. This chapter discusses information systems theories underpinning the present study and additional theories related to the subject being studied. The information systems theories discussed are 3.1 Upper Echelon Theory, 3.2 Absorptive Capacity Theory, 3.3 Stewardship Theory, 3.4 IT Capability, 3.5 Resource-Based Theory and lastly 3.6 Resource Dependency Theory. A conceptual research framework informed by the underpinning theories is then presented under section 3.8.

To gain a better understanding of a subject, related IS theories are discussed. Theories are the "process of systematically developing, and organising ideas to explain phenomena, and a theory is a set of empirically testable, interconnected ideas formulated to explain those phenomena" (Doherty, *et al.* 1993; White & Klein., 2002). To understand organizations' IS/IT capabilities in various contexts, scholars have developed a diverse range of theories and models. While numerous studies have used the theories to study the elements that might influence and contribute to the effective use of technology in various contexts (Alshammari and Rosli, 2020). The majority of researchers, adopting an appropriate theory or model is a crucial effort. Most research studies either expanded or changed the original theory to explain the idea of the topic they are studying (Gunasinghe et al., 2019). In this thesis theories underpinning the study are discussed and then some elements are constructed for the conceptual framework to develop an IS framework for SA mining firms.

Discussions of the IS theoretical frameworks, which inform the study, are discussed in the preceding section.

3. Discussions of Theories

The section discusses IS theories applicable to the study. The study discussed specific theories only applicable at the organisational level, the study's is a single case study of the mine with multiple case units, and IT capability is a subject. The IS theories at the

organisational level discussed in this chapter are Upper Echelon Theory (UET), Absorptive Capacity Theory (ACT), Stewardship Theory, IT Capability Theory (ITC), Resource-Based Theory (RBT), and Resource Dependence Theory (RDT).

3.1 Upper Echelon Theory (UET)

The UET has extensively received a lot of attention in the IS adoption theory. The theory's theoretical perception is about the executive's experiences, values, personalities, educational qualifications, and their behaviours towards the organisation's outcome (Hambrick & Mason, 1984). Literature on upper echelon theory (UET) explains how top management affects business performance (Kokot *et al*., 2021). The theory is based on two fundamental tenets: (1) "The top management team responds to strategic problems in accordance with their personal interpretations, and (2) Personal interpretations are a result of experience, values, and personalities" (Tipuri, 2020). It is believed that the importance of UET is evident in the 2.304 citations, and seminar article of 354 citations that updated and extended the theory (Web of Science, 2015). Given the large volume, the organisations perceive what their leaders think, feel, perceive, and believe how to engage in any business, strategic, and operational activities (Martin & Matlay, 2003; Simpson & Docherty, 2004; Galloway & Mochrie, 2005).

It is the qualities of a leader to gain outstanding results include attributes such as well-organised, technical skills, professional expertise, and skills to manage the complex situation within the organisation (Mumford *et al.*, 2002). UET offers great predictions of organisational outcomes in direct proportion to how much managerial discretion exists. A lack of discretion will influence strategic characteristics (Hambrick, 2007). This study addresses the characteristics of leadership in the mining firm in addition to a number of the upper echelon theory notions stated above.

Hambrick and Mason (1984) propose the variables of UET as shown (see Figure 8). The theory indicates that organisational outcomes, and processes are a result of the actions of key decision-makers in an organisation that are determined by their perceptions, attitudes, and beliefs.

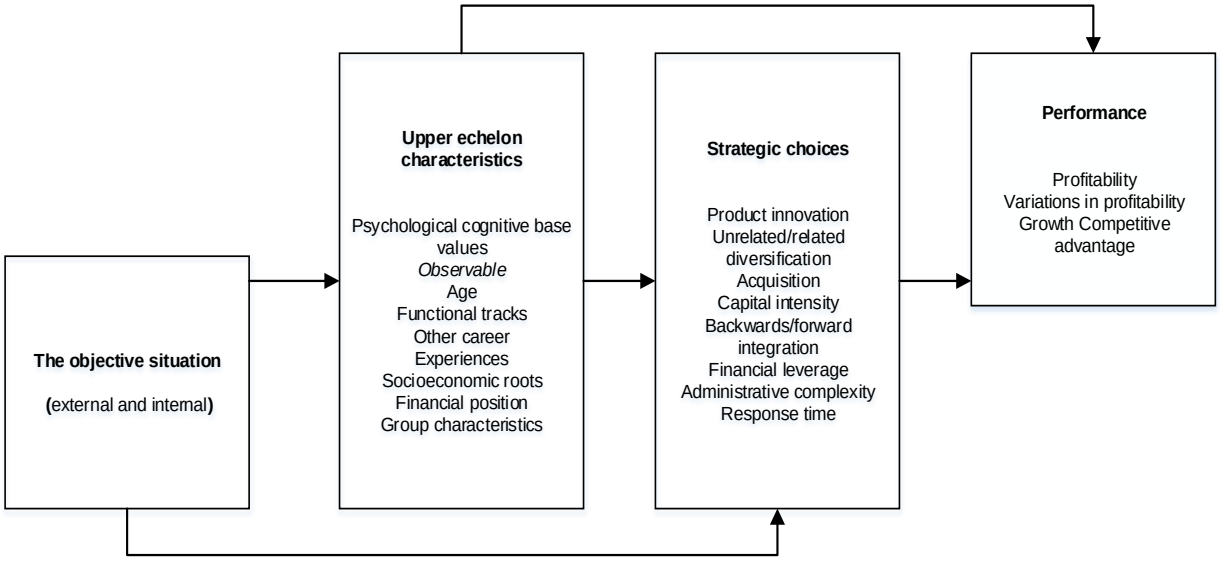

Figure 8: Upper echelon theory (Hambrick & Mason, 1984)

Upper Echelon Theory analysis is fundamentally multi-level, and includes people, individuals, and organisations (Nielsen *et al.* 2014). This thesis tackles the leadership style of the leaders in the mining firm. Characteristics such as education, leaders' skills and how they lead and manage their employees plays a crucial role in the development of IS capability framework. Discussing UET theory, this study would be able to describe how leadership influence information systems capability in a SA mining firms. The Upper Echelon theory was originally used to analyse the effect of senior managers on their organisation in two ways.

Firstly, the theory assesses the characteristics (age, gender, job experience, and education) of leaders (executives and top managers). The populations are analysed to assess whether the organisational efficiency is allowed or hindered. Secondly, they are evaluating the underlying psychological condition of leaders, and whether they contribute to the organisation or not. This theory has several limitations since it was unable to establish a connection between top managers' traits and organizational outcomes (Oppong, 2014). Meanwhile, a new study established the connection that had been absent between the traits of top managers and their organizational success which contradict with most previous studies (Kim, 2021).

3.2 Absorptive Capacity Theory (ACT)

Absorptive Capacity is extensively used in literature. Over 10,000 publication citations were used to construct Absorptive Capacity conceptualised from Lewin *et al.* (2011). While Volberda *et al.* (2010) make the argument that the basis of absorptive capacity remains unclear. Cohen and Levinthal (1990) introduce absorptive capacity in 1990, and its original meaning was “the ability of a firm's employees to develop relevant knowledge bases, recognise valuable external information, make appropriate decisions, and implement effective work processes and structures.” Sambamurphy and Zmud (1999) emphasise that for the organisation to be fully capable of effectively implementing, and sustaining decentralised IT decisions, managers need to have IT-related absorptive capability.

Internal knowledge of a mining firm depends on the organisation’s employees to develop relevant knowledge. Sahra and George (2002) extend the theory and change the original dimensions of knowledge to acquisition, assimilation, transformation, and exploitation. Michael and Ewan (2019) extend the theory and change dimensions from co-creation, testing, metamorphosis, and diffusion. Understanding how and why an organisation has adopted a specific IS capability is important in this study for the reason of advancing knowledge about the effectiveness of governance arrangements to sustain IT capability in a mining organisation.

IT managers who do not appreciate IS, and IT processes are uninformed, and unwilling to promote the importance of deregulation (Brown & Magill, 1998). In the same token, Sambamurphy and Zmud (1999) affirm that the organisation’s capability to effectively implement and sustain decentralised IT decisions is based on the requisite level of IT-related absorptive capacity. Therefore, absorptive capacity is reflected on IT managers' IT management experience for limited IT-related absorptive experiences capability presents outside knowledge. However, this thesis is not about IT-related absorptive capability, this thesis explores and describe the influence of Resource Dependency to develop IS capability framework for the mining firm. For this reason, the study is not underpinned by this theory however the capability to effectively implement and sustain decentralised IT decisions the theory explored.

Several assumptions that are underpinning the absorptive capacity are highlighted (Roberts *et al.*,2012). Failure to explain the meaning, and assumptions of absorption ability can lead to an idiosyncratic, and/or inefficient usage of the construct.

Firstly, absorptive ability is influenced by prior knowledge. The organisation will be unable to accurately evaluate the potential value of further knowledge without any past expertise. Secondly, the institution's absorption strength is defined by the employees' absorption ability. But it is not necessarily the amount of the absorption capacity of its members; rather, it depends on the absorption capacity of its members. Finally, absorption capacity is path dependent. Accumulation of absorption capacity in one period will allow for more efficient accumulation in the next.

It is important to remember the differences between absorption capacity as an asset, and absorption capacity as a capability. Conceptualising the ability to absorb the information of the organisation is identical to applying previous knowledge should not take into account mechanisms by which useful new knowledge is identified, assimilated, transformed, and applied.

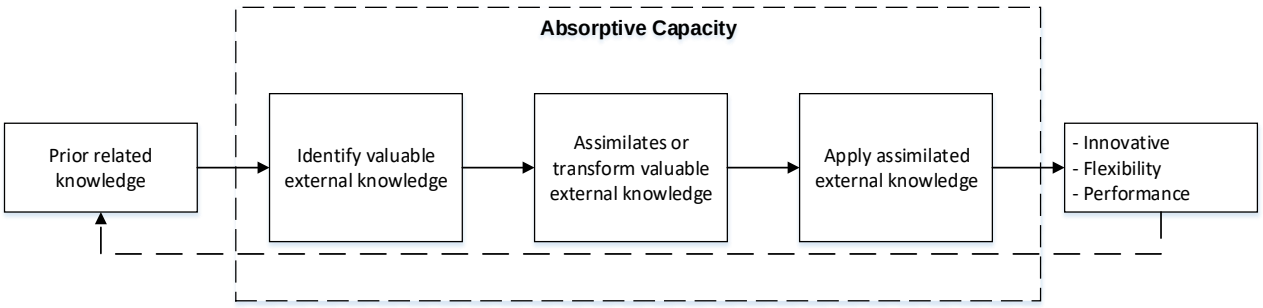

Figure 9: Absorptive Capacity, Prior Related Knowledge, and Outcomes (Roberts *et al.*, 2012)

Absorptive capacity is strongly connected to organisational performance, but this connection is not simple and clear (Lane *et al.* 2006). IS researchers have been exposed to absorption capacity building because of its potential application to many IS research topics, such as IT assimilation, IT market importance, and technology transfer. However, a comprehensive, and holistic analysis of the effect of absorption capacity, and its role in IS research, has not been conducted.

3.3 Stewardship Theory

Scholars that have studied Stewardship Theory have primarily concentrated on distinguishing it from agency idea instead of furthering and developing a grasp of this theory (Morela, 2012). Therefore, the gap in the literature remains. The Stewards are motivated only through making positive decisions that promote organisational goals while assuming that executives will benefit if the firm prospers. At the same time, the theory of stewardship suggests that executives' and managers' key responsibility is to improve firm efficiency (Davis et. al., 1997). Davis *et al.* (1997) focus on differentiating between agency, and stewardship theories by discussing several elements representative of each theory. The theory structured the facilities, and the manager's work in the organisation. Furthermore, the theory states that stewardship theory executives are honest, pro-organisational, and dedicated to a single purpose of profit maximisation. Nwonyuku (2016) mentions one's stewardship theory assumption, which is on the welfares of stakeholders, and the interest of the leadership blended together. His argument on stewardship theory is that it is not the leadership structure that determines the performance of the firm, but the performance of the firm lies in the potential, and attributes of a firm's leadership. They are contradicting mechanisms about this theory.

3.3.1 Stewardship Theory Model

The pillars of the stewardship managerial approach are enabling trust, and stewards functioning as company leadership, and performance enhancement. Morela (2012) explores and constructs the stewardship theory with the aid of a diagram to inform motivating workers to use pro-social strategic decision-making (Figure: 10).

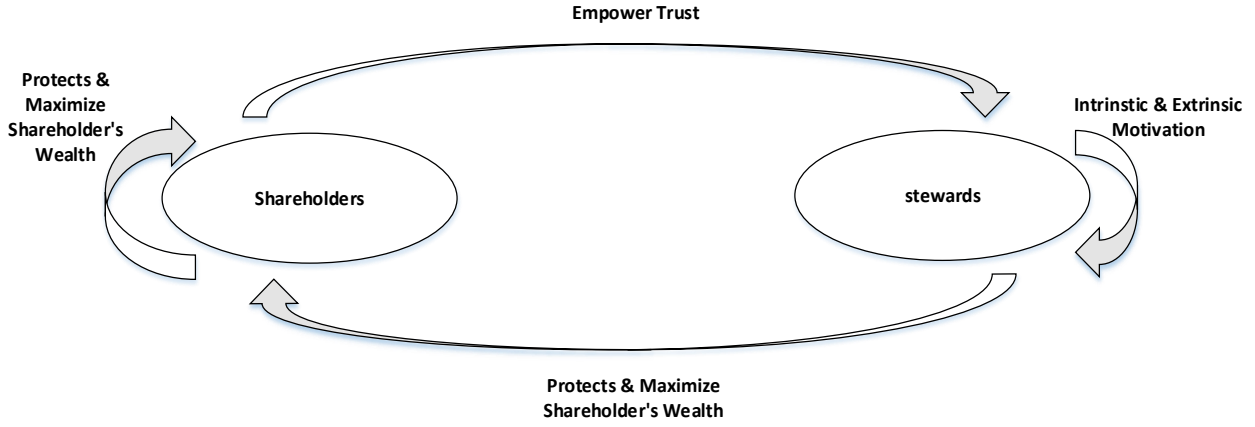

Figure 10: Stewardship Theory Model (Abdullah & Valentine, 2009)

Stewards act as senior executives who are guided only by making the correct choices that promote the firm's principles. There is also a clear expectation that stewards will gain if the company prospers, while executives, and managers will optimise the firm's success. On the other hand, Donaldson and Daivis (1991) argue that the concept of stewardship excludes individualism; only firm executives, and managers perform their positions as stewards by aligning their desires with the corporate objectives. Also, the principle of stewardship recognises the importance of systems that allow firm executives, and directors who are given maximum control to build on trust (Donaldson & Davis, 1991). The theory underlines that management, and directors behave more independently to optimise the profits of the company, and to ensure an optimum return on investment capital from shareholders.

3.4 IT Capability Model

Researchers in the literature of many IS have conceptualised IT capabilities from various perspectives. The IT Capability Model applies to the ability of organisations to understand IT needs (Karimi *et al.*, 2007). The IS community emphasise that greater IT capabilities may not always translate into better performance for a company, however they can act as a catalyst for higher-order organisational capabilities and better business results (Ales *et al*., 2016). The framework provides information technology for better organisational functions, and additional IT-based applications with technologically effective long-term operations, and maintenance. Researchers have researched the IT capabilities from different perspectives, which account for the design, energy interactions, coordination, and conversion of processes (Saeid *et al.* 2011).

The IT capability model consists of various dimensions. Saeid *et al.* (2011) note six other studies that discovered the dimension underlying IT construction capability, which had been examined in literature linked to IT. The six other studies that were found to have dimensions underpinning the potential of the IT model are Sabherwal and Kirs (1994, 1999); Ross, Beath and Goodhue (1996); Feeny and Willcocks (1998 a, b); Bharadwaj *et al.* (1999); Byrd and Turner (2000), and Bharadwaj (2000). They all proposed measurements for the description of IT capabilities. The resulting dimensions that have been collected from both of these studies are (1) IT architecture defined as a high-level

map of the entire organisation's information, and technology needs, consisting of sub-architectures of the system, data, and application, and technology; (2) IT infrastructure defined as the degree to which it is possible to exchange software, and data by way of communication networks, and others acquired for the organisation's use; (3) IT human resource defined as company comprehension, preparation, problem - solving skills, professional knowledge, etc., and (4) IT relationship resources defined as achieving collaboration, teamwork, and negotiating excellence on all sides of the partnership, along with a significant mutual understanding of IT strengths, and market needs.

Saeid *et al.* (2011) discovered a gap after the review of the investigations, and evaluating the literature on this topic. To fill the gap Saeid *et al.* (2011), included the building of IT capabilities in terms of strategic alignment, and IT flexibility. Mensah (1989), defined IT flexibility as the “ability to respond, and adapt to changing business conditions both within and outside the organisation." The strategic workforce of IT and IS has become crucial for any enterprise, as this enables companies to transform the fundamental structure of their industries. Their effective and measurable effect involves the integration of IS/IT strategies with corporate strategies, business plans, and continuous delivery to enhance competition and maximise efficiency. Strategic alignment is important to ensure sustained productivity benefits every sector. The practical and effective application of IT is well embodied in the principle of strategic alignment. A variety of meanings of this term have been set out by academics, such as Reich and Benbasat (2000), who describe strategic coordination as the “extent to which the IT mission, objectives, and plans support the business mission, objectives, and plans."

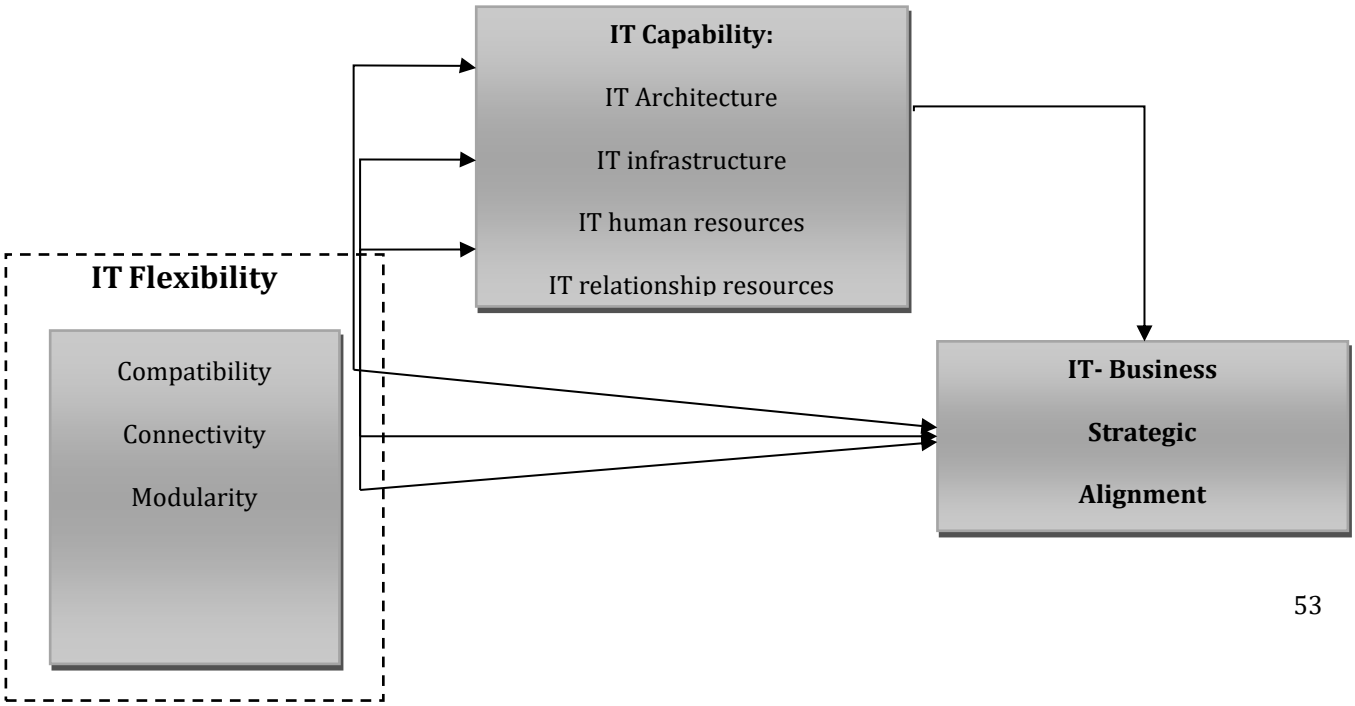

Figure 11: IT Capability Model (Saeid *et al.*, 2011)

Saeid *et al.*, (2011) report that IT flexibility elements have a significant impact on IT capability, and, in the same instance, IT capability has a major impact on strategic alignment. The drivers that allow organisations to maintain strategic alignment are very significant. Based on studies and analysis (Tallon, 2009; Ness, 2005), it can be stated that several aspects influence strategic alignment.

3.5 Resource-Based Theory (RBT)

According to the RBT, the strengths and disadvantages of the organisation are depending on the resources (Barney, 1991). Furthermore, resources can aid to a maintainable modest gain if they are useful, unique, inimitable, and non-replaceable. The company's ability to allocate resources is much more important than its resources (Amit & Schoemaker, 1993). Resource-based philosophy focuses on understanding the strategic management of organisations. The theory has been given substantial coverage in the literature on strategic management. Resource-based theory is rooted in economic theory (Penrose, 1959), and Strategy theory (Selznick, 1957; Ansoff, 1965).

The theory has expanded its use in research on information systems since it offers a systematic framework for studying how information systems contribute to the policy, and success of organisations. It is a promising theory, and it has implemented a systemic approach to studying IT capital at the corporate level, and strategic importance (Wade & Hulland, 2004). The RBV claims that success differs across organisations due to organisational differences such as strategic climate, policy, mission difficulty, and management style (Lawson & Samson, 2001), and there is ample certainty to assess the importance, inimitability, and non-substitutability of organisational capital, and their ability to determine the value, inimitability, and non-substitutability of organisation resources, and its capabilities.

The theory argues that the varying success of organisations is due to the mixed pool of resources or portfolios that are vital to the execution of the strategy (Penrose, 1959), and that the mixed pool of resources is seen as a possible competitive advantage (Barney, 1991; Miller & Shamsie, 1996). Prahalad and Hamel (1990) state that companies should not fight for new products, but for the opportunity to produce new products. Moliterno and

Wiersema (2005) share this opinion that companies aim to obtain or grow resources as a necessity to obtain the resources required to execute their plans or build long-term competitive advantage. The incentive to make improvements to the mixed assets or portfolio package is a corporate calculation if the existing asset targets are unachieved.

Research has suggested the tools and description of the theory. Resources are identified as human resources, technical resources, operational resources, organisational measures, and many other characteristics of the organisation. However, the resource-based theory does not consider all resources held by an organisation, but focuses exclusively on key resources (Rangone, 1999).

3.6 Resource Dependence Theory (RDT)

The fundamental element of resource dependence theory is that the demand for resources of a firm generates ways for others to take the influence of it (Frooman, 1999). However, RDT proceeds from entities that are incapable internally to produce all the support needed to sustain themselves, and then the entity relies on one another for their existence (Katz & Kahn, 1978). Then, the entity enters into a contractual relationship with external factors capable of supplying the necessary resources and services (Aldrich & Pfeffer, 1978).

RDT received extensive attention in the literature on strategic management and organisational theory. Basic principles of the Resource Dependence Theory it is its dependence on "critical" and essential resources affects the behaviour of organisations, and that organisational decisions, and actions can be clarified by the real condition of dependency (Werner, 2008). The term "dependence" is characterised as a condition in which one actor relies on the behaviour of another to obtain specific outcomes (Pfeffer, 1982).

Pfeffer (1987) presents the fundamental case for resource dependency, and outlines inter-organisational relations are as follows:

1) Organisations are the basic units for understanding intercorporate partnerships, and social systems.

2) these institutions are not independent but are governed by a network of interdependencies with other organisations.

3) interdependence, combined with confusion as to whether the behaviour of those with which the organisations are interdependent would lead to a situation in which survival, and ongoing growth are unclear.

4) organisations take steps to control external interdependencies, but such efforts are invariably never fully successful, and produce new mechanisms of dependency, and interdependence; and

5) these patterns of dependency produce inter-organisational as well as intra-organisational influence where such influence has some effect on organisational behaviour.

The authors also measured the formal five steps that organisations should take to reduce environmental dependence: (a) Mergers/Vertical integration (chapter 6), (b) Joint Ventures (JVs), and other inter-organisational partnerships (chapter 7), (c) Boards of Directors (chapter 7), (d) Political Action (chapter 8), and (e) Executive Succession (chapter 9) (Hillman *et al.* 2009).

RDT provides an externally based insight into which companies are purchasing other companies (Haleblian, Devers, McNamara, Carpenter & Davison, 2009). More precisely, Pfeffer (1976: 39) suggests three reasons why organisations can participate in M&As: "First, to reduce rivalry by absorbing an essential competitor organisation; second, to manage the interdependence of either input sources or output buyers by absorbing them; and third, to diversify operations and thereby to reduce reliance on the current organisations with which they are engaged. Walter and Barney (1990) note that one of Mergers/Vertical integration's (M&A) management priorities is to minimise company reliance on other companies in their climate. Finally, the Pfeffer (1972a) analysis shows that M&As are mostly used to eliminate direct competition.

In summary, there is broad support for mergers between companies that rely on one another like buyers/suppliers and competitors as a way to minimise dependency. Also, the degree of dependence predicts the probability of M&As. The study also suggests that this notion is an insightful, yet incomplete view of M&As. There are other significant determinants of M&As, which merit observations from other theoretical perspectives. This also provides prospects for more refinement of RDT, as exemplified by recent attempts to

distinguish between power inequality, and reciprocal dependency. Early research by Pfeffer and Nowak (1976) confirms RDT's request for JVs to find that JVs are typically established between interdependent firms. Empirical research further confirms the use of inter-organisational partnerships to mitigate domestic, and international environmental complexity and raise capital (Elg, 2000; Goes & Park, 1997; Stearns, Hoffman & Heide, 1987). Pfeffer (1972b) argues that boards permit companies to reduce dependency or gain capital. Pfeffer (1972b) finds that the composition of the board is related to the organisational needs of the firm, and that those of greater interdependence need a higher proportion of outside directors. It concludes that "board size, and structure are not spontaneous or isolated variables, but logical organisational reactions to external environment circumstances". Pfeffer (1973) supports this claim in a replication analysis. Pfeffer and Salancik (1978) propose that directors add four advantages to organisations: (a) intelligence in the form of consultants, and consultation; (b) access to information networks between companies, and environmental contingencies; (c) privileged access to resources, and (d) credibility. Again, good support exists for the claims of Pfeffer and Salancik (1978) that boards should handle environmental dependency and should represent environmental needs.

Pfeffer (1972b) argues that boards help companies to reduce dependency or gain capital. Important scientific data confirms the proposed advantages, both in general, and in particular. Pfeffer and Salancik (1978: 189, 190) state that, through political mechanisms, the company aims to create an area for itself that is best for its needs, and that companies may use political means to modify the situation of the external economic system.

In doing so, the corporations actively attempt to "build" their climate by attempting to form state laws to build a more desirable environment. Executive Succession is a theme in which Pfeffer and Salancik (1978: 248) address as an organisation's internally oriented approach to environmental instability, and dependency. They also gave the following model of effects:

(1) the external backdrop, with its contingencies, complexities, and interdependencies, has an effect on the distribution of power, and control within the enterprise; (2) the distribution of power, and control within the enterprise affects the tenure, and appointment of key corporate managers; (3) organisational practices, and structures are the product of actions that are affected by the allocation of power, and authority; and (4) certain practices, and

subsequent structures are affected by managers who authorise organisational operations (Pfeffer & Salancik, 1978: 228).

The core thesis of the theory of resource dependency is to explain the actions of organisations in their environment. While most theories concentrate on internal resource utilisation methods, RDT concerns resource procurement. The shortage of vital production capital has been seen as a crucial goal. A single resource may be a small portion of the overall need, but it is an integral component. RDT promotes the theory that organisational activity is directly affected by the environment, but RDT accepts the relationship between the organisation, and the environment.

The principle of resource dependency is illustrated in a diagram (Figure 12), adapted by Nienhuser from Pfeffer and Salancik (2003). RDT offers a kind of framework, but it does not indicate explanatory solutions. Pfeffer and Salancik (2003), did not propose a model of theoretically interconnected ideas, but introduced their framework as an easy theory.

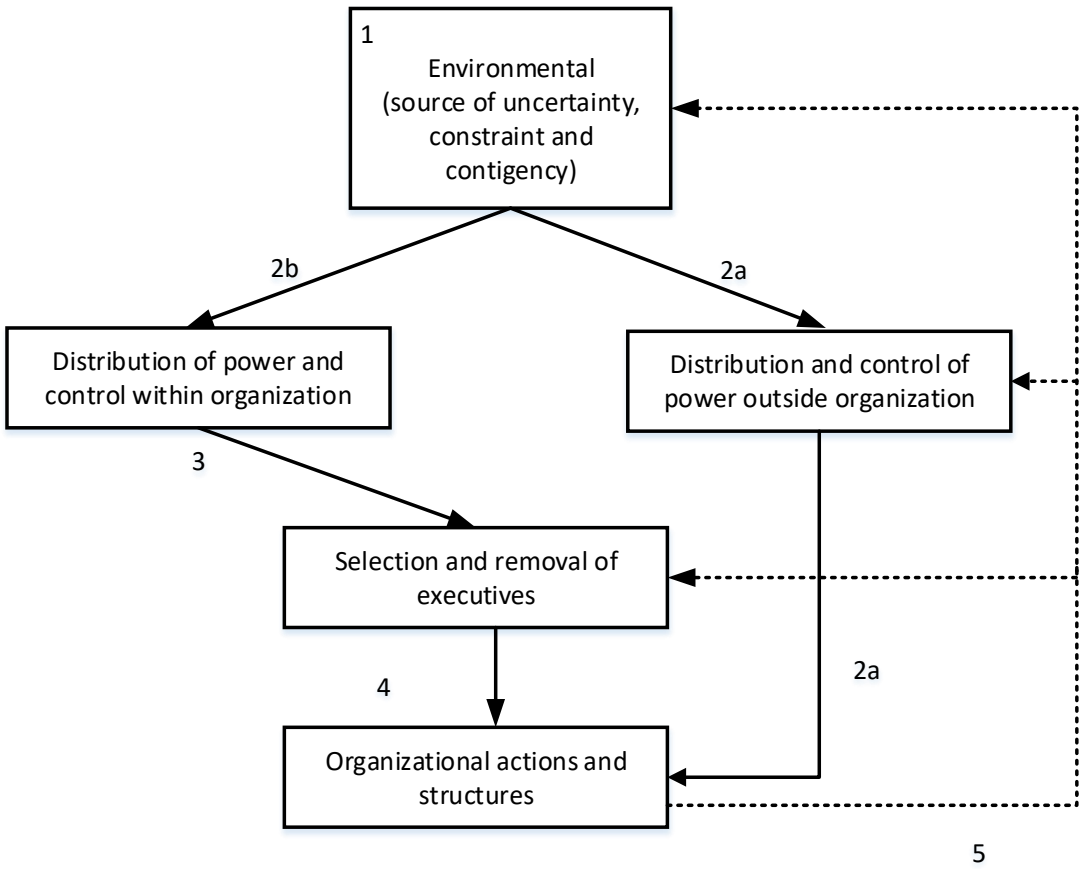

Figure 12: The Connection between Environment, and Organisational, and Organisational decisions or action (Pfeffer and Salancik, 2003: 229 by Nienhuser, 2008:11)

The key concept of resource dependency theory is the interpretation of organisational actions in the environment. Pfeffer and Salancik (2003:3) explain the environment as a source of uncertainty, and constraint. RDT highlights that the environment is made up of the institution's critical assets. To be able to understand organisational behaviour, one must, first of all, explain which resources are important. Pfeffer and Salancik (2003: 46) explain critical resources as the capability of the organisation to continue to work in the absence of resources. Furthermore, the criticality of the resources is that the resources have the potential to place the enterprise at risk of not working based on its absence. The shortage of vital production resources is seen as a crucial goal. In the allocation of limited resources in the system, there is a complexity that cannot be predicted precisely (Pfeffer & Salancik, 2003). Organisations aim to minimise their demands, obtain new suppliers of resources, or maintain leverage over those resources to reduce their dependency. In the organisation, resource allocation must be subjectively understood, and interpreted by managers. The theory of RDT was extended by Pfeffer and Salancik to the interaction with both the external, and internal environment. The theory implies that the organisation strives to reduce uncertainty. 2a) explains the external transfer of power, and the management of relationships between dependencies.

RDT assumed that the power of someone who owns resources is over those who use those resources. The higher the dependence of actor A upon actor B, the greater the control of actor B over A. There is relative power among the players who manage the vital services required by other organisations. 2b) applies to the distribution of power internally. It is believed that an actor who wishes to minimise their dependency must decrease their need for resources managed by the other actor to increase their influence over others. The organisation is not only influenced by external influences, but also by critical resources from internal players within the organisation, such as individuals or units. 3) illustrates the relationship between the organisational distribution of power, and control. The phase is that of the executive post. Authority may be used to control the selection of top managerial staff. 4 and 2b) explain the relationship between the structure of management, power distribution, and decisions or organisational structures. The priority of strong decision-

makers is believed to be more likely than other desires to be realised. The decision leads to behaviour and organisational structure that is necessary to interest the dominant coalitions in control, and therefore inefficiency. Actions fulfil the expectations of key resource providers, thereby contribute to supplying essential services to the business, and maintaining the organisation's sustainability. 5) demonstrates the feedback results. According to Pfeffer and Salancik's (2003) argument, organisational decisions, and behaviour have a feedback impact on both the resource situation, and the powerful group's demands. If they succeed in detaching themselves from the environment, and both external, and internal actors, stakeholders within organisations will protect their control. This could result in the organisation's downfall if it can no longer protect vital resources.

In conclusion, from the viewpoint of power-sharing of organisational resources, RDT complements the theory of political economics. RDT points out that companies have options to preserve their capital through the adaptation of strategic choices, such as collaboration, joint ventures, partnerships, and so forth. based on dependence-exchange. Then, to navigate a fluctuating environment, active decision actions should be understood by organisations. Finally, RDT offers a comprehensive explanation of inter-organisational interactions, and provides a valuable framework for identifying, and strengthening the environmental sharing of resources.

3.7 Theories Underpinning the Study

The theories underpinning the present study are UET, IT Capability Model, and Resource Dependency Theory. There is a need to understand how the underpinning theory UET complement the roles of the management in the mine. The understanding of mining firms' leaders' behaviour, and how they can influence IT Capability in the mining context remains unexplored. The Upper Echelon Theory might offer explanations for mining firm leaders' behaviour. The attributes of decision-makers can be understood through the upper echelon theory, while the organisation's IT capability can be best understood through the IT Capability Model. RDT offers a lens to understand resource dependencies. Triangulation of these three theories inform the conceptual research framework.

3.8 Conceptual Research Framework

A conceptual research framework is used either to test empirical data, to observe a phenomenon, or to systematically explain a scientific theory. The development of ideas formulates a conceptual research framework. Walls *et al.* (1992:36) define the design of model as “a prescriptive theory based on theoretical underpinnings which says how a design process can be carried out in a way which is both effective, and feasible.” While De Moor (2005:1) define the design of theory as prescriptive theory guided by theoretical underpinning theories. As stated, the study aims to conceptualise an IS capability framework for SA mine.

Theories underpinning the study are used to conceptualise a research framework for the study (Figure 13).

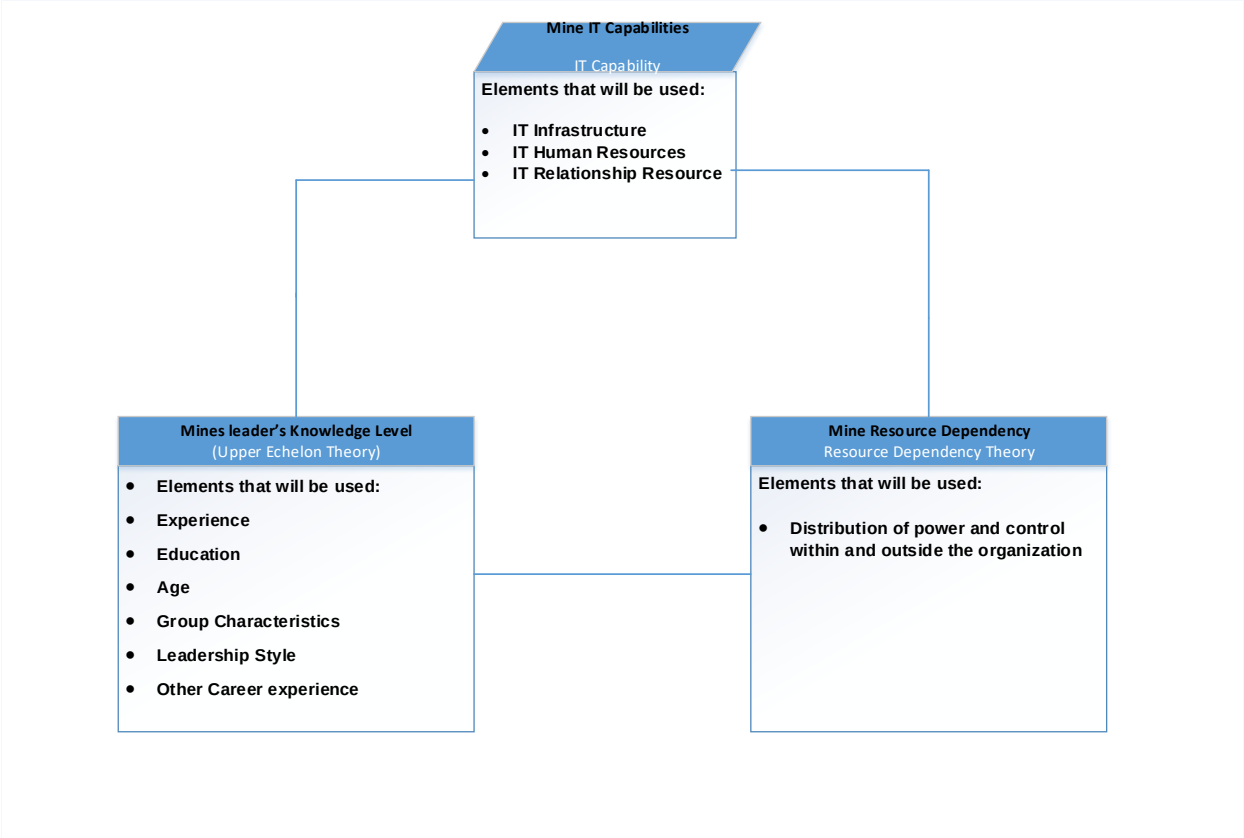

Figure 13: Conceptual Research Framework

Business sectors may follow different business processes within the context of the organisation’s own goal and objectives. The conceptual research framework, above,

guides the present study by providing the processes and elements (themes) that influence information systems capability. These are discussed as follows:

3.8.1 Resource Dependency in Mining Firms

Any organisation needs to identify which resources are important for the organisation. The criticality of the resources is that they have the potential to place the organisation at risk of not working based on its absence. The shortage of vital production resources is being seen as a crucial goal.

This study looks at the organisation's resource dependence and constructs critical resources. The critical resources that could place an organisation at risk may therefore have the opportunity to retain its capital by adapting strategic choices, such as collaboration, joint ventures, partnerships, and so on based on the dependency-exchange. Then, to navigate a fluctuating environment, active decision actions should be understood by organisations. This will also offer a comprehensive explanation of inter-organisational interactions, and provide a valuable framework for identifying, and strengthening the environmental sharing of resources.

3.8.2 IT leadership (UET) in Mining firms

In this study, the role of the mining firms' leader's knowledge level is important to conceptualise the mine information systems capability framework. UET theory was chosen because it includes characteristics of a mine leader that is appropriate for the study. The mine leader's goals are of significant value because leaders work in the best interests of the organisations. The study intends to use UET demographics to understand leaders in the mine organisation's behaviour influence towards IT capability knowledge possessed by departmental managers, and their will to accept IT decision-making responsibilities for future benefits of the mine. The Upper Echelon Theory might offer explanations for the manager 's behaviour as the mine business unit leaders act in the best interest of the organisation to determine if the process is interoperable, and aligned to the information technology governance.

Mining organisations operate, and manage their business in their market sector, abiding by government policy, and regulations. The Mines context signifies the space in which a

company operates. Law abides South African mines to have an Environmental Management Plan (EMP) that contains the steps that can be taken throughout the life of the mine operations (Fourie & Brent, 2006:1085). The Mines leader's Knowledge Level will look at the mine leaders' career experience, age, leadership style, education, and other characteristics. Leaders of the mines may influence major structural changes in an organisation. Changes may include sending communication and creating change management within an organisation's structure.

3.8.3 Mining Firm IT Capabilities (IT Capability Model)

Many industrial, financial, and governmental organisations have become dependent on IT systems. Studies have found that IT plays a part in the success of the strategic goals, and objectives of an organisation. Technology's rapid evolution is a trend that constantly concerns companies, and IT management. As a result, it is critical to strike a balance between personal, and professional use of technology. Therefore, the IT Capability Model selected for this study applies to the organisations' abilities to understand their IT needs.

This study adopted the three dimensions from the IT Capability model by Saeid *et al.* (2011). The dimensions adopted are the IT infrastructure, IT Human Resources, and IT Relationship Resource. The IT infrastructure is adopted for the study for the reason that the study will look at applications resource's usage for the mine while with IT human resources, the study will look at the understanding of the business operation, issues encountered, and technical capability skills in-house. Then, IT relationship resources will significantly assist in terms of aligning the public information regarding the abilities of IT, and the requirements of the corporates.

3.9 Summary of the Chapter

This chapter discussed IS theories related to the study and formulated a conceptual framework by making use of the underpinning theories presented last. The theories discussed gave lenses to the development of the conceptual idea. Theories underpinning the study will be used to explain, predict, and in some instances, extend current understanding within the critical boundaries. In any field of study, the eventual aim is the desire to increase understanding of the subject matter. The theories underpinned the study, guide the study to explore, and add to the body of information on the topic.

The next chapter discusses the research methodology which aims to reveal the processes, or methods used to describe, collect, analyse, and interpret the study data.

CHAPTER FOUR

RESEARCH METHODOLOGY

Chapter three discussed IS theories. Upper Echelon Theory, Absorptive Capacity Theory, Resource Dependence Theory, Resource-Based Theory, Absorptive Capacity Theory, and Stewardship Theory were the theories discussed. By making use of the theories underpinning the study, a conceptual research framework was formulated.

In any field of study, the eventual aim is the desire to increase understanding of the subject matter. This chapter aims to discuss the processes and methods used to describe, collect, analyse, and interpret study data. The layout of the chapter starts with a discussion of the 4.1 research process, and then the 4.2 ontology, and 4.3 epistemology of the research are discussed followed by the 4.4 research approach, 4.6 research paradigm, 4.7 research strategy, and the 4.8 research design. These are the main sections discussed in this chapter.

4.1 Research Process

The research process describes the method, which the study gathers data to address research questions. To recap, the primary research question that drove the study was, '*How should South African mining firms improve and optimise information systems capability?'*

The research process onion offers a step-by-step roadmap to the implementation of the study, rationale, and a justifiable research methodology (Saunders *et al.*, 2019). This study followed the research onion in describing the research methodology followed. The method used to collect the data and data analysis addressed all the branches of the figure 14.

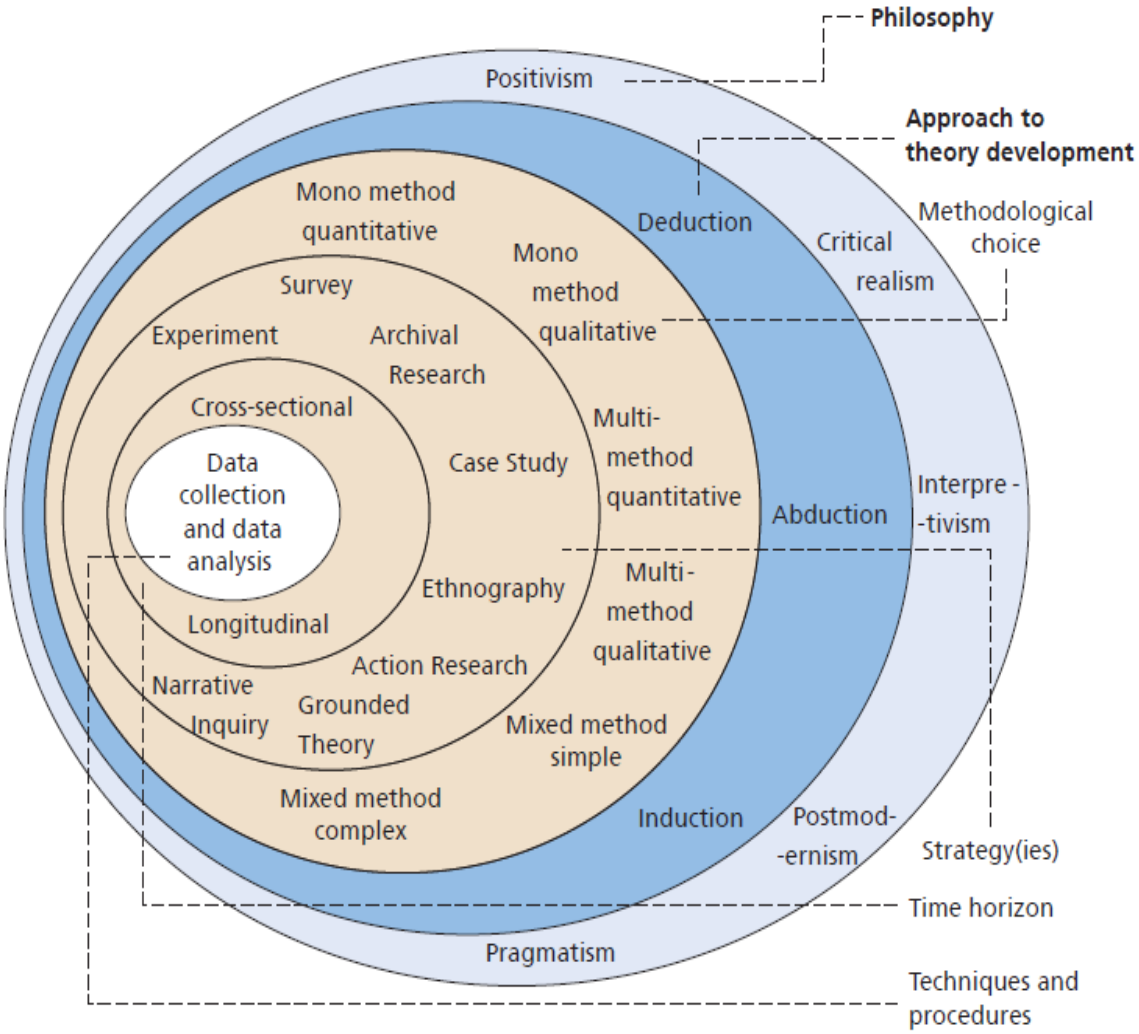

Figure 14: The 'research onion' (Saunder *et al.* 2018)

This figure is used to explain the problems that underlie the choice of methods for gathering data and analysing processes. By following the research onion, the following section unpack the "how" data was collected and the method underpinning the study.

4.2 Ontology

The concept of ontology answers questions, such as "what is a reality" (Denzin & Lincoin, 2005). Bottomley (2008:385) refers to ontology as a "study of being or of what there is." In overall, Ontology poses and attempts to address two important questions; 1. What are the world's categories, and 2. what are the rules that govern them? (Grossmann, 2019). Bullock and Tromley (1999:609) state ontology as primary elements that articulate the things about a particular population in an organisation. The study supports the statements

about ontology assumptions, how the mining world is, and what things exist. This study takes interpretivism assumptions based on people's subjective evaluations, experiences, and social realities that are unique in the mining context. This method is chosen because it enables the study to address issues that influences, impacts, on factors affecting IT capability in the mines.

4.3 Epistemology

Epistemology is defined as the study of knowledge that provides an answer to questions such as “how can I know reality” (Naturalist Epistemology, 2017). The Oxford University Press (2006:584) dictionary defines “epistemology as the theory of knowledge, especially with regards to its methods, validity, scope, and distinction between justified beliefs, and opinion.” This research adopts interpretivism epistemology based on research intentions to interpret and acquire new knowledge of understanding IS capability in the mine. The purpose of the study was to explore and describe interpretivism capability in the South African mining firm. How can we know the IS reality that exist within the mining firm and how can South African mining firms improve information systems capability, the study addressed such questions. In addressing such questions, the intended goal of the study was to conceptualise an IS capability framework for the mining firms improve and optimise their information systems capability. Therefore, interpretivism epistemology was deemed adequate for the study. People's subjective experiences may be used to acquire new knowledge of understanding IS capabilities in the mine via direct engagement with the participants. Thus, the data may be interpreted. The interpretation of the data will result in knowing reality of IS Capability in the mine.

4.4 Research Approach

There are two popular types of research approaches in information systems studies, namely he inductive qualitative and the deductive quantitative approaches. According to semi-systematic and integrative methods, each style of approach may be highly successful depending on the goal and the application in practice (Snyder, 2019). The gold standard for reviews, systematic reviews were first created in the field of medicine as a technique to summarize study results in a methodical, transparent, and repeatable manner (Davis *et al*., 2014). Although the systematic review approach was originated in the field of medicine,

efforts have been made to build standards for the social sciences (Davis *et al*., 2014; Palmatier *et al*., 2018). A systematic review's goal is to find all empirical data that satisfies the inclusion criteria and addresses a specific research issue or hypothesis (Snyder, 2019).

The approach best suited for a study is chosen to align with the aim and objectives of the study. The aim of the study can be either to develop a theory in a qualitative study or test a theory in a quantitative study (Marshal, 1996). Where the objectives are quantitative and intends to establish relationships amongst variables that can be measured numerically, hypotheses are stated to assist in test the theories and the approach used is deductive (Saunders *et al.*, 2009). On the other hand, where data collected is in words using interviews guides/schedules, observations, and documentation, then the approach is inductive (Saunders *et al.*, 2007).

The research approach also relates to the nature of the scientific method used. No specific method or practice can be privileged over the other. The aim of the study and objectives of the study are the ones that direct the methodology the study can follow. In addition, the research problem, experiences of the researcher, and the target audience intended for the study determine the suitable research methodology (Creswell 2003). The study by Denzin and Lincoln (2008) defined qualitative study as studies of things in a natural manner in an attempt to make sense of the way people bring meaning to them. They differentiate qualitative from quantitative study by expressing how quantitative research involves quantitative measurements or statistics approaches while qualitative studies produce findings not arrived at by the statistical procedure. The present study did not intended to produce any statistical data, and for that reason, the quantitative method does not apply in this study.

In this present study, the approach used was qualitative and inductive. Merriam (2009: 13) states that the use of qualitative research describes and explain how people make sense of the world around them as well as their experiences. Miles and Huberman (1994) state that the qualitative research method mostly works with a small sample of people to obtained in-depth information with regard to a particular phenomenon. In qualitative studies, the researcher in immerse in the study and the sampling techniques is usually non-probability, purposive rather than probability random sampling process. Furthermore, the chosen approach for this study is qualitative as it supports, and resembles the study by its purpose of describing, and understanding the phenomena from the participant's point

of view. The study was close involvement with participants from various business unit in the mine. Small sample of participants from all various business units were chosen based on their participants experiences. Small sample included head of department, seniors, and junior members.

4.4.1 Inductive Reasoning

For this study, the approach chosen is the inductive approach. Inductive is chosen for the purpose of developing a theory. The inductive method goes hand in hand with the qualitative method. This study aims to conceptualise an information systems capability framework by gathering data from the interviewer's point of view. The gaol of the study is to conceptualise a framework for the mine and inductive approaches gives the researcher to collect empirical data, look for patterns in that data, and then theorize about those patterns.

4.4.2 Deductive Reasoning

Deductive methods are concerned with quantitative methods. Quantitative methods use mathematical models, statistics tables, and graphs (Denzin & Lincoln, 2008). For that reason, the approach does not apply to the study.

4.5 Research Philosophy

The research philosophy describes a system of principles, and hypotheses about knowledge development (Saunders *et al.*, 2018). Oates (2006) classify the philosophical perspective of the research as either (1) Positivism, (2) Interpretivism, and (3) Critical Theory. Orlikowski and Baroudi (1991) confirm that a "paradigm is a theory that stipulates an overall set of theoretical assumptions considering three common research Paradigms; Positivist, Interpretivist and Critical." According to Myers (1997), the two commonly used philosophies in information systems research are positivist and interpretive.

Kim (2003) states that positivism seeks to solve major research problems through statistical analysis. While Horkheimer (1982) argued that positivism has failed systematically to "appreciate the degree to which the alleged social details it yielded did

not exist out there, in the objective world, but were themselves a product of socially, and historically mediated human consciousness."

The interpretive philosophy used qualitative methods such as interviewing or observing participants to understand the work through the experiences of an individual (Kaplan & Maxwell, 1994). Washam (1993) claims that interpretive research studies attempt to understand phenomena through the meaning that people bring to them. Interpretivism paradigm aims at working together with participants to make sense of and draw meaning (Kaplan & Maxwell, 1994).

Plark (2005) asserts, "Critical social research is not a single paradigm, but rather a collection of alternative paradigms including feminism, neo-marxism, materialism, social theorists, sociolinguists, participatory inquiry, racialised discourses, cultural studies, and queer theory." This paradigm supports the mixed method depending on the strategy chosen for the study.

This study distinguishes the difference between the three paradigms in Table 11. The first column is a type of philosophy. The second column explains the meaning of philosophy. The third column highlights the research methods that support the chosen paradigm. The fourth column is data collection specified for the chosen research methods. The last column is the data analysis. The present study applied the interpretive paradigm. The chosen paradigm complements the qualitative research method the study followed, and it is why it chosen is explained.

Table 10: Three types of Research Paradigm (Chasauke, 2014).

Research Philosophy	Explanation	Research Method (Oates,2006)	Data Collection Technique	Data Analysis Methods

1.	**Positivism**	Scientific method' or science research (Mackenzie & Knipe, 2006).	Experiments survey	Predominantly use quantitative	Regression analysis, and structured equation modelling.
2.	**Interpretivism**	Involves social construction of reality	Ethnography Case studies Action research	Interviews Observation Document analysis Field Notes	Grounded theory Expansion analysis Thematic analysis Discourse analysis Content analysis
3.	**Critical Theory**	Critical social research in IS, and computing is concerned with identifying power relations, conflicts, and contradictions, and empowering people to eliminate them as sources of alienation, and domination". (Oates, 2006)	Ethnography Case studies Action research Design and creation	Focus groups Interviews Observation	Depending on the research strategy used. The research paradigm can employ both qualitative and quantitative data analysis methods.

4.6 Chosen Research Paradigm

The present study followed the interpretive paradigm. Davidson (2006), "Interpretive approach produces a theoretically informed interpretation of the research context." The chosen paradigm complements the inductive qualitative research method the study

followed. Further, the paradigm complements the study because it is a method that seeks to collect and analyse data from parts of occurrences. Denzin (2010: 271) states the paradigm is in-depth understanding. Furthermore, Denzin (2010) states that the use of several validations, not single validity, and a commitment to dialogue is sought in an interpretive study. According to Klein and Myers (1999), interpretive research is accountable for the study based on close involvement with people. The study aims to closely involve personnel within the mining sector.

4.7 Research Strategy

Case studies formulate an important culture and context (Silverman, 2013). Common research case studies from social science are an exploratory case study, a causal case study, and a descriptive case study (Yin, 2003). The difference between the 3 case studies is distinct from Yin's (2003) explanation. An exploratory case study occurs before specific research questions are formulated while a casual case study looks for the cause-and-effect relationship while explaining theories of the phenomenon. Lastly, a descriptive case study is where theory is required to guide the collection of data, and analysis. Three different case study types are distinguished in Table 11.

Table 11: Common case study research

Case Study type	Explanation
Exploratory Case Study	The knowledge emerges before the hypotheses or relevant analysis questions are developed. In this sort of case study, the critical, and first stage is to underline the problems to be researched.
Causal Case Study	The guiding theory for the causal case study is to search for the relationship between cause and effect and explain the descriptions of the phenomena. This is primarily related to positivist research.
Descriptive Case Study	The theory is required to lead the data collection, and interpretation for the descriptive case study. The ideas

	should be explored, and a conceptual aspect is used to conceptualise a paradigm for conceptual analysis.

The present study was a case study with multiple case units to explore and describe IS capability in a real-life situation. Each business unit of the mining firm is treated as a case unit. Under the case study research strategy, the real-life context, including the mining firm environment and its external dependencies give a profound and in-depth description of IS capability.

4.8 Research Design

4.8.1 Unit of Analysis

The research unit may be the study of an activity such as a decision-making process activity (Hak & Dul, 2010a; 2010b). The unit of analysis describes the level at which the study is conducted, and the objects being studied (Lewis-Beck, Bryman & Liao, 2004). This may be at organizational or individual level. The unit of analysis for the present study was the organization, a mining firm with multiple case units.

4.8.2 Study Population

Seawright and Gerring (2008), defined population as subjects or members that adhere to a set of standards that could provide the richest, and most important data.

As of January 2022, there are 548 mines in SA listed on African Mining IQ (African mining iQ, 2021). The country is listed as the largest producer of platinum (1st) coal (3rd) gold (6th) and diamond (7th). According to African Mining iQ (2021) the South African mining firm's population is as follows:

- Gold mines: has total of 86 listed mines, of which 27 are currently operational, 40 are in various phases of development and 17 can come back to development phases in future.

- Diamond mines: total of 48 listed mines, 18 are currently operational, 6 are in various phases of development and 24 can come back to development phases in future.
- Platinum Group Metals: listed total of 91 mines, 30 are currently operational, 26 are in various phases of development and others can come back to development phases in future.
- Copper mines: listed total of 6 mines, 1 is currently operational, 3 are in various phases of development and 2 can come back to development phases in future.
- Iron ore mines: listed total of 21 mines, 5 are currently operational, 5 are in various phases of development and 11 can come back to development phases in future.
- Manganese mines: 17, 8 currently operational, 3 are in various phases of development and 6 can come back to development in future.
- Uranium mines: 8 mines listed, 1 currently operational, 3 are in various phases of development and 4 can come back to development in future.
- Coal mines: 132 to 54 are operational, 33 various phases and 36 of the mines listed are currently operational, are in various phases of development and some can come back to development in future.

The listed commodities of mine are combination of surface and underground. 122 are surface mines, 129 are underground mines and 66 are combination of both.

The study purposively selected the platinum group metals (PGMs) mining category. The PGM mining firms are situated only in Limpopo, Northwest, and Mpumalanga provinces of SA. Out of the reported PGMs mining firms currently operational, this was a single case study of one platinum group metals mining firm operating in the Limpopo Province.

4.8.3 Sampling Method

The most common sampling method for qualitative researchers is purposive sampling (Devers & Frankel, 2000). Purposive sampling techniques are intended to improve an interpretation of the perspectives of individuals or communities by choosing participants rich in knowledge that can have the most insight into the study question asked (Patton 2002). The sampling methods used rely on a study's research questions, objectives, and population (Saunders *et al.*, 2011).

Purposive sampling strategy was chosen for the present study. Purposive sampling allows a researcher to “select settings, individuals, or activities that provided the information relevant to the research questions, and goals that cannot be obtained from other sources” (Maxwell, 2013; Palinkas *et al.*, 2015). Purposive sampling is a technique widely used in qualitative research. Yin (2014) states that when the study aims to extract deep-rooted knowledge of the participants about a phenomenon, purposeful sampling is appropriate to gain in-depth data for the study.

Out of the reported PGM mining firms of which 30 are currently operational, this study purposively sampled one of Platinum Group Metals mining firm in the Limpopo Province of South Africa. This mining firm was deemed appropriate for the present study as it exhibits characteristics significant for thoroughly exploring and describing the IS capability phenomenon. The mining firm chosen is a large PGM firm seen as representative of the rest in that category, and therefore appropriate and adequate to answer the research question.

4.8.4 Study Participants

The potential participants were also purposively selected based on their familiarity, knowledge, and experience in the mining firm as well as in the varied mining firm capabilities. For each business unit, case unit, purposively selected participants included senior management, heads of departments, and operational employees. The business units (Case units) included Human Resources, Safety, Procurement and quality, Finance accountant, Risk and standard, Protection services, sustainable development, Environment, Lab and Quality.

4.8.5 Data Collection Methods

Collecting data involves compiling the information needed to answer the study research questions. The interview questions were constructed in observation of noting what data to collect, and from whom. Forms of data collection techniques for qualitative research are observations, interviews, and literature reviews to mention a few.

The chosen method for collecting data was through interviews with participants, including observations of the mining firm as participants were going about their routine roles and tasks.

4.8.5.1 Interviews

They are different types of interviews, such as telephone interviews, face-to-face interviews, group interviews, formal/informal interviews, and general interviews.

Formal semi-structured interviews were carried out. Interview schedule was sent out via emails prior to the face-to-face interviews being carried out, to derive profound quality and thorough data.

4.8.5.2 Semi Structured Interviews

Once the appointment was set and accepted by participants, face-to-face interviews took place at the agreed location and time, mostly at participants' offices. The interviews started with introductions, including what the study was about. The participants then signed the informed consent forms. The request to digital audio recording the interviews was sought and once gained, the interview commenced.

The semi-structured interviews followed the pre-determined themes, guided by the conceptual research framework. However, leads outside of the schedule were entertained and followed up on to gain even more rich data. On average, the interviews lasted 37minutes each.

4.8.6 Data Analysis

Data analysis is a method used in all social science research (Levine, 1996). According to Kenneth (2014), data analysis assists in "defining evidence, identifying designs, improving clarification, and examining theories." Yin (2014) defines data analysis as methods of examining, categorising, and tabling sets of methods to produce research findings. Miles *et al.* (2014) notes that data collection, and data analysis in the qualitative study should happen simultaneously to increase rigour in the study. Maxwell (2013) supports the statement by emphasising common problems in a qualitative study, that is, letting

unanalysed data, and documents pile up. A pile of unanalysed data makes it difficult for the researcher to analyse it at a later stage.

The study acknowledges the types of qualitative data analysis common in social science research. Common data analysis techniques are thematic analysis, content analysis, narrative analysis, grounded theory, and framework analysis.

In analysing the collected data, the thematic analysis method was followed. Thematic analysis is defined as “identifying, analysis, and reporting themes within data, and interprets various aspects of the research topic” (Braun & Clarke, 2006:79). The method is also used to organise, discuss, and describe the researcher’s data collection in detailed datasets (Attride-Stirling, 2001; Cavanagh, 1997).

Thematic analysis is a qualitative data analysis approach that involves searching through data collection to find, analyse, and report on recurrent patterns (Braun & Clarke, 2006). It is a method for describing facts, but it also includes interpretation in the processes of picking codes and developing themes. It can be defined as a qualitative data analysis approach that involves searching through data collection to find, analyse, and report on recurrent patterns (Braun & Clarke, 2006). It is a method for describing facts, but it also includes interpretation in the processes of picking codes and developing themes. The flexibility and accessibility of thematic analysis are its two primary advantages (Braun & Clarke, 2012). To support this, the authors noted that thematic analysis may be an essential or realistic technique that reports on participant experiences, meanings, and reality or it may be a building method, which explores the impact of a range of social discourses on events, realities, meanings, and experiences to mention a few. This case study chose participants based on their knowledge, and experience with the chosen area. The study seeks to report on participants' experiences and examine in-depth analysis of an organisation. For such reason, we chose thematic analysis because it ‘understands’ how people make sense of their experiences, and how these meanings are impacted by a broader social context, yet remaining focused on the material, and other "reality" constraints.

In sum, thematic analyses include the search for recurring patterns of meaning across an array of data such as several interviews or focus groups. This study employed a case study of a mine with multiple case units, and for this study, only 10 different case unit participants

were interviewed. The ability to determine themes is part of the flexibility of thematic analysis. The themes that occurred from the transcripts do not determine the quantitative measurements in this study. However, themes are chosen based on how they capture something significant in connection to the broader research questions. The approach the study applied the thematic analysis shown below in Table 13.

Table 12: Phases of Thematic Analysis (Braun & Clarke, 2012)

A step-by-step thematic analysis in this study	
Phases	Explanation of the process
1) *Familiarisation with Data*	Listening to audio recording, and transcription of the interviews (Highlighted items potentially of interest and noting down initial ideas).
2) *Generated initial codes*	Coding interesting ideas across the entire 10 various case units' transcripts relevant to the research question.
3) *Searched for themes*	Develop themes from the codes. Theme "captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set" (Braun & Clarke, 2006:82).
4) *Reviewed themes*	Reviewed the entire dataset and evaluated if the theme told something about the research question. Generated a thematic codes map.
5) *Defined and named the themes*	Deep analytic work was performed to shape up analysis into fine-grained detail. Produced clear significances names for each theme.
6) *Produced the report*	Provided compelling data and made arguments with literature to answer the research question.

4.8.7 Rigor in the Present Study

To convince others (peers, grant reviewers, examiners, readers, and other interested parties) that the findings of the study are worthy of attention, Lincoln and Guba (1985) argue for trustworthiness in qualitative research.

In the present study, trustworthiness was addressed by credibility, transferability, consistency, and conformability aspects.

4.8.7.1 Credibility

For credibility checks, it is often difficult to make sure that the research findings are convincing but to minimise the inconsistency, the research will focus on the credibility as a means of demonstrating that a clear image of the occurrence is being depicted under investigation. (Shenton, 2004). Some of the interview questions were repeatedly asked in a different context to draw same credibility.

4.8.7.2 Transferability

The transferability approach defines the study's population by identifying populations, specific participants, organisations, and situations (Walsham, 2006). The study targeted C-upper, that is senior employees, and management, from all various business units who had a strong understanding of the mine and were knowledgeable about the subject matter.

4.8.7.3 Dependability

Dependability is used to demonstrate that the results are consistent, and that a study could be repeated by a future researcher (Lincoln & Guba 1985). Through verifying the results, the consistency criteria for reducing errors, and biases and the use of audit inquiry techniques helped to establish reliability.

4.8.7.4 Confirmability

Confirmability ensures that the study results reflect the study's purpose, and not the opinion of the author (Eriksson & Kovalainen, 2015). Face-to-face interviews were audiotaped, and transcribed throughout different settings, and locations.

The confirmability of the transcribed data was addressed by the need for additional members to crosscheck for the accuracy of codes for findings to show the study results, and not the biases resulting from the data.

4.9 Ethical Consideration

The goal of ethics in research is to ensure no one is harmed or suffers undesirable outcomes. Stages of ethical consideration in projects include when participants are recruited, during the intercession, and throughout the release of results obtained (Welman & Kruger, 2001:171) Privacy and beliefs of participants' points of view need to be handled accordingly as per agreement. Allmark *et al.* (2009) note that the researcher needs to take into account the terms of ethics of participants. The researcher noted privacy, confidentiality, consent, honesty, respect, possible harm, and anonymity. Participants should be kept private (Leedy & Onrod, 2010). Thompson *et al.* (2005) state that honesty, integrity, consent, confidentiality, data protection, intellectual property, and all information obtained and copyrighted are concerned and have to be addressed. This applies to all information obtained, and cited in this study and was identified, and fully acknowledged.

As part of the requirements to maintain an ethical practice in research, the Institutional Research Ethics Regulatory Committee (IRERC) of the NWU formulated ethics guidelines for the University doctoral students. Research scholars are required to obtain ethics approval from the University Research Ethics Committee (REC) before the commencement of the study that involves all humans. This study has obtained an ethics clearance from the Economic and Management Sciences Research Ethics Committee (EMS-REC) of the North-West University, and the study was deemed as a minimal risk study.

4.9.1 Informed Consent

Informed consent is one of the fundamental aspects of research ethics. Its purpose is for human participants to be able to enter research willingly (voluntarily) with full knowledge about what it means for them to participate, and to give their permission before entering the research. An arrangement is made between the researcher, and the study subject outlining their roles, and responsibilities.

An information leaflet and informed consent (Appendix B) were sent out to participants as a basis to help participants decide if they would like to participate. Based on the participant's agreement to take part, an information leaflet explained full details to assist the participants to understand what was involved in the study participation. Emphasis was made that the participants could not agree to take part unless they were completely satisfied with all aspects of the study. All participants that agreed to take part were required to sign an informed consent form (Appendix B).

Participants were advised concerning the audio records. Permission was given to all participants to record the interview audio, and none of the participants had trouble with being digitally recorded. The researcher informed the participants that the transcripts would be transcribed later. The audio recording was used to free the researcher from notetaking, enabling them to focus on the task at hand as well as helping the researcher to focus on interviews and save time.

4.9.2 Privacy and Confidentiality

Maintaining privacy and confidentiality helps protect participants from possible injury, including psychological harm such as humiliation or distress; social harm such as work losses or financial damage; and criminal or civil liability. Participants were not asked about any sensitive, incriminating, private or personal information. In other words, participants or their family/community were not at risk or adversely affected by their involvement in the research study, including any sort of cultural, social or financial risk/harm. The purpose was to collect participants' perspectives, experiences, and viewpoints on organisational roles, processes, strategies, competencies, system capacities, and human resources.

All the data that were provided during the study was handled confidentially. This meant that access to data was strictly limited to the researcher, the supervisors of the study, data coders, translators, field workers, members of the research ethics committee, and/or the designated examiners (appointed by Northwest University). Also, participants' data, and personal information were kept and stored in a confidential format that was only accessible to the researcher.

The participants were advised in regard to the results of this study, that is, the results could be published in a scientific journal or either presented at scientific meetings, but again without revealing the identity of any research participant. The original questionnaires were to be stored in a safe place for three years, after which they would be destroyed.

The researcher expanded on the confidentiality of shared knowledge so that trust can be preserved. To gain trust, participants were persuaded to express their views, and opinions openly.

4.9.3 Protection against any harm

The process of the study involved no conceivable physical discomfort to participants or the organisation. The questions asked were to gather participants' views, experiences, and opinions about roles, processes, strategies, competencies, system capacities, and human resources. Participants were not asked potentially sensitive, incriminating, confidential or personal questions about themselves. That is, participants or his/her family/community were not at risk or adversely affected by their participation in the research project, including any form of cultural, social, or financial risk/harm. However, participants were asked to describe any factors that the researcher could not be aware of that might create a risk of unintended harm, for example, psychological problems that already existed.

4.9.4 Reflection on Interviews

The outcome of the interviews was later discussed with participants to substantiate authenticity. Research interviews were considered successful, and the participants reported they welcomed discussions. All participants engaged openly in the interviews. This showed that the interview process allowed participants to share their expertise, and

experience in a relaxed atmosphere. It was also hoped that the findings would bring significant knowledge information capability framework within the South African context.

4.10 Summary of the Chapter

This chapter addressed how this study was conducted. It addressed the research methodology followed by the study.

This chapter discussion 8 main section, those were the research process, the ontology, and epistemology of research, the research philosophy, the research approach, the research strategy, and, finally, the research design.

The next chapter analyses the collected data and discusses the study findings.

CHAPTER FIVE

DATA ANALYSIS AND DISCUSSION OF FINDINGS

Chapter four discussed processes and methods used to describe, collect, analyse, and interpret study data.

Chapter five discusses ten case units, case unit A to Case Unit J. In this chapter, the data collected are analysed using a thematic method and the findings are discussed per the study themes and subthemes. A theme is synonymous with a study objective, and the subthemes are elements derived from the triangulated underpinning theories. That is, the theories are used as lenses in the analysis and discussions.

Table 13: Recap of Research objectives and Theories.

Research Objectives	***Theories as analytical lenses:***
1) To understand the current IT and business resources South African mining firms.	IT Capability Model
2) Explore and describe how information systems capability manifests in South African mining firms.	
3) Explore and describe the influence of Resource Dependency on a South African mining firms information systems capability.	Resource Dependency Theory
4) To describe, using Upper Echelon theory as a lens, the influence of leadership on building IT capability in a South African mining firm.	Upper Echelon Theory
5) To determine a framework for improving information systems capability in South African firms.	IT Capability Model

The following section discusses the interpretation of interview data. This chapter used thematic analysis phase one, which is *familiarising with data* and highlighted items

potentially of interest and noting down initial ideas that are explicitly discussed in chapter 6.

Familiarising with Data

This chapter discussed how data was analysed, present and discussed the results. According to Kenneth (2014), data analysis assists in “defining evidence, finding patterns, improving explanations, and theory building.” Using this familiarisation phase of thematic analysis, we gain deeper insights into the data. This speeds up, and simplifies the coding process, allowing us to code at a higher conceptual level, and confidently generate themes that will be reviewed, and refined in the following chapter. This chapter codes the transcripts, and writes comments to highlight inputs with potential interest, and interprets the participants experiences. This chapter aims to be familiar with the datasets.

This section is organised as follows: Firstly, the demographics of the participants are provided. The interviews were held across the 10 business units, which are regarded as case units. Data are analysed and discussed per case unit - that is, sections 1 to 10. There is anonymity between the mine, and the participants, and the name of the organisation is replaced by the pseudonym (Chromine), where interviewees often mentioned the actual company name.

The 10 business units, which are presented as case units A to J are as follows:

1. Chief Safety Office (Case Unit A)
2. Quality Superintendent Office (Case Unit B)
3. Risk and Standard Office (Case Unit C)
4. Protection Services Superintendent Office (Case Unit D)
5. Procurement and Quality Office (Case Unit E)
6. Financial Accountant Office (Case Unit F)
7. Lab Superintendent Office (Case Unit G)
8. Environmental Superintendent Office (Case Unit H)

9. Human Resource Development Office (Case Unit I)
10. Sustainable Economic Development Office (Case Unit J)

The next subsections analyses data and discusses findings per each case unit, A to J.

5.1 Section 1: Case Unit A – The Chief Safety Office

This subsection analyses and presents the findings from the Chief Safety Office business unit.

Case Unit A description

The role of case unit A is to manage emergency services on the mine, to ensure emergencies are responded to and handled appropriately to preserve the mining rights. Also, this is meant to promote a safety-orientated culture as well as rendering technical health and safety assistance to other departments. Besides, it serves to conduct and perform the duties imposed on the position in Mine Health and Safety Act or Occupational Health and Safety Act.

5.1.1 Case Unit A: IT Capability

This subsection analysis data and discusses findings on the IT capability theme. The theme has subthemes.

Role of the Business Unit subtheme

What would you say is the core business of the mining firm? Please describe the role of your business unit relative to the mine's business?

> *In my view, the business is to profitably supply chrome to the South African as well as international market. Obviously, they have to do it safely, and within the cost effectiveness of the company.*
>
> *The role of my business unit [Chief safety office] is merely to legislate whatever is legislated to see, whether we are compiling in terms of the legislature that has been written for the mining industry. Strictly under the mine health and safety act, you do your audits,*

your inspections and the whole VFL, your compliance audit and stuff. To measure yourself against your legislature, against your standards. Then, you write reports, and you give recommendations to the managements. And obviously you draft your reports. Monthly reports, daily reports, quarterly reports, weekly reports, annual reports. Contain all these stats, and you also engage with them to give them a clear view of what happened for the months in terms of non-compliance, where is the focus area, and which accidents you had. Where do you what to focus on the next month?

The Chief Safety Office business unit deals with compliance via the legislature, making sure the mine conducts, and performs the duties imposed in terms of the Mine Health and Safety Act. The unit's business is to prevent and minimise accidents, in respect of safety and health standards and render technical health.

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

Obviously, it is to manage all my safety officers, manage a fulltime health and safety representative, a document control lady, and a risk administrator and to see if they are in line with their current responsibilities as per their KPIs. Then, you attend to your daily meetings, daily emails, then you do your daily IOD's reports, you do your daily SharePoint update that you know in terms of safety. If there are any injuries or accidents, then you need to comply, and do your whole accident control register, your safety flashes. You summarise documentations towards DMR visits if it's reportable or what and also to report to rand mutual if it is an injury . You have to submit. So, basically, in a nutshell, that's what we do daily.

Its system is populated by myself, and some colleagues that I had. It's all formulates. Very nicely formulated. You just enter your data, and then it will pull through automatically, and give you your LTI, RFL, and non-lost time rates, injuries, and all that staff. So, basically, it is based on what you guys gave me on a technical drive. It is a folder that is built in there, and safety officers do their inspection, and all that, contracts, and with the clerk risk officer.

The Chief Safety Office's role is to supervise the entire business unit, and direct and give guidelines to all the subordinates.

The system that is used for daily tasks is accessible by all relevant employees within the business unit and is populated daily.

IT systems value, limitations, and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

> *I think it adds a lot of great value because without the systems, and the stats, you will never know where you are or what you need to focus on, and where you need to attend. Obviously, you will give thumbs up information if you do not have a system that you can manage. Obviously, there's a backup system that makes sure that this one talks to this one end the end of the month. So, the backup talks to the other ones. So, it's a nice system that I currently have to manage my stats, and the necessary information.*

The unit performs safety audit stats and information that guides and gives direction on where most focus needs to occur.

> *I think we will always have a few problems. As long as we are here, I think for me, it is to get one individual system that every section or every department can use like SAP. Every department can use SAP, which interlinks with all the stats. You understand what I mean. You do not use a different system. You just go on to SAP for as I do my safety stuff, HR does safety stuff as well. IT personnel does its IT stuff. It is very nice. It's one system with less trouble and fewer worries. So, for me, in the future, that is what we need to progress.*

The current system occurs to have limitations, and recommendations would be to get a centralised system that interlinks all other business units in the future.

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

> *In terms of that, I think the IT department really comes in there fast, every time I have an issue or there is a crash on the document. I can always rely on the guys to retrieve the*

document for me, which is very nice. If you do it on your laptop on your desktop or whatever, if it is damaged, then no hope for recovery. There is no other way that you retrieve it that easily. So, I think IT guys are superb there. They normally help me with the damaged logs.

Internal support by the IT unit supports systems dysfunctions and the support is convenient.

For the support, to be fair to you, we are leaving in a world of reality. I am not going to make excuses. I think in all businesses, we have a lack of resources, and I think that is one of our biggest issues in the mine... a lack of resources. We do not have enough manpower in each department to be quite honest with you. So, I think if you have a lot of resources, you will not have to sit with a lot of bottlenecks, and backlogs and stuff like that. So yeah, I think the people are there; even the competent are available. The skills are available, but I think we need more hands to assist us to improve on the system.

There is a shortage of staff for system support, although the systems, and competence are there, what is needed is more staff.

IT systems strength

Please describe the value of those systems, and how can you not function without them?

The value of the systems that we currently have make my life easy. I cannot operate without it. Otherwise, you have to do stats manually. You will set forever with a calculator, and you will not even finish the task at hand. So, the system is effective, and efficient for me. With a click of a number, it gives me what I want. It sets on the documents that nobody can access the documents except me, and certain people who are assigned to work with the documents. This makes it quite easy for me. So, I know who to approach if there is a problem with the document, and stuff like that. So, for me, it's wonderful; it's good.

The value of the system is much valuable because it provides effective, and efficient information as needed. In addition, a trail audit record is provided when there seems to be an issue with the documents on the systems, which shows a high level of security for systems in place.

IT Systems weaknesses and opportunities

Which challenges do you experience with the systems within your business unit? Please describe the issues encountered with the systems, and how do you wish they can be resolved?

> *I think the biggest bottleneck I am having is contractor management, which is also part of my scope. Currently, we are doing things manually, with the safety file, and on the adhoc side, we have a system, secucon (Security contractor), which is set up for the adhoc guys. It is also working quite nicely. But in terms of contract management in general, everything needs to be updated manually. It is a lot of interaction for people, which is a big area for me. So, if I want to improve something right now, I have to get a proper contractor to manage the system in place. A contractor can sit in the privacy of his home and hack into the cloud and update the documents. I will review the documents and approve them electronically. That will make our life easier with contract management.*

The unit does coordinate, and facilitate external contractors, and make sure the contractors' compliance with internal, and external requirements. However, there is inconsistency in terms of the system that is currently being used. In addition, an electronic management system is desirable for contract management as things are manually done and updated.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

> *I think in terms of the risk, we would be giving false information. I think it will show incompetence in terms of the stats. The biggest risk is also giving false information to our legislature, the DMR. We are legislated by them. The report that we submit must be spot on; it must be 100% correct. Without the system function, I do not think we would be in a position like that now. It would be chaotic.*
>
> *We have a backup system within the IT department. On the IT side, if the documents crash, I will go to the IT department, and they will retrieve from the backup system. They can also trigger it to see where it was damaged or crashed. You can't give the DMR false*

information. I think it can lead to dismissals; thus, we rely on the system to give us reliable output.

The effectiveness of the electronic safety management system cannot be compromised as the organisation is legislated by the DMR, and non-adherence would lead to the appointed personnel being dismissed. Accurate, quality, and timeous reports have to be provided, and shy away from any errors or inconsistencies.

IT systems dysfunctions

What measure is in place if the systems were not to function accordingly?

We have a cut-off date for our reports, so we set it a week early. We start with our monthly week performances at end of the month to see if we have any hiccups or bottlenecks during that week. So, if something happens within that week, we can still go back, and do the stuff manually. We retrieve some of the information and try doing it manually. But in my case, it has never happened for the IT department is always handy. They've always helped us even from home. When you work remotely, you can call them anytime, and they will hack in, and try to assist you.

The unit plans their reports before the due date to rectify any system issues beforehand. That is, a proper measure is in place, and in case of any hiccups, then the manual process can still be utilised.

IT Systems dysfunctionality measures

How would you mitigate systems dysfunctions to optimally function accordingly, going forward??

I think if you need to have proper security systems in place from the IT side; I do not know what they call it but need to have a stronger chip model. If we could have more than one layer of defence backup systems, that would be very nice, and you would have enough space to handle all this information. I think the bigger the database itself. The more space we have the better. And obviously with more qualified personnel to help can be better to help a lot.

Backup systems with high level of security, together with more qualified personnel are desirable to mitigate systems not to function.

IT business operations enablers

In your opinion, would you say IT enables your business unit operations to be smooth or are there any hiccups? If you were to change your business unit operations, what would you change, and how would you go about it, especially with regard to IT systems?

> *For me, as I have said before, I would start with my organogram. I would reshuffle the entire department. I think to be quite fair; we are running quite a lot of silos at the moment. Going forward, you need to put the safety on its leg; you need to put risk on its leg. You need to put contract management at its risk. Then, you need to put health on its risks with its subordinate's managers, with the people working for you, and so. For now, having a contractor management, and risk management is chaotic. So, when I change, I would start there, and get proper supervision in place to assist this guy. I will get people on the floor because currently, we do not have people on the floor.*

The findings of this unit imposed on the layout of the organogram, units or systems running in silos, one unit running multiple units and there are short staff. The change would start with properly aligning organogram, and business unit then getting staff for those relevant units.

Usage of IT in the business unit

Describe how you use information technologies in your business unit for your daily routines?

> *IT is 100 % of my work; I cannot work without IT. There is no way. Our lives are turned upside down without it; you cannot operate without it. That's why we are saying IT is one of the biggest sections in the mine. We do think about pulling on a laptop. On your PC, you get emails, and on the folder, you get information that is stored or backed up. So no, it's broad.*

Information technology is the driving force behind the unit. All work relies on IT to operate or function, and without IT, work cannot be done.

End user's competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

> *I think in our operations, we are quite lucky in terms of IT systems, staff and the processes. We have a portion in our induction where every employee who will be using our PC gets trained on how to use them, where the documents are, and which folder contains what. We have limitations to use certain folders, thus, we get permission to open such folders because of the privileges, and the privacy of these documents. So, I think that for me, it is quite well.*

Training is in place for users to familiarise themselves with the systems in the business unit.

> *That is when the skill of a supervisor normally comes in. I think we have proper inspection, and proper communication between your employees. As a supervisor, you need to know exactly the type of reports you want. So, the minute you get reports that are not 100% or 80% accurate, you need to sit down with the employee, and see where the hiccups are. As soon as you get the full correct report, you need a supervisor, who will sit with that person, and skill him, coach him, and train him. You have the facilities; you have got the IT department. Even myself, I can coach him. I do coaching daily. Even myself I still learn, and sometimes I go to IT guys, and tell them I do not understand these functions; I forgot about them. Then, they will come. So, it is one must be honest with themselves. If you do not understand, you need somebody to come over, and assist you again. So that's the open relationship I have with the guys. I can automatically see when they are struggling with something. And the programs that they are using at this stage are very easy. It's very easy compared to other programs that you get. S I am quite happy with what we have.*

Users of the system's competency relies on the work conducted or quality of the reports submitted. There is no proper competent programme in place. Users get trained once their work is not fulfilling.

IT systems maintenance

To what extent are the systems regularly updated or enhanced? In your view, which risks can be imposed if systems are not regularly updated or enhanced?

> *I think the systems are updated quite nicely, to be quite frank. I think we have been battling with some space lately, of which, I know the guys are working around the clock to get that approved. Also, there is huge money that we talking about there but the guys are there. They are very busy, and consistently trying to make our lives easier even with Wi-Fi, and stuff. Getting the databases bigger again. The emails bigger. So, there is progress; we just need to bear with the guys because money is always an option.*
>
> *Systems are updated well. However, space limitations need to be looked at for greater improvement.*
>
> *That can be significant; I mean if you do not update, and maintain your stuff, that can be disastrous. We can get a total mine closure.*

Systems adherence and compliance as per legislature can be compromised, and that could lead to mine closure. The mine cannot afford to have systems that are not updated.

Disaster Recovery plan

What recovery is in place if disaster were to happen, and the systems were to be dysfunctional?

> *I think in my view, the guys have a good backup system. I have never experienced anything like that before. So, I think the backup systems work very nicely, and get monitored quite nicely so I am quite sure the guys are capable of handling those types of situations.*

Disaster recovery measures are in place, and none of such disasters have happened before.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

> *Currently at the mine, we use the IDP (Individual Development Plan), our way of training. If you sit with your employee, you will see where the guy needs development. Obviously, with the new skills, with the new succession planning, it is quite nice because you are in depth with your guys there. And you can see whenever he is not competent even if it is an office programme. You will put that on his IDP. You will go through with him and you will agree both of you, win on win situation. And if you are happy, you will sign the IDP. But the most important thing about IDP is that you are not supposed to just do it. You need to do it with your skills matrix, and your job matrix and from there, you need to monitor everything. So, you need to make it work; it should not be a document that you just put it in a file. You need to complete that IDP.*

The main tool in place to develop employee's competencies, skills, and knowledge is IDP that caters for all required training, and competencies that an individual needs as per job profile or roles.

Communication culture

What is the communication culture imposed by the organisation?

> *I do not think we have an issue with communication. It is one out of 200 or so. Because when I do investigations, I have one or two interpreters for the other people. People speak different languages here. I think culture is brilliant. There is old fanakaloon here; there is English here and Pedi as well. It is nice, honestly, I do not see issues with it.*

Communication culture imposed by the organisation is mixed culture.

5.1.2 Case Unit A: Resource Dependency

The subsection explores and describes resource dependency in the business unit. A subtheme questions follows.,

Outsourcing business process

How do you determine what business operation to outsource, and why? Please describe the procedure of outsourcing within the organisation?

I usually use all the resources. I use finance; I use HR; I use IT; I use mining. So basically, all of those sections are interlinked. One cannot be with the other one and the other one cannot be with the other one. So, I use all of them.

Mostly, if you have worked outside of the scope that you do not have skills for, for instance, construction or building bridges stuff like that, you will normally outsource because you do not have the expertise. You don't have the skills. And you don't have the people to do that kind of work. Then, you will normally get the expertise like the contractors, who you outsource for the work.

Outsourcing for the business unit is determined the unavailability of relevant skills within the business unit.

Selection criteria

Please describe the procedure of outsourcing within the organisation? What are the criteria used for selecting the suppliers?

They go for a tender, and whoever gets the tender, you will offer him with that job based on the safety files requirements. If he is compliant based on the risk assessment, and his previous work history, then you will go for that type of person to do the job on site. Obviously, it is a learning point for you. When you get people on site that are doing expert work for you, work that you have never done before, you will also gain something from them. You will draft the risk assessment, your procedures for future use. So, most of the work that we will outsource is the work that we do not have people with the required skills, knowledge and training.

The tender process is being followed. Compliance is strict in terms of safety files, risk assessment, and previous work history of the contractor awarded the tender.

When we have a tender process, it is about which procurement runs with it, and where they will do the tender. And then, once the adjudication has been done for the tender, we will also guide them through what we need on the safety files, and the SHEQ side whatever the case might be. And then, everything is based on all the information we received, also taking into account one's previous history accident, and incident ration history of the contract. Based on that decision, they will choose the supplier, which they will then hand over to me.

We will take through the whole process from start to Z, indicating to them what they need for the requirements and stuff like that.

The supplier is selected by a procurement department, and certain criteria are followed before the contract is awarded to the bidder.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

I think after the adjudication was done on the contractor, the tender, or the company that you going to use, based on the safety, depending how the safety records looks like, the end-user will monitor the contractor. Obviously, they get feedback from us in terms of safety, and non-compliance. Then, they are also responsible to do contractor evaluation every month. So, based on that contractor evaluation, everything that they do can determine which contractor is good enough for the contract. During the course, they need to sit with each contractor individually, and go through the questionnaire. And obviously when there're deficiencies, the contractor knows that he did not perform for this month and needs to pull his socks up for following month. if a guy doesn't perform, obviously, it speaks to itself, and you can look for someone else.

Contract evaluation is conducted by the business unit, and when there are deficiencies, the contractor gets notified to either perform better for the upcoming month. Failure to perform better in consecutive months, then the opportunity to look for another contract suffices.

Skills and knowledge transfer

Does the SLA include a clause to enforce suppliers to upskill your internal staff? How do you make sure the supplier skills are passed over to the internal employees?

What we do is that we do not basically rely on procurement side. What we have on the safety side, on the safety file requirement, is a SHEQ agreement. All those clauses will be stipulated there. The end user from the mine contract management will engage with the contract manager in terms of what is required of them. It covers safety, it covers health,

and environment; it covers quality. And that specific document caters for every contractor's employees. And we need employee details in the safety file.

Clauses to upskill or pass over the skills to internal employees are covered in the SHEQ agreement, and not SLA. Records of the proof are kept in the safety file. However, there is no measure that is in place to monitor or to audit if the skills transfer was successfully rendered.

Selection and critical function rendered by suppliers

What is the critical function of those services rendered by suppliers? Describe what influence you have in selecting a supplier?

The critical function is to have a good, and clear safety performance. No accident, no incident, and no injuries whatsoever. That is the first thing we look at. One need have SHEQ, a clear SHEQ record. No injuries of people, no repeats, and stuff like that.

Obviously, from a safety perspective, I think I have a full scope there. I can also guide the procurement, or the end user will need the contractor on the performance of this guy. Obviously, when they submit a safety file or when you engage after a tender process with these guys, you can clear this goal. There's an indication whether this guy knows mining or whether they do not know it. And based on that, I can clearly say no to the end users. If you do not know risk assessment, how will you build a procedure? So, it starts with small things. If they do not know those small things, I will not recommend them.

The critical function is a clear safety performance appraisal, and a selection preference is through a contractor that knows mining and has a clear goal.

Resources value added

Which other resources might add value to your business unit?

We have external stakeholders; we have got the regulator, and the DMR that we are working with. We have got the community also that you are working with. You do not really interact with the community at this stage is SED (Social Economic Development) function for now. But I think the function that would really make sense or practical sense to me is track Patel, that is a critical function for me in terms of contractor management. I think

there is a platform like that, where all the mines can bring the issue to that forum, raise the issue that they have, and a make informal decision that caters for the whole Limpopo region. It is not only for one mine this time. So, I think that is a resource that I can really take to my heart because then, you can set out things in place, and then, you can have a standard amongst all the mines.

A track Patel system is one of the most valuable resources that might add value to the business unit for contract management. This is a forum whereby all the mine issues in terms of health and safety the mines have can be discussed there, and informal decisions can be made to cater for the whole of Limpopo region.

Competency shortage

Describe any competencies that you cannot do without that a vendor or supplier has?

That guy must have a clear safety background, managerial skills, and play managerial functions. He must cover the whole HR, and finances. When you offer him that appointment on 2.6.1, you obviously need the safety skills, risk skills, and people skills. And if those things are lacking, then you have a problem and you cannot appoint that person. The other person that you really need is the 2.9.2 supervisor, but they normally pick them randomly to fill the position. The most critical position is 2.9.2 for one must at least have a safety background, one must at have at least five or so years of experience in managing people. And you need to track this requirement by doing reference checks, and stuff like that. Otherwise, you will have a big problem on site when managing people.

The most critical functions within the business unit are a clear safety background, managerial skills, and the managerial functions. Those are the most critical elements that are needed when awarding a contract.

Measure for in-house skill development

From your point of view, how can your unit deliver those services rendered by the supplier without having to rely on those suppliers?

Currently, it is a function on its own in our contractor management system. In terms of qualification, and in terms of responsibility. But at this stage, because of the magnitude of this company, we are a very small mine. And we are a very small department. So, we really

rely on HR to do verifications on qualifications, but we do the MIE (Managed Integrity Evaluation) verifications prior to engaging the person on site. So, you will check if it's a legit certificate. And if it is not legit, we would not accept the guy on site. But for me, if we can expand our business a bit, I think the requirements that we had previously should be cut because of the resources that we have. You need to go in details in each of those things. So currently, we only have one guy who is looking after that. But we do look after the MIE, which is very important to us. So, if I would expand, I would expand the contract management division. I will give them more resources to go in details when checking one's qualification and stuff.

Because the business unit is small, it cannot rely on suppliers. However, if the unit can expand the contract management division, they can get more resources than relying on suppliers.

Supplier improvement measures

How is the current performance with your suppliers, and how would you improve it? Maybe you have seen some loopholes after they sign the contract, how would you improve on it as a way of going forward?

I think the best way to do that is a monthly contractor's meetings with your contractors; obviously, you need to share with them the findings, be it about the lack of skills, or whatever the case might be. For instance, you have a problem with the risk assessment; you need to have scheduled risk assessment meeting with the teams to try address these loopholes like to give them training; formal training like our induction is very strategic. We have a portion for contractor management, and for appointments. So, we try, really try to make quite easy for contractors when they come on site to attain skills about how the system works. But I think it's a 24/7 process. You will always have loopholes in every system, but you need to have a stable system. This includes audits, and inspections to pick things up, and act accordingly. And obviously you don't need to keep that for you as in a silo. You need to take it to the end user so that they can know, where the underperforming people are. And it also needs to go back to procurement because you need to close the loop there. Because you need some service suppliers, they can take chances. So, you need to identify them, and address the issues fast.

Monthly performance meetings are done when the business unit shares the findings regarding performance. Such findings are also shared amongst all stakeholders.

Service delivery challenges

Besides cost, which other challenges do you encounter while working with a supplier/vendor or a third party? Going forward, how would you like that to be done?

> *The safety side of the business. People know exactly what you do, and where you are in terms of skills. I do not think they get the necessary skills on an IDP (Individual Development Plan) level to upskill these people. So, I think for me, that is one of the biggest challenges on the safety side, and a lack of knowledge and skills at sometimes you should get people that really focus, and know about safety, and if it is just about the money, and lacking in safety, then obviously, there's no space for you.*
>
> If safety with regards to contractors is not being well managed, it becomes a concern mostly because the mine does not provide safety management for the contractors.
>
> *To be honest with you, I would like to get my contractor management system electronically. I would like to take the middlemen out because we are currently doing all the work for them. And it's very frustrating for the contractor as well. by updating systems manually, to get people in and out to get updated safety files. So, the way for me is to get a system where you can upload these documents on to a cloud or wherever the case might be, and you get electronic approvals, and stuff like that. So, before the contractor comes on site, he knows he can sit in his office, and update his staff. That will make things a lot easier, especially during Covid-19, with all this documentation and the spacing out of people (social distancing), it is a terrible headache. The only interaction that you need is when you see the guy on site, but for on boarding and stuff, it should be electronic.*

The main concern currently is the manual way of doing things, and then going forward is an electronically contractor management system that can resolve most of the hiccups with regards to contract management.

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

> *It really depends on the skill, or on the type of work that the guys are doing. To be fair and honest with you, international companies are way ahead of us. Also, we should not let down our south African contractors because about 95% of our contracts are based in South Africa, so we need to also skill them and engage with them and get them to same level as those international guys.*

While there are no preferences, selecting contractors depends on the skills, expertise, right people, tools and resources, and mostly international suppliers are way ahead. However, local suppliers need to be skilled as well. So, both are preferred based on the work to be rendered.

Skills development

Why are you not building the capability within the organisation for the tasks that are done by suppliers so that you can reduce the outsourcing role by the suppliers?

> *It is a great question. The new GM (General Manager) that we currently have Mr M is one of those guys that do not believe in contractors. He does not believe in outsourcing. It is not a personal issue; it is not a people's issue, but he believes that whatever they can do, we can do. And we can also employ more people in our section to do this type of work. And you also skill your people. So, I and there are so many different handles between a contractor, and employee. It's not only what happens on the mine, but it's what happens outside, in his company as well. So, there's lot of hectic stuff. As you can see, we already got away with some of our contractors. Some of them are really taking chances as well on the safety side, and we cannot allow that to happen. So, whoever you engage can also have a big cost 'effector'. Really, cost effector. I believe that there is some work that we can do currently that a contractor can't do.*

The business unit and the mine management are currently looking at reducing the number of suppliers to minimise costs, and so that things can be managed effectively.

Change recommendations

What change would you bring given the authority to bring change to the way the mine does things, especially regarding the suppliers?

I think with the guys like the GM here already, the wall has been broken already. We've presented to him the amount of contractors that we have on site, the turnaround time of contractors on site, and the amount of work that goes in to contractor management. And then, the cost in terms of paying contractors every month, it's ridiculous. I think if you have a good plan for going forward, if you have a good KPI, you can turn the heads of HODs around. We can firmly get rid of some of the suppliers.

Reducing some of the contractors is the biggest concern. Because there are a lot of contractors, the turnaround time of contractors, and amount of the work that goes into contractor management, then the biggest concern of the business unit is to reduce the contractors.

5.1.3 CASE UNIT A: UPPER ECHELON THEORY

The subsection explores and describes resource dependency in the business unit. A subtheme questions follows.

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

My current position is Chief Safety Officer. My position is regulated by the Mine health and safety Act, Chapter 2, 19.1.3. That's where all my duties come from. It is a very tough appointment. I have a lot of work; I have got lot of people working under me. And it's all legal requirements. I am there to protect the GM from losing his ticket. I am there to protect the GM from losing our business. I am there to protect each HOD, and the end user of this mine. In terms of the compliance with the law, in a nutshell, it is so huge. I am here to do risk management so that we do risks associate baseline. I am here to look after the system, to see whether we have all our procedures, and COPs in place, and our risk assessment whether they are still valid. I am here to manage isometric, our action management tracker to see whether people are closing out the actions. I am responsible for incident, and accident investigations. For closing out, I am responsible for 30 days, 90 days, 45 days inspection, legal inspection underground and surface, and all over the place. I am the link

between the mine and DMR in terms of all my summary documentation level 5. That is all in a nutshell, but it's so broad. It is quite broad.

I think at least 10 years can suffice.

The role of the Chief Safety Office is entirely critical and is a legal appointment as per Mine Health Safety Act. It serves to manage emergency services on the mine, and to ensure emergencies are responded to and handled in an appropriate manner to preserve life and property. Also, the position is mandated too promote a safety-orientated culture as well as rendering technical health and safety assistance to other departments. Besides, this office conducts and performs the duties imposed on the position in terms of the Mine Health and Safety Act or Occupational Health and Safety Act. Perhaps, a 10 year period of service is desirable to cater for this role.

Competency skills, experience, and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

I think academic background is one factor I am not that quite worried about. But in terms of your experience, as I have said, it should be 10 years plus. You need 10 years plus experience. One of the most important skills having 'people skills. That is the most important skill. If you do not have 'people skills', you will not survive. Remember you can do the right thing in two ways. You can do the right thing in shouting, or you can do the right thing in a formally way. Treat your colleagues humanely. You need to be flexible. And you need to make decisions. And you need to make recommendations that will sustain the safety side of the business. And then you can handover to your HODs or even your GM and give them your recommendations.

People skills management is highly recommended for this role because it compromises how one works with people by giving recommendations that will sustain safety of the entire organisation. Experience and expertise needed should be roughly 10 years of hands on.

Leak of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

I think it is catastrophic. If you look at underground mining and surface mining, it is totally different. You cannot ask a normal safety officer underground. He will not have a clue about what is going right there. You cannot ask a normal safety officer to manage engineering; he will not have a clue of what is going on there. You cannot compromise on that. So, you need clear skills clear. There is no favouritism.

While the business unit cannot operate with no relevant skills for the relevant section or role, each section differs with each role and operation. Therefore, it is recommended that each section is provided with right personnel that has the right skills for that section.

Qualifications and value added

Is there any qualification needed for your position, if then, please list them? What value have they added to your experience, and career?

You need, say a three-year Diploma with UNISA, then a blasting certificate or you need to do a trade testing. I have blasting I got and artisan trade certificate. I was a diesel mechanic, and I needed to do all this risk management because I am responsible for contract management and risk and safety management. So, you need risk management qualification like a diploma. You need a contract management qualification. And then, you also need to set standards. You need qualifications that address auditing as in internal and external auditing. And the list goes on; it's a lot but those are the critical ones.

Wow, I think in my career, it added a lot of value. When I started my career, I almost told my family that I was not going for a degree then. I wanted to go where the 'tekkie hits the tough'. I started there at the bottom and then worked up myself. Then, when I got to that level, I educated myself, and so it is quite nice.

A three-year Diploma is needed for the role. A variety of qualifications can be obtained to be considered for the role. The qualification adds values to one's role.

Are there any qualifications you feel you would like to enrol on, and how can they add value to your current role?

I don't think this position deserves a degree holder. I would rather go for competencies, then nebosh. It is an international standard; it is an international qualification. You can

> *take all other stuff away from me, and then you put nebosh on your CV, and you will be recruited overseas because is such a great thing to study nebosh.*

A qualification is not a complete thing that adds value, but a competence certificate is recommended.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views.
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

> *All right. My view is how I see myself. I see myself in all those three leadership styles that you have mentioned. The reason why am saying that is that you cannot neglect the other leadership role. So, whenever I do my work, I execute all the three leadership styles. They are interlinked. And that's what is even done by our HODs' and our supervisors.*

Leadership style are interlinked. However, to understand the roles one desires in their business units to achieve business goals, a sub question was asked. That is.

Which leadership styles and management skills are required to achieve the business goals?

> *As I have said to you, people skills. You need people skills. You need to be people driven. And you need to have clear goals. So, I find all three leadership styles equally important.*

Leaderships skills and people skills are required.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow and acquire new resources like human personnel. people? How does management influence the daily operations of the mine?

> *I think if you look at the contract management perspective, you get rid of contractors. You can corrode the mine more. We can train people more; we can upskill people in a specific field, especially with the skills that we do have. Even from the contractors, you can acquire some expertise, and skills. And remember, it is quite easy to save a lot of money if you are upskilled from within the mine.*

The most important thing trains more people, equip them with skills, and knowledge.

> *I think our GM and the HODs are spot on; they are really practise and show a good leadership style. They are very accessible. One thing I do not like is a leader that is quiet, and that does act, and interact with other people. I have been called Visible Felt Leadership (VFL) also for engaging with people. But, for our current leadership on the Mine, I think out of 100, I would give them 80%. We also know that we've a lot of changes lately in our top management structure. So, we not quite that stable as well because every time someone comes, and another one leaves, that makes things a little bit unstable. So, once you have a stable top hierarchy management, I think it will be good for our organisation.*

Management influences daily operations by doing VFLs. Currently, there are changes in management, and when the management structure is stable, things might be on the right track.

Organisational growth

Explain briefly how the organisation grows, and acquires new resources like recruitment, and retention? How does the organisation (or the different units) ensure that the targets are met?

> *I think the recruitment portion is doing quite well, and is run by HR. Vacancies have been advertised, and I think that the processes are quite legal, and legit. We've all the participants, those participating in the interviews and in the adjudication of the short list and long list. The files have been generated for us to go through them. I think that process is working well.*

In acquiring new resources such as with the recruitment processes, HR runs the section and legal processes are followed.

The GM will set the objectives, and the KPI's for the HODs. To set the KPIs for the next year, they have to agree and sign them off and the HODs will then work with level D employees. H works with us, if we are happy, we sign off, and then from there, we take it down to our subordinates .We break it up a little bit more to make it more work specific, and set the KPIs for the next year and then I know we only do KPI's once a year, which is not right, but I try and engage with my guys as they come in for inspections. I see them daily, so I have the opportunity to speak to them. So, I think that it is working.

There is quite a number of processes that ensure targets are met. KPIs are in place for employees. Each section has its HOD or D level employee, who facilitates, and ensures targets are met.

Employees performance measures

What measures do you have in the business unit that may help improve employees' productivity? How does the company manage the employee's performance?

I think one of the biggest things that I can share with you is that we are filling most of our vacancies internally now, which is a good thing. Previously, they would go outsource. I think that is a big, big issue that we had previously. So, I think if you employ people in that manner, you will have the community on your side, and you will have happy employees because you upskill them up every time you promote somebody if there's a vacant position. So, I think hiring internally is one of the best things that can help the employees. And obviously, with the good salaries the mine is paying the guys, I think the employees are excited.

Employees are happy when people are promoted internally. This excites the local community as they grab available posts in a firm.

Well, employees' performances reviews are done through KPI's; all the KPIs are set down to the last person at the bottom.

Internal employees' performances are managed through KPIs.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

> *That is where you have all your standards that you put in place, your procedures, and staff, where you will audit your staff. You will get an internal auditor to come check whether you are still on track. Because if you lose your certification, you cannot sell your product. We have internal auditors that come once a year. They give us a report; we raise the findings, and then we prepare ourselves for the external audit. They will come and check what the findings were from the internal auditors. They will also issue us with different sets of findings, if any, which we must also fix, and get right. Then, based on that, they will issue us with our new certifications. For example, 45900 certificate, or 40000 certificate.*

There are standards, procedures, and the auditing of staff internally to maintain the certification of the mine because without that certification, the mine cannot produce, and sell product. That is how the business unit complies internally.

> *We do it through the tender process before the judicator is done. And then prior to that, you would have engagements with them via the telephone, email or whatever. And then, we have our contract management procedure, which governs us in terms of contract management. Our safety files compliance must map at 100% compliance. Audits are set within 90 days. After every 90 days, there is an audit done on the file, and they should be file. Then, if it is not done, then we block the contractor.*

Compliance by contractors is done through engagement via email or any sort of communication. There is also a contract management procedure that binds all contractors, safety files in place, and 90 days audit to ensure that all files are up to standard and compliant.

Business process governance

How does the current organisational structure ensure proper governance, and maintenance of business processes?

> *I think we are well covered there. I think if we split our processes into sections, you will have your 4.1, which is your GM, 3.1a for mining, 3.1a for plant, and 7.4 for health and*

safety. You will have 7.4.4 for finance, and 7.4 for HR. Each structure is clearly defined. I think it is well set.

Organisation structure is structured according to a legal appointment. An appointment covers all governance, and the maintenance of the business processes through its authorities.

Management support

What influence does the upper management provide in achieving the goals, objectives, and mandates of the organisation? How does upper management envision/support your business unit?

They set strategic goals for the company. Those strategic goals are being given to the HODs, which they will then break down in their departments where they like it. About Health and safety objectives, they will have plant process objectives, engineering objectives, and mining objectives. They will also have HR objectives, which are then broken into smaller pieces for the lower down-level people.

Management set goals for the company, and then divide its business unit objectives. The business units run their objectives.

I think from 4.1-persepctive, 3.1, and HOD perspective. I think they do quite well in strategic management. I think they are doing a good job in terms of that. They give us a platform; they lay out fuss. They set goals and targets, measurable goals, and measurable targets for us. Sometimes, it is a bit hectic but sometimes it's there for a reason. But I think the set goals are measurable.

Measurable goals and targets are set.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

I think change management is very important, but I think automation is everything. You can automate your whole mine. Then, you can operate mining from the control room; you sit in a comfort of air-conditioned room, and then you operate underground. But also, that

has risks involved. It can lead to job loses though I am a believer in automation because I know companies that do full automation. And they still use the same amount of people; they just use people in different areas. So, I am a believer in automation. Currently, we are doing it manually. I think we are not doing too bad in that regards. But I think if you have automated systems in place, it's just much better than the manual systems.

Currently, the organisation uses manual. However, automation seems to be taken well, provided one area of concern, which is job losses because of automation has not been perceived as replacement of workers.

5.1.4 Case Unit A: Summary of the study findings

The role of case unit A is to manage emergency services on the mine, to ensure emergencies are responded to and handled appropriately to preserve the mining rights. The study discovered that IT is imperative for the functioning of the Chief Safety Office. The system in place is effective in achieving organisational objectives but there is a need to increase staff. Shortage of staff hinders the performance of the business unit, and that affects the overall organisational performance. Manual ways of running the business are established, which means the information technologies have not been utilised to their full potential yet.

Currently, the biggest challenge is contractor management. The case unit uses manual to render their services to contractors; everything is updated manually. A contractor management system to manage the systems is needed for the Case unit. The system must have the scalability to allow a contractor to sit anywhere, and not necessarily at the mine, and update their documents. The documents can be reviewed by a competent, appointed employee internally, and be approved electronically. There is a lack of human resources competencies needed for this case unit. Certified knowledge of blasting personnel, a trade certification, risk management background, knowledge in auditing, internal and external auditing, general knowledge of working with computers, and to produce quality reports certificates in computer soft skills training are all required, specifically Excel and PowerPoint.

The case unit entirely relies on information technologies. Therefore, competency skills in working with systems and being technologically advanced are required for the case unit.

Individual competencies are measured based on the quality of work provided and if an individual's report is not 100% up to the required standard. A supervisor steps in and assists with communicating, coaching, and training the employee. Therefore, training is an open relationship for those who come forward and ask for assistance. Then, this means no proper training and competencies are conducted within the case unit. And in that case, proper training needs to be conducted by a training unit.

Firstly, the case unit has to restructure the entire business unit's organisational structure. Thus, s risk, contractor management, health, and safety must be standalone units. All these sections running together make the business unit not to function accordingly. Each employee within the unit has to run their daily tasks. This means roles need to be aligned accordingly. This will then reduce the amount of work that gets overwhelming. The case unit systems are run in silos. It will be beneficial to get all systems running in silos to run in an integrated system.

The next section will discuss the Quality Superintendent Office business unit. Some of the the case units' discussions are not shown here because of the need to manage the volume of the thesis.

5.2 Section 2: Case Unit B - Quality Superintendent Office

This section analyses results of the Chromine's Quality Superintendent Office Business unit.

Case Unit B description

It serves to maintain quality management system and manage non-conformances relating to qualities. Other roles include liaising with relevant stakeholders on issues pertaining to qualities in order to minimise customer complaints, managing ISO 9001 certification to ensure compliance, and ensuring compliance to quality management system and ISO 9001 certification requirements.

5.2.1 Case Unit B: IT Capability

The role of the Quality Superintendent office in the mine is to ensure production meets the standards and objectives laid out by the board. The quality superintendent officer identifies

any potential problems during mining operations that can affect the quality of output. The quality superintendent is there to ensure there is enough manpower and equipment to achieve all objectives.

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

> *The role of the entire business unit is a mining organisation. We are mining Chrome. We export it, we are not selling it to SA, although we have few clients that are in SA, but our main aim is to mine the chrome then after that we run the chrome through the beneficiation plant. And then we sell it to the different client. And most of our clients are in China. The role of the business unit on the department that I am, is a quality department. We ensure that we monitor every product that is going outside if it met customer's specifications. That is a primarily goal and then if the product does not meet the customer's spec, we engage with different business unit that are responsible to ensure that they made the check-ups. Especially in the lab and even the production to ensure that they produce and inspect product, but the main business unit is to ensure quality is given to the clients as per customer require.*

The core business of the organisation is to mine chrome ore and sell the chrome to its international clients. The business unit deals with assurance of quality production and dispatch of the Chrome production to the customers.

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

> *Our specific daily tasks and routines on a daily task is to do check, we do have a central system where we capture all the results of the product. Then we go into the system, we check if whatever the company is producing on daily basis. Like the previous day if specifications are met and if anything went wrong. A non-conformance is then issued. But before we issue a non-conformance we still engage with the responsible department and if we doubt that the product is inspect but the only problem is the accuracy of those analysis. We then engage*

with the laboratory to ensure that they still check their processes. That is the primary activities that we do on daily basis and the other thing rather than the product. We also run the ISO9001 system which is the quality management system to ensure that whatever we do at the end of the day, we are consistence. The system that we are using, we are using the same system to ensure that the final product still meet the customer's specification. And the other thing we also monitor dispatch. Whatever product that is going out, we go and check the stock. If the stock looks good and then we check whatever we are taking out on daily basis is still in the good condition and is still meeting customer specification.

The business unit's role is to monitor and check the product specifications are met. the entire business unit, and direct and give guidelines to all the subordinates. ISO9001 system is used for rendering the quality management system that ensure consistency of the processes.

Systems used daily are MES (Mining Execution System). Which runs our database for the results? Then we are also using JDe (Edwards EnterpriseOne) to ensure that whatever we want to buy resources that we want to use in our processes. We use the JDe for procurement, for purchasing and all those things. Then we also use the isometrix. The isometrix we use it for the non-conformances. Where we do load the non-conformances for the inspection. We use it. That's the only three that am using but doesn't mean that the business use only three.

The quality superintendent uses three main systems: MES, JDe and Isometrix to render their daily operations and support to the mine.

IT systems value, limitations, and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

The system add value into the system for integrity of the information and the confidentiality of the data which are the traceable. On the MES, although we do put analysis there, there is limitations. okay sometimes you want to play with the data and then export it to the excel so that it can give you the graphs. However, it is difficult to do that because of the settings that are there on the MES. You cannot play around excel because it becomes difficult for us to play with the data especially if you want to do different graphs using it. I think if they want

to make an improvement, they have to make it to such extend that when we export data it, we can still be able to edit and make graphs the way we want.

The current system occurs to have limitations, and recommendations would be to upgrade the system so that it meets the end user's needs.

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

Internal support by the IT business unit supports systems dysfunctions and support offer is convenient. We do have IT business unit, and one needs to we log a call on a system through IT support services and then ticket is sent through to support technician that comes and help end users.

While the support system process applied in the mine seems to be satisfactory and reliable.

With options for IT to assist employees remotely, however we need to have can the IT Technician for every section. For example, plant section, we have different business units and if we can have one technician around I think it's going make things easier but for now there is backlog and then you find that technician is having 20 or 30 job cards. Which then takes time to resolve issues that we do have.

The is no allocation of staff support that renders service promptly to all section of the mine because of staff shortage. Although the systems, and competence are there, there is a need for more skilled IT support staff.

IT systems strength

Please describe the value of those systems, and how can you not function without them?

With reference to MES, it is very easy to run the business unit. We have a lab on site, logistics onsite and then we do have the process business unit onsite. If we did not have the MES the Lab have to write down the number of the sample or the identity the sample, but with the MES it gives a unique identification and then when it gives you identification it's easy to trace back because it's a system that you do not need to punch the figures. It improves in terms of people to make mistakes, it improves and limits a lot of mistakes which cannot be

obtained without it. Even on the dispatch like I said I work under the quality department; I was not going to be able to go through department to department to look at their data however MES is a central system where I just go there and get the data without requesting it from people and course all the information is there. On JDE, the JDE is okay on the purchasing we know where money is. You must be careful. We cannot use the manual things specially to do the requisition and all those things. But with JDe the money is easy to trace back. We cannot utilise the money without those systems do not function.

The value of the system is convenience of data availability and sharing from one business unit to the other. It took away manual process. Money is utilised accordingly as budget is provided by the system and purchase reports are available on the systems. One is able to budget and plan accordingly.

IT Systems weaknesses and opportunities

Which challenges do you experience with the systems within your business unit? Please describe the issues encountered with the systems, and how do you wish they can be resolved?

MES with me I don't experience a lot of problems. I never have a serious problem where I can specifically tell you about.

While systems without challenges are one of the best investments when it comes to businesses.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

The product itself, we can dispatch the product and then three months later it comes to back as customer complain that the product fails to meet the specification. And then if the system is not there it is going to be difficult because the risks is when the customer complain we still have to go back and trace to check how was the product analysed. Then we cannot do so if the system is not functioning. The risk is very high.

Accurate, quality of the product records is kept on the systems to provide specifications of the product sold to the customer. This assist to manage customer complains.

IT systems dysfunctions

What measure is in place if the systems were not to function accordingly?

> *The measure that is the manual system in place. The only thing that we can do is write down data so that when the system comes back, we can transfer to the system.*

The manual utilisation of process take place in accordance with system dysfunctions.

IT Systems dysfunctionality measures

How would you mitigate systems dysfunctions to optimally function accordingly, going forward??

> *Am not sure if our IT they do have a lot of servers where they can have a backup to such extend that even if this thing can happen or if the system does not work, we can connect to another server and operate.*

No proper mitigation process is shared and advised with relevant business units. Business unit rely merely on IT and expect IT to have measures in place.

Change of business operation

If you were to change your business unit operations, what would you change, and how would you go about it, especially with regard to IT systems?

> *Okay, I will cut some of the functions that we do, especially on the ISO9001 and focus more on the product quality. Because on the product quality, that's where the organisation is making money. And then on the other department the system is just there but is not really making that impact.*

The business unit observed some systems which are not valuable for the organisations. Which means some cost could be cut across by cutting out the systems that add no value in to the business.

Usage of IT in the business unit

Describe how you use information technologies in your business unit for your daily routines?

> *Okay the technologies I use on day-to-day basis is the MES that is the only thing that am using. Then the other technology that we are using is the communication. Through the communication what we doing we still need to call people and then we still need to communicate with people through the emails and then the other thing even nowadays we do have WhatsApp. And then we do communicate with WhatsApp if somethings are not well and for some communication.*

Various technologies are used by the business unit.

End user's competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

> *Every system that is introduced, firstly it goes through the management of change where they identify the risks and then competency and training is one of the risks and then go through the training for everybody. After all business units are trained, they still call people and send the IT technician to take employees through those systems until they are sure that everyone is competent and then when they implement, they don't just implement things at the same time. They implement stages by stages until fully implemented and when they are sure that people are all train.*

Training is in place for users to familiarise themselves with the systems in the business unit.

However, there is no proper competent programme in place. The business units learn on the job and get assist as they do their daily tasks. For example;

> *Users use central call system and when they have a problem, let's say they sent the person they train us and then after they train us then after they sent us you sign something to say*

you have been trained and then they still open the centre call system to say if you are not competent to run the then you can log a call.

IT systems maintenance

To what extent are the systems regularly updated or enhanced? In your view, which risks can be imposed if systems are not regularly updated or enhanced?

On a daily basis. In the afternoon there is an auto updates but am not sure if they update all the system at same time. But there is a pop ups to tell us that the system is going to be updated especially if you don't shutdown the computer it will automatically force you to shut it down so that it can be updated. But on daily basis they get updated.

Regular updated of systems are run accordingly. This means proper measure are conducted regularly to keep the systems operating effectively.

Disaster Recovery plan

What recovery is in place if disaster were to happen, and the systems were to be dysfunctional?

Backup serves in our IT business unit.

The business unit relies on IT Business unit for their backups.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

IDP processes is in place, and we do have a PTO (Planned Task Observation) system, and we do have a training centre. We do have a training matrix and then we determine how often must we train our employees.

The main tool in place to develop employee's competencies, skills, and knowledge is IDP that caters for all required training, and PTO is for the individual daily tasks while training matrix is a schedule to determine when an individual can do training.

Communication culture

What is the communication culture imposed by the organisation?

> *We have a central person that issue the communication. Like the memo and everything else. And then everything that is important it goes through that central communication, and we know that if it is coming from that person is the official communication.*

There is an appointed communication specialist who sends out all communication.

5.2.2 Case Unit B: Resource Dependency

The subsection theme explores and defines describes resource dependency in the business unit. A subtheme questions follows.

Outsourcing business process

How do you determine what business operation to outsource, and why? Please describe the procedure of outsourcing within the organisation?

> *The procedure of outsourcing it goes through the procurement. If you want to outsource something. You must firstly determine within the resources that you have. if you cannot do that specific task that you want to outsource. If you don't have enough resources, you still have to write the motivation and everything else and then the HOD need to agree with you to outsource that system and then if the HOD agree then they take it through to the procurement then from the procurement they fill the procurement system where they get different quotation until they get somebody else who's going to do perform that task for you.*

Outsourcing for the business unit is determined by the unavailability of relevant skills within the business unit.

Selection criteria

Please describe the procedure of outsourcing within the organisation? What are the criteria used for selecting the suppliers?

> *There are different criteria in place. We've got criteria in terms of the quality of the product. Then we've got criteria in terms of following the BEE status and then we've got*

the criteria in terms of the cost. And then from there we also looking at the repetition of the organisation. We also look at the standard for example in my case the criteria that we do specifically, we do auditing. Someone audit will look at the organisation where the auditors are accredited.

Various criteria can be followed before the contract is awarded.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

Yes, we do have a SLA with the suppliers and inside those SLA we do mention how are we going to evaluate if the supplier are doing very well and on a monthly basis and some are quarterly basis it depend on the criteria but on the monthly basis on quarterly basis we do the supplier evaluation. We call the supplier and then we look at their performance and then if we are not happy with their performance there's a rating that we do follow when we agreed on and then if there is a penalty that we need to impose we impose the penalty. But all the criteria are mentioned on the SLA and then we keep the record of the supplier evaluation.

Contract evaluation is used monthly or quarterly to evaluate the performance of the contractor. Failure to meet the rating criteria then penalty is imposed.

Skills and knowledge transfer

Does the SLA include a clause to enforce suppliers to upskill your internal staff? How do you make sure the supplier skills are passed over to the internal employees?

Most of the services that we do, most of the time we do not need the supplier to upskill our employees. We do have our own system internally. Where we upskill our own employees.

No skills transfer from supplier to internal employees. Internal employee's skills and knowledge are provided through internal training process.

Selection and critical function rendered by suppliers

What is the critical function of those services rendered by suppliers? Describe what influence you have in selecting a supplier?

> *Auditing by a 3rd part laboratory that certify our material that are outside going to the clients. Influence for selecting suppliers lies in the competent or not accredited.*

The critical function is auditing since for governance purpose an organisation needs to be audited by accredited audit firms.

Competency shortage

Describe any competencies that you cannot do without that a vendor or supplier has?

> *Auditing. Business unit or organisation cannot audit their own systems then it has to rely on other vendor to come and audit them.*

Auditing and evaluation of a company's operations are usually performed by an external third party. However, it can be performed by internal parties.

Service delivery challenges

Besides cost, which other challenges do you encounter while working with a supplier/vendor or a third party? Going forward, how would you like that to be done?

> *Okay, beside cost it might be the barrier of the languages. Sometimes you'll find that the other auditors that they send us they are more in Afrikaans, and they want somebody else to translate something that they want to say in English. Going forward I think I will tell them to bring somebody else who's better in English rather than Afrikaans because there a barrier language that I've realise if somebody else only understands Afrikaans.*

Language barriers is the main challenges. Language must be included in the SLAs to avoid translation process.

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

I think local supplier, why am saying local supplier looking at turnaround times Locals you know that within two hours, three hours people they will be here. International you need to log a call a day before and they take three days maybe .one office maybe in Joburg then it takes time for it to lend here. But locals you know, 10 minutes everything is done.

Local suppliers are preferred based on time respond and convenience.

Skills development

Why are you not building the capability within the organisation for the tasks that are done by suppliers so that you can reduce the outsourcing role by the suppliers?

Yeah, we have got the plan in place especially with auditing. Let's say I'll get somebody else from another department who can audit my system and ill also go and audit that person's system because the only biasness here is the biasness in terms of auditing out systems, but we've got the plan to train people from the other department so that they can come audit us.

The audits of business units can be conducted internally by other business unit. That can also reduce the cost and barriers encountering.

Change recommendations

What change would you bring given the authority to bring change to the way the mine does things, especially regarding the suppliers?

Currently our supplier evaluation and the selection is not that strict and if I might change something. I would enforce the supplier selection and supplier evaluation. Instead of doing supplier evaluation and selection only annually I would do it every six months to check the progress of the supplier.

There are loopholes with supplier evaluations and selection.

5.2.3 Case Unit B: Upper Echelon Theory

The subsection theme explores and defines describes resource dependency in the business unit. A subtheme questions follows.

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

> *My current position is a quality superintendent and the critical role that I play is to ensure that we don't get the product back. Whatever the company send out, it must be good in the eyes of the customer. Plus, or minus five years of experience to ten years. Because you have to understand all the process like you have to understand the lab side, you have to understand the logistics, you have to understand the production side so that you can be able to say the analysis are not fine or the product is not fine.*

The role of the quality superintendent carries customer satisfaction. Superintendents in the mining firms are on the management level that means more than five years' experience is required.

Competency skills, experience, and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

> *In terms of the competency, you need to be able to evaluate data because remember here you are not producing but evaluate data from other business unit. Chemical engineering can be metallurgy, it can be chemistry. You need all those things because is all about the mineral processing and then the other thing you have to understand the statistics. So that you can apply the stats on the data that you going to collect from different departments.*

Various competence skills and experience are required.

Leak of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

> *We going to produce a lot of out of spec material and the which means that we going to send the product that is off to the client and then we going to lose on our revenue.*

Product specification is one of the risk associated with the production of the product.

Qualifications and value added

Is there any qualification needed for your position, if then, please list them? What value have they added to your experience, and career?

> *We need a statistic even though it can be in terms of the short courses. You need to have a quality qualification. It can be a quality diploma, or it can be a btech but the science alone is not enough. You still need the quality so that you can understand when we are talking about quality what I we referring to. Value added, I used to understand that quality is the quality of the product. I never understand the quality in terms of the supplier evaluation, I never understand the quality in terms of the finances. I never understand quality in terms of engineering. But those qualifications they had to open my eyes and understand to say quality, what is quality in terms of the strategic values. What is quality in terms of finances, what is qualities in terms of HR. Now I understand in a broader context rather than only in the product.*

A qualification is needed, and a statistics certificate is recommended to understand the broader context of the business unit.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views.
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

> *Is a transformational leadership, why am saying that, for every small change we do have a lot of things like the management of change they always tell us in everything that they change. Every small change they do that. That is a leadership which is more visible.*

Transformational leadership style cut across the mine.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow, and acquire new resources like human personnel? How does management influence the daily operations of the mine?

> *We still need to do the benchmarking and go to do the conferences and see when things are changing, when technology are changing so that we can also move because this world is dynamic especially on the quality also because the quality is dynamic. Things are changing. When you tell yourself that you are already on the highest standard the clients, they change their requirements and then they need some other things then you need to other things then you need to involve new technologies, so that you can grow. We do have what we call visible leadership and then where we go, we still coach on a day-to-day basis, where we see wrong and then we still talk with the employee so that we can be visible.*

Management influences daily operations by doing VFLs.

Organisational growth

Explain briefly how the organisation grows, and acquires new resources like recruitment, and retention? How does the organisation (or the different units) ensure that the targets are met?

> *We do have the budget system. We do them on the yearly-to-yearly basis. We focus and then we check. we review the previous year budget and then that's how we get the resources. For example, let's say on the labour we check if the labour is still adequate and then we budget for the labour then next year we can still ask why. There are daily meetings and on those daily meetings we reflect on what happened on the previous day and then we plan so that we cannot get the same errors and then if we see that we are improving we improve from the last day we still in current so that we can do whatever we do previous day more. And then if we fail, we still plan how are we going to close the errors that we do and then we plan forward.*

There is quite a number of processes that ensure targets are met. Each section has someone who facilitates, and ensures targets are met.

Employees performance measures

What measures do you have in the business unit that may help improve employees' productivity? How does the company manage the employee's performance?

> *Every day we have what we call the safety talks. We go there we talk to the employees and then we tell them the reality and then we still do the training and the coaching to ensure that they can be more effective. There is performance appraisal and then the other thing that we have on the employee's performance on the month-to-month basis. We do have something like the employee of the plant. Check how did the employees do. And then the other thing we do through the training, on the PTOs we check where we lack we coach you and that helps to improve employee's performance.*

Internal employees' performances are managed through performance appraisal, training and conducting PTO.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

> *Inspections are done on day-to-day basis to ensure compliance with set standards. While supplier compliant are run through the SLA and even through the meetings. And sometimes just the informal communication through the emails.*

Compliance by contractors is done through engagement SLA.

Business process governance

How does the current organisational structure ensure proper governance, and maintenance of business processes?

> *There is somebody that I report to and that somebody else make sure that I still do things that are within my capability and then I do things that they are within my process and if I am not compiling.*

There is no measure to follow to ensure proper governance.

Management support

How does upper management envision/support your business unit?

> *They support business unit through the funding, they give us the budget. They give us almost what we want. So that we can achieve the goals.*

Management support give various channel to support business units.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

> *Automation and manual. To me automation and even though you automate things you do need people to check and then, but you cannot put everything manual because where there is manual people always do mistake and they do not do consistency. Ill balance the two, ill automate some other things in the process that they do not need more on people to monitor and then I will make sure that I cut manual where we capture things. Ill balance between the two. I cannot say ill work on manual and ill work on automatically, we need both of them.*

Currently, the business unit uses both manual and automation of processes. Both processes are needed.

5.2.4 Case Unit B: Summary of the study findings

The daily tasks of the quality superintendent proved to be predominantly IT based. To adequately measure quality of each departmental output, IT is used for measuring quality, and for communication purposes. IT is key in ensuring the needs for the clients are met. IT applications were used to carry out purchasing decisions and non-conformances. The IT system in place is not without its problems. Data Analysis is proving to be a challenge due to its inflexibility at times. For example, exporting data to Excel is a major challenge despite Excel being key in presentation and analysis of mining data.

Whilst IT was seen to be key, staff was seen to be inadequate. Each department or section of the mine needs an IT assistant to monitor, and address problems that arise. The IT

systems make financial management easier. They can track all costs easier, and the mine's finances have "traceability." IT is key in dealing with customer complaints. The Quality Superintendent and his team can trace the root causes of product deficiencies much easier. The organisation also has a manual system as back up just in case the IT system fails. Perhaps, this indicates not having 100% faith in the system.

We still have the manual system in place; if it is down for now, the only thing that we can do is to write it down so that when the system comes back, we can transfer to the system. (8_16238293897_Quality Superintendent)

IT is a major communication tool through emails, and recently WhatsApp. Toensure quality is achieved through the IT system, the management arranged for training of their staff. The training is there to ensure they are competent enough to use the system. Even after training, the staff is still able to log queries to prevent any errors.

In making purchases for the organisation, the quality superintendent seeks to buy the best products as these will affect the final product that will go to clients. To ensure this, the organisation has quality checks that are instituted regularly to guarantee that suppliers are bringing quality equipment and raw materials to the mine. Auditors and laboratories are crucial in ensuring the best products go the clients. These suppliers have to be accredited in order to supply the mine. This ensures that quality is verified. The quality superintendent is crucial to the running of the mining, as he has to monitor all these different facets of producing quality chrome to clients.

Transformational leadership was seen to be the most prevalent leadership style in the organisation. This is because the quality superintendent was always consulted before any major decisions were made by his superiors. Such leadership was seen to be important in ensuring the mine ran smoothly. Clients have been known to change their requirements, and specifications from one order to the next. Being able to relate well with subordinates is also very important for the leader. To ensure growth, the organisation has budget system that everyone follows. The leaders are important in communicating with staff, and coaching them to ensure they are more productive every day. Performance appraisals are also done on a monthly basis as key feedback mechanism for employees. Automation was seen to be better than manually doing tasks because it brings consistency, and cuts out mistakes.

The next section will discuss the Risk and Standard Office Business unit. Some of the case units' discussions are not shown in detail because of the need to manage the volume of the thesis.

5.3 Section 3: Case Unit C - Risk and Standard Office

This section analyses results of the Chromine's Risk and Standard Office Business unit.

Case Unit C description

The role of the business unit is to audit workplaces within designated area to ensure compliance to risk policies, procedures, legislation, and programmes. The unit coordinates risk assessments to ensure corrective actions are put in place to co-ordinate contractor compliance. Overall, the unit deals with Safety and Health Compliance and legal requirements compliance.

5.3.1 Case Unit C: IT Capability

The purpose of the case unit C is to ensure issue-based risk assessments are in place and updated for each activity and occupation on the mine. With continues timeous revision of relevant procedures and standards. To coordinate risk assessments to ensure corrective actions are put in place in order to maintain a safe and healthy work environment and co-ordinate contractor compliance.

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

> *Core business of mine is chrome extraction from underground processing and dispatch to the portal. While the business unit ensure Safety and Health Compliance and legal requirements compliance.*

The core business of the organisation is to mine chrome ore underground. The business unit deals safety and health requirements as set out by the mining firm.

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

> *Contractor management, standards, which includes inspections, covid-19 compliance. Systems uses daily is Firefly for access of the contractors and for myself as well, and I use Mozilla for adhoc contractors and for Isometrics.*

The business unit's role is to standards and compliance are met. *Systems used daily Firefly and Mozilla.*

IT systems value, limitations, and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

> *The system adds value to the mine, for the fact that we control access, and we are able to block and parade non-compliance contractors. The limitation that the system has which I have discovered is they are not correlated, that is the biggest limitation, they are not interlinked. So I believe the improvement should be on linking the 2 systems so that whatever is reflected on the other can then be actioned on the other system because adhoc and permanently contractors are managed differently but at some point adhoc are managed both systems and of which we needed both systems to assist and help each other in order to show that we have people that should be on the mine not illegally.*

The current system occurs to have limitations, which is systems running in silos. This limitation was also noted on Case unit A. this shows that there is a need to have a centralised system that interlinks all other business units in the future.

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

> *We have an IT administrator that helps with the dysfunction of the system. I log the call on the system, or I just walk to their office their next to me, that is then I will explain the*

predicament that I have with the system, then the administrator will help me either in his office, remotely or come with me into the office to sort out whatever need to be sorted out.

The support system process applied are satisfactory and reliable.

IT systems strength

Please describe the value of those systems, and how can you not function without them?

Normally in terms of contractor management, those two systems cannot be taken away. We need them. If we do not have those systems, then it means we would not be able to be effective, we would not be able to manage contractors, people will be coming in and out of the mine unmanaged and uncontrolled which possess significant risks to the operation. So we need them prior to said they just need to improved so that we can get to know value.

The mine cannot function without Firefly and Mozilla as it will have imposed significant risks.

IT Systems weaknesses and opportunities

Which challenges do you experience with the systems within your business unit? Please describe the issues encountered with the systems, and how do you wish they can be resolved?

Currently there are no measure issues with the systems. Nothing can be improved. Systems are working fine.

This shows systems reliability and effectiveness.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

Risks with the regards to system not being effective or not being in place is that, firstly with the 2 systems we would have people coming in and out of the mine under the influence of any habit-forming substance like alcohol and drug and of which we would not be able to you know to detect those people, not be able to deter them from entering the mine. That is a

significant risk and which can, you know pose the risks of mine licence being discontinued. We do have currently the system it does have alcohol breathalyser for instance where you blow in and when you are under the influence you are then blocked. you are not able to access the mine.

The mining firms are one of the sectors that operates with licenses issued by the department of Minerals and noncompliance with certain laws can discontinue operation of the mine. Therefore, disasters that can happen is discontinuity of the mine.

IT systems dysfunctions

What measure is in place if the systems were not to function accordingly?

The measure that are in place is the security control firstly and whereby they can use the register to come in and out.

Security control in place.

IT Systems dysfunctionality measures

How would you mitigate systems dysfunctions to optimally function accordingly, going forward??

What can be mitigated going forward is that the systems need the backup anywhere in terms of the system crushing down, we need the backup. We need to find the alternative backup whereby the other system is down the other one can work. And we might as well have the technicians 24 hours on the mine to work on the systems.

Backup systems and 24-hour support service.

Change of business operation

If you were to change your business unit operations, what would you change, and how would you go about it, especially with regard to IT systems?

In terms of the systems, I would change to oracle. I like that one. It manages absence and it is assistant by chromones which is alternative and whereby you get messages coming through on your email notifying you that your subordinates are not at work, or your

subordinates has come to work but is late which that is high class and system that can be adopted to ensure we manage absence properly and we do not wonder where is and who and we do not wonder the where about. We will know exactly where they are, exactly at what time did they clock at the mine. Which is the technology we need currently, and we do not have.

System upgrade and expansion for the current system is needed.

Usage of IT in the business unit

Describe how you use information technologies in your business unit for your daily routines?

Information technology we use emails, we use memos, we use telephones and computer that's anything to do with infrastructure for communication.

Communication through business unit uses information technologies.

End users' competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

The systems are introduced via communication memos, emails, and people are getting trained on the new systems that are been installed. So that you would know what to do and how to work with those systems.

However, there is no proper competent programme in place. The business units learn on the job and get assist as they do their daily tasks. For example

The competency, you would determine through pragmatic testing of the system with the user.

IT systems maintenance

To what extent are the systems regularly updated or enhanced? In your view, which risks can be imposed if systems are not regularly updated or enhanced?

The system I believe they are being updated on a regularly basis by the IT department, we do not necessary get to indebt of how and when are they updating but we have seen an improvement and we have not seen any outdated system and the systems have always been working fine which means the IT now are updating on frequent basis. One of the biggest thing is the virus protection, if is not updated it can course operation a lot due to the fact that the information can be stolen due to fact that it is not protected. It will be chaotic if the systems is not protected in terms of virus protection.

Proper measures are conducted regularly to keep the systems operating effectively.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

The process is training; we have training induction. We've got a training happening on site, as and when system is getting introduced and they are some changes in the system.

Trainings are conducted for both induction and systems.

Communication culture

What is the communication culture imposed by the organisation?

The communication culture is through notice board, through memos, through meetings and through the VFLs.

They are various communication channel utilised.

5.3.2 Case Unit C: Resource Dependency

The subsection theme explores and defines describes resource dependency in the business unit. A subtheme questions follows.

Outsourcing business process

How do you determine what business operation to outsource, and why? Please describe the procedure of outsourcing within the organisation?

Firstly, we identify the process that need to be outsource, then we advertise a tender. Then we select through procurement tendering abdication process. That's when the tender is getting awarded to the suitable service provider that can come to the side and provide us with the service.

Tender process is method used for outsourcing services.

Selection criteria

Please describe the procedure of outsourcing within the organisation? What are the criteria used for selecting the suppliers?

It is merely the procurement process, which actually has an embedded functions of tendering adjudication awarding of tender to the service providers. That is a process entirely to make sure we have people that are competent to come in to service the mine. Is the adjudication process. That is having the criteria embedded as to who then get. Normally they would send out 3 quotes and chose from the most reasonable service provider. That is one of the criteria, you are able to compare the cost, you able to compare the price that they charge.

The procurement business unit is responsible for outsourcing and selecting suppliers. All the process does not take place at the business unit, but only through procurement business unit.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

We do have performance evaluation process that the contract manager onsite is going together with procurement superintendent with the site of the service providers to ensure that the performance is as expected in terms of the scope of work given to the service provider.

The SLAs we do have with the tren-tyre for instance for the tyre that we use for the machine, we have SLAs for fire suppression systems and gases detection underground, we do have

those, I just mentioned few. We do have those and those are critical because the mine itself has does not have that expertise to adhere those functions.

There is performance evaluation process for contract management and expectations are measures according to the SLA both parties signed.

Skills and knowledge transfer

Does the SLA include a clause to enforce suppliers to upskill your internal staff? How do you make sure the supplier skills are passed over to the internal employees?

Currently the suppliers they are not passing the skills to the internal employee but what is happening is if the term of the contractor comes to an end and we see a need to absorb the employee of that contractor then we do so because we got a clause in our contractor management and the procurement management procedure to say that the contractor cannot absorb our employee but we can absorb theirs, when the scope of the work has come to an end.

No skills transfer from supplier to internal employees. Options provided by the SLA is to absorb the supplier's competent employees.

Selection and critical function rendered by suppliers

What is the critical function of those services rendered by suppliers? Describe what influence you have in selecting a supplier?

They are very critical for instance if you do not have the time management, service provider on site you would have a problem whereby you would not have tyres, one you would not be able to inflate your tyres, to spec as required ,3 you would not be able to have your vehicles that are having tyre that are in good condition. That is the worst case that could have happen. Secondly underground in terms of gas detection you would have people assuming to being killed by the gases that are then released after blasting. So, you need those service providers to make sure that the gases are detected and enough ventilation is now have been given to those sections. We are getting influence by the fact that they are tasks that we cannot do ourselves. Those are our tasks that would influence us, to make the decision. For instance, to get the people to come and install the fire suppression systems on our building,

underground and to maintain them. Because we cannot do that ourselves, so that is the driving force behind selecting those service providers.

The service and skills rendered by suppliers are very critical.

Competency shortage

Describe any competencies that you cannot do without that a vendor or supplier has?

It goes back to gas detection. For example, every mine including ours cannot function without having fire detection, fire suppression, gas detection in place. Because if we do not have that and we got fire underground. That is the worst-case scenario. Because people would die due to smoke, people would die due to inhalation of gases.

Fire suppression service business unit relies on suppliers.

Service delivery challenges

Besides cost, which other challenges do you encounter while working with a supplier/vendor or a third party? Going forward, how would you like that to be done?

The Typical example is the contracting employees and there is the rule of contractor not coming to work intoxications. So they come to work being intoxicated with alcohol and drugs and the system at the gates by the access points detect them and they just run away and disappear without even reporting. So that is the challenge we have currently experience is merely human behaviour. Enforcement. The contractor must just enforce and continue to communicate the same information to their contracting employees. That is the only thing that should be done and to also make them aware of the repercussion in terms of the person coming to work drunk.

Human behaviour which needs proper measure to enforce the compliances with rules.

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

The international suppliers they are suppliers that are far from us and they are supplier that have long turnaround time. And which cost the mine lot of money because we need to wait for a spare which is critical, where else you've got the local or the national suppliers you get that in real-time. Your turnaround time is very short and you're able to deliver as expected. The qualities of the suppliers, we look at the previous employer that employed this supplier. The performance, reference check. And we look also at the convenience. How convenient if we going to get them quickly to the mine and service us for instance those that are not to stay in business service providers. We look at that to say how quickly, how effective will they be in terms of responding to the service to render to the mine.

Local suppliers are preferred based on time respond and convenience.

Skills development

Why are you not building the capability within the organisation for the tasks that are done by suppliers so that you can reduce the outsourcing role by the suppliers?

It goes back to the human resource department. It has to make sure that they recruit from the service providers. So that we can have the skills transferred. Have the leaners, or having the learnership, or the artisan aiders if they artisan to learn from those that we recruited from the service providers.

The business units rely on human resource business unit to cater for learnerships.

5.3.3 Case Unit C: Upper Echelon Theory

The subsection theme explores and defines describes resource dependency in the business unit. A subtheme questions follows.

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

Risk and contract management. Looking after risk assessment, am looking for after contract compliance in terms of safety and health to ensure that we've got contractors that are complaint on the mine, complaint with BBB, complaint with tax clearance, compliance with

compensation commissioner, compliance again with the local rules and regulations. compliance also with our standards. Years of experience 16 years.

The role of Risk and Standard Office updates, implements and maintaining of safety and health of employees and manage the risk control measures to ensure not only compliance but also create awareness.

Competency skills, experience and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

In this role, you need to have at least an auditing certificate for ISO9001, ISO1401, ISO4501. You need to know the international standards governing governmental quality and safety management. And apart from that, you need to have a little bit of safety management, you can do safety management and upskill yourself going forward.

Various competence skills and experience are required.

Leak of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

We would have the stoppage from DMR time and again which poses a risk to the operations since most of the work has been done by service providers.

DMR is the department of mineral and resources that make sure mining firms compliance with the standard. Failure to do so, the DMR can impose a stoppage in production and fine the mine.

Qualifications and value added

Is there any qualification needed for your position, if then, please list them? What value have they added to your experience, and career?

You need COMSOC. COMSOC is something to do with the safety and legislation part. They added a lot of value to my experience. I can function on different levels from the risk offer

level, safety officer level, chief safety office level, safety manager level. Those have helped me a lot and am still continue studying.

A qualification is needed and a COMSOC is recommended.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.;
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views.
- Transformational leadership is someone who actively communicates any changes to employees, and is always motivational.

Autocratic leadership is being dominant in the organization. Whereby people are being ruled with iron rot. You will do this. This is a kind of leadership, you will do this, I need this to be done now. It all about instruction directives. And this less of support, there's less of the assistant.

The leadership style differs according to business unit. For Risk and Standard office Autocratic leadership style followed.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow, and acquire new resources like human personnel? How does management influence the daily operations of the mine?

The mine can grow should they look at the skill development which we currently doing but at a very low rate. And to absorb the leadership once they completed their service. So that we do not lose skills and we do not lose expertise. because those people we have upskills and they know our processes, they know our culture and therefore we need to absorb them because for the fact that we trained them, for the fact that we gave them exposure. the in-service training that they received; we then can have an easy. You know the recruitment process because those people are already here and they know people around, they know

sections around, they know the culture and they know the process and the systems that are used. Daily operations are merely through incentives.

Skill development and absorption of the skilled people. While where there is incentives provided to employees for performance measure the employees turn to be more motivated and operate effectively.

Organisational growth

Explain briefly how the organisation grows, and acquires new resources like recruitment, and retention? How does the organisation (or the different units) ensure that the targets are met?

In terms of human resources, we look at the analysis, employee analysis and we check what are the roles that are needed for the organization to improve and again what are the department that is under skilled. Or which ones are over complicated and to balance you need them to analyse the compliment of the organization and to ensure that you are not under-resourced in terms of the labour. So you need that in place. That is what is currently been happening to make sure positions are being filled with relevant expertise. Target is driven from corporate coming down to the business unit, coming down to departments, coming down to sections, and coming down to individuals. So now to ensure that the targets are met. The objectives are being given to the departments. To disseminates to the sections so that the sections communicate with the people that must make sure that targets are met and we are able to meet those target of the corporates. So those objectives are being shared amongst the department and are being shared throughout so that the objective of the organization can be met through different sections.

There is quite a number of processes that ensure targets are met. However, targets are given per each business unit.

Employees performance measures

What measures do you have in the business unit that may help improve employees' productivity? How does the company manage the employee's performance?

IDPs and KPIs which is also utilised by other business unit.

IDPs uses to upskill the people through training. And KPIs are used to measures performance. So that is driven by the department prospective supervisors to make sure that the people are upskilled and deliver in terms of the KPIs

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

My role as I mention is to manage contract compliance on the mine to make sure contractors coming to the mine before they could be exposed to the sections are compliant with the standard, is compliant with the mandatory code of practice. The complaint with legislation.

The business unit ensures all employees are complaint with legislation.

Business process governance

How does the current organisational structure ensure proper governance, and maintenance of business processes?

We do have the organisational structure that is being pioneered by the General Manager that appoints people in different positions to ensure that the organisations are being driven in the same direction and earning reports.

Proper governance cut across the organisational structure.

Management support

How does upper management envision/support your business unit?

They support it through the budget, the budget for the things that we need so that we can be able to purchase what is needed to be on site.

Management support make budget available to the business units.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

Automation is the biggest enemy of mankind. Is taking away the jobs of the people for instance drill rigs can function without a person controlling them. They can be automated. We can have an automated drill rig. We can have 2 or 3 people in the control room operating 10 rigs and of which you've have taken away bread of almonds 10 people. So that is not a good thing although gradually coming through on the industrial revolution of which we are seen from other countries that is already in place but is the biggest enemy of mankind. We going to experience a lot of arise, you know house brake ins and of which people will be hungry and need something to swallow.

Currently, the business unit support automation of processes. However, they acknowledge the impact automation of process comes which merely affects the employment.

5.3.4 Case Unit C: Summary of the study findings

The system adds value to the mine because they control access, and the unit is able to block and parade non-compliant contractors. The improvement should be on linking the two systems (Mozilla and Firefly) so that whatever is reflected on the other can then be actioned on the other system because adhoc and permanent contractors are managed differently. However, at some point, adhoc are managing both systems, of which we needed both systems to assist and help each other in order to show that we have people that should be legally on the mine.

The systems are in silos; Mozilla and firefly are not linked. For instance, when a contractor is being terminated on Mozilla, the contract is still active on firefly, meaning the person can still gain access to the mine, which pauses a higher risk. There is a reason why a contractor would be terminated on Mozilla, and there is a system that if correlated and interlinked, they would have stopped him from accessing the mine basis (9_16238293898_Risk & Standard Office).

In terms of contractor management, these two systems cannot be taken away. Without these systems, it means the mine would not be effective. It would not be able to manage contractors, and people will be coming in and out of the mine unmanaged and uncontrolled, which possess significant risks to the operation. There are risks with the regards to system not being effective or not being in place. With the two systems, we would have people coming in and out of the mine under the influence of any habit-forming substance like

alcohol and drugs, of which we would not be able to detect those people, and unable to deter them from entering the mine. That is a significant risk, which can result in the license being withdrawn.

Technology provides value to the mine since we control access and may restrict and punish non-compliant contractors. The two systems have a drawback in they are uncorrelated. They are not interconnected. It was suggested that these two systems be linked so that whatever is reflected on one may then be actioned on the other. What can be avoided in the future is that the systems need backup in the event of a system failure. It was suggested that there be a backup system so that if one system fails, the other may continue to function. Certain duties are delegated. There is a procurement procedure that includes tendering adjudication and awarding of tenders to service providers. That is a whole separate procedure to ensure that we have qualified personnel to come in and serve the mine. Following the award of the tender, a performance assessment procedure is carried out to verify that the performance is as anticipated in terms of the scope of work assigned to the service provider. One issue that has been identified is that vendors are not passing on expertise to internal employees. As a result, the mine has absorbed the contractor as part of the team to guarantee that the contractor's expertise is maintained.

The organisation is dominated by autocratic leadership although the respondent claimed that transformational leadership would be more suitable. It is all about leading from the front, teaching others what to do, being present, and prepared for the items they must deliver. The respondent utilises incentives, and the existing bonus structure to persuade employees. They are pushed from corporate down to the business unit, departments, sections, and people to achieve goals. The GM's organisational structure selects the individuals in various roles to guarantee that the organisations are all moving in the same path and earning reports.

The next section will discuss the Protection Services Superintendent Office Business unit. To manage the volume of the thesis, some discussions are not detailed.

5.4 Section 4: Case Unit D - Protection Services Superintendent Office

This section analyses results of the Chromine's Protection Services Superintendent Office Business unit.

Case Unit D description

The role of the business unit is to manage resources and investigate breaches of security, to initiate and manage appropriate systems to minimise risks relating to the security of employees and assets. Their purpose is to looks after not only fixed assets but also products on mine and throughout the whole logistics chain.

5.4.1 Case Unit D: IT Capability

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

> *The role of the business is to mine chrome profitably and sell it from the open market. Protection services looks after not only fixed assets but also product on mine and throughout whole logistics chain. Basically, in SA from mine to border.*

The core business of the organisation is to mine chrome and sell. The business unit deals security measures.

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

> *Specific daily task is to look at all the GPS tracking system for example on our guards. So we have to look if they perform their duties during the night. We signoff any registers that's in place like for example control registers, control sheets, posting sheets. And then monitoring electronic systems to check all the loads that was dispatch if is there any issues. The automation deviations that we get from MES. See if there is anything that jumps out. All*

the reports during the night overloads to check in the morning to see if there is any pertains or highlighted risks. MES, Outlook, WhatsApp and Microsoft are systems used daily.

The daily task of the business unit's role is to guards and monitor electronic systems*. Information technologies are utilised to render daily operations of the business unit.*

IT systems value, limitations and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

I think the biggest value added in terms of our internal systems is to ensure that tasks are performed and that we get the service that we pay for and on the MES, to monitor for exception. You see if there are exceptions or anything that needs specific actions. I think the biggest limitations is live monitoring. Live tracking. I mean in terms of security and theft. You will know the next morning that there is a variant but you would not be able to act quickly enough to prevent theft or loss.

The current system has limitations, which is systems makes the business unit not to be effective in their roles. It takes certain hours for variant to alert the responsible personnel of any theft. Which means the system fails the business unit to provide prompt service.

IT skills support

How is the system support offered, and how can it be improved?

Most of the support in the mine is helpdesk based. So you log a call and you can probably phone directly if there is a higher risk issues or something needed to be sorted out quicker.

The support system process applied are satisfactory and reliable.

IT systems strength

Please describe the value of those systems, and how can you not function without them?

We would be blind, and we would not know if product is lost, we would not know if there are variances in weights in terms of the internal staff I wouldn't know if guards are doing their work or the internal companies are doing their work. And all risks are being addressed.

The mine cannot function without the system merely because theft cannot be controlled without the business unit systems.

IT Systems weaknesses and opportunities

Which challenges do you experience with the systems within your business unit? Please describe the issues encountered with the systems, and how do you wish they can be resolved?

> *To be fairly, I am new in the organisation and my biggest issue now is that the systems are outdated. There was no replacement schedule. For now, only software systems and hardware system as well. So some of the first things that I have done is to update the licences. There was no schedule to do it and there was no somewhere part of the database or a list to know that we have to update this licences, we had to update these systems.*

The new joiners of the business struggle with taking over and running of the business because previously thins were do different which impact of the system updates.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

> *I think on the MES side; we would have a huge risk in terms of exposure on the product side. I think up to a point that you might miss shifts that you might not be able to deliver on customer expectations or on planned shipments and theft. On my side theft is a big issue. I don't know what disastrous recovery plans is, I would not be really involved in that side.*

The business unit does not have any identification of recovery methods if the system were to not functions. This shows high risks of disastrous which has to be attended as a matter of urgency.

Change of business operation

If you were to change your business unit operations, what would you change, and how would you go about it, especially with regard to IT systems?

Look I am changing things now, we are updating licenses, we are updating software's. We have loaded new software. We are busy replacing hardware from next year budget. We plaining on having a look at outdated hardware. Put them on replacement schedule and off course you want everything to speak to each other. So there's opportunities for integration between alarms and CCTV. On MES side I think, as I said the biggest issue for me would be live monitoring. Where I can see a guy in front of a PC and he sees what happens in real time and then you can quickly and maybe prevent theft instead of just knowing about it the next day.

System upgrade and expansion are currently upgraded.

Usage of IT in the business unit

Describe how you use information technologies in your business unit for your daily routines?

Information technology we use all IT related staff, basically cell phone, laptop, PC.

Business unit uses information technologies.

End users' competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

Not at this Mine. When I started here, I asked for example JDe training, I asked if there was training that I might have on JDe course I never worked on JDe and response was I must go to somebody that knows the system and get training because there is no formal training or training on the system to know how to use it. So that's a big, short coming, I mean if there is a system or you start working or you put in a new system they have to be training and the person has to know how to use it and that's no in place at the mine.

There is no proper training or competent programme in place. The business units learn on the job and get assist as they do their daily tasks. This is a challenge because it is noted from other business unit as well which might impact negatively on the usage of the systems in place. User may not be comfortable or keen to use the systems in place.

IT systems maintenance

To what extent are the systems regularly updated or enhanced? In your view, which risks can be imposed if systems are not regularly updated or enhanced?

> *I have only been here for six months that I haven't seen any update in the last six months. Like I said I had to update all licences and some of the licences where seven years old and if I look at my internal space there was nothing done in the last seven years. The biggest issue now is ransomware and viruses and staff if you don't update your antivirus programs and software files. And like I said cost wise for the business if you don't update your licenses each year then you get to a point where after seven years you have to do everything at once. So there's definitely a cost implications and we've seen it in the past that ransomware if it gets on to your network then you get in trouble.*

While some business units stated that systems are regularly updated, the Protection services business unit is the first to state leak of system updated.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

> *I don't know about basic computer, skills and staff but as I've said for example JDe when I started and I requested formal training they said there's no formal training you must get somebody to assist you.*

Trainings are not conducted to improve employees' competencies and skills.

Communication culture

What is the communication culture imposed by the organisation?

> *For electronic communication that goes out, there's weekly or monthly safety topic. But there's also quarterly face to face meetings. I think it has reduced now because of the of the Covid restrictions but it's mostly electronics. Weekly meetings sent out on presentations*

They electronic communication is the method used for communication.

5.4.2 Case Unit D: Resource Dependency

Outsourcing business process

How do you determine what business operation to outsource, and why? Please describe the procedure of outsourcing within the organisation?

> *I think in terms of security it is all about cost and its cheaper to employ a security guard in terms of total cost of employment and its easy to employ a person on a same level because we typically will have to pay that person more. And the total costing if you look at pension, leave and everything becomes more than what you'll pay for a contractor. I think in terms of the starting point is probably a decision that is just made to outsource specific function and then they would be a tender or procurement process to identify suitable vendors that can do the job. It start with a decision that we either outsource or insource something.*

Tender process is method used for outsourcing services.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

> *While I don't have the SLAs as yet but what I do daily, I post sheets to make sure if there must be 20 guard, there is 20 guard on duty. We've got GPS tracking on all the guards to make sure that they do their patrols as they supposed to. We have got weekly meetings with the contract security company to highlight any issues during the week. Operational issues. I have got monthly manpower planning meeting that we put out for that month. Where we going to post guards which sides they are, which sides do we remove. We also base our invoice on that manpower planning meeting. To pay for what is on the ground and that there are no variances or anything.*

There is no SLA in place for performance monitoring. The business unit relies on meeting and engagement with the employees.

Selection and critical function rendered by suppliers

What is the critical function of those services rendered by suppliers? Describe what influence you have in selecting a supplier?

> *Critical functions at mine in terms of my supplier is specifically access control. The whole access control portion is done by contractors. As well as all after ours control of the site is basically left to the contractors. I did not select the current contractor but that was based on the tender and then the tender was further split in to two companies based on local economic development and black economic empowerment.*

The service and skills rendered by suppliers is access control which is very critical.

Competency shortage

Describe any competencies that you cannot do without that a vendor or supplier has?

> *The biggest issue in terms of us is probably riot and crowd control where they've got competencies to work or use firearm and staff like that and that we might necessary not have in place internally.*

Licence to use firearm for riot control.

Service delivery challenges

Besides cost, which other challenges do you encounter while working with a supplier/vendor or a third party? Going forward, how would you like that to be done?

> *My biggest issue is availability of personnel. We like for example December we have a lot of short postings. I mean then we request credit notes from contractor, and we did not pay for the service that was not rendered. Look when I started at the mine six month ago, they didn't have enough personnel to cover the sides. So there was a lot of overtime work. So obviously there was a lot of appointment made and there's was no enough people now to cover the sides. And have relievers so that's the one issue. Over December is normally a difficult month and there was a bit of additional lot of postings. So that's why it was a bit short and you cannot appoint a guy for a one month so we just try and manage. Security it is all about a the labour and there is a lot of labour issues and labour availability and staff like that.*

Labour issue management mostly during pick seasons need to be planned and managed accordingly.

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

> *For me local. The big reason for that is we are about 350 kilos away from Johannesburg. So everything takes longer to get resources on site. Let's say riot, crowd control if a company comes from Johannesburg there is cost implication to dispatch from and even time. It is going to take two to three days where else local companies have resources available much quicker and much cheaper. Once again contract security is all about management because the guards normally just shift from company to company but normally but you need to have a look at the leadership of the organization. Whether they are security people and are willy to assists going forward. And that's where the big differences are between the companies.*

Local suppliers are mostly preferred supplier. Time respond and convenience are the driving force behind the preferences of business units.

Skills development

Why are you not building the capability within the organisation for the tasks that are done by suppliers so that you can reduce the outsourcing role by the suppliers?

> *From purely procurement background we need to maybe have more, I don't know if it's difficult because we have a lot of history in this. We need to look at supplier that can do the job and it's not going to be manipulative and excessive costing and on my side I would like to go back to one contract system. Whereby now I have two contractors, which makes a bit more difficult to manage.*

Managing two supplier requires more effort and the business unit would like to change and move to one contract management.

5.4.3 Case Unit D: Upper Echelon Theory

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

> *I am a protection services superintendent, and I am responsible for the leadership security onsite and then throughout the logistics chain in SA. Probably 5 to 10. I have 20 years' experience. But probably 5 to 10.*

The role of protection services superintendent is responsible for whole mining firm security protection. It is a management level that requires more than 5 years of working experience.

Competency skills, experience and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

> *I think the key, obviously you need to have paperwork, academic degrees the academic background then experience in the mining industry, in the Steelpoort area experience working with the communities, the history between the communities and the different representation. Models that have been used in the past. And then like I said experience in the mining industry. Know how to get things done to work with the systems, the people that work with you.*

Academic degree, skills and experience are required. Mostly people management skills.

Skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

> *I think at the mine in the past, they have been a lot of gate closures and instability in terms of community issue. That's one risk. The second risks are theft of company assets and even product and then obviously misappropriation in terms of procurement and all those processes.*

Community engagement and control is the major risk that the business units has to manage.

Qualifications value added

Is there any qualification needed for your position, if then, please list them? What value have they added to your experience, and career?

> *The standard qualification would be a degree in safety manager. But also international standard which are very good. All your Access standard, your certifications.*

The business unit requires a degree and certifications.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.;
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views;
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

> *I think in mining you need to be direct, but you also need to take people with you. There are different ways of motivating people, like you said the autocratic leadership style like you simply tell people what to do and people would do what you tell them to do. But they would do what is best for the business or what they think is best in their area. Most people know exactly what needs to change or what needs to be change in their different area. You have to give them the freedom and the support to be able to it.*

The leadership style differs according to business unit.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow, and acquire new resources like human personnel? How does management influence the daily operations of the mine?

I think the most important thing for the mine to be sustainable. We need to become platinum producer, so that involves bit of capital outlay to continue with chrome and then platinum group metals as well. Yeah management instruct and ensures that we all heading in the same direction, so there's daily reports and emails that goes out. We have got management group. I go in the morning to general manager any additional instructions are given.

Management communicates and instructs daily to keep everyone in the same wavelength.

Business units' targets

How does the organisation (or the different units) ensure that the targets are met?

I think obviously the budget are there and production is part of the budget then there's monthly production reviews. There are quarterly reviews from head office, there's bonus and KPIs attached to production figures, cost and everything. Some guys get it monthly; some get it annually.

There is quite a number of processes that ensure targets are met. However, targets are given per each business unit on quarterly or yearly.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

In terms of legal compliant my guys are the gate keepers. so we make sure that the company that comes on site adheres to not just Covid regulations but they are complaint to the regulations and procedure that have in the company and that in turn compliance to national legislations and all different rules and staff.

The business unit ensures all employees are complaint with legislation.

Business process governance

How does the current organisational structure ensure proper governance, and maintenance of business processes?

As far as I know, there is internal audit that comes once a year that audit different departments to see if there are abiding by the rules. My role is that I operate outside the business, because we assist with auditing stores and making sure that rules and procedure are followed. We investigate if there are any concerns. So that is how we make sure that rules are ensure and give governance assurance on processes and staff.

Governance is followed in the business unit.

Management support

How does upper management envision/support your business unit?

I think they give direction, and they give overall objectives that we need to meet and what they would like and highlight to us what is important and what we need to focus on.

Management supports the business unit by giving direction and objectives.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

I think a lot of process especially in security can be automated, let's call it automated done by systems. They certain process have gone but you need to carefully decide and investigate what technology sustainable and what gives you the best return on investment and what is the easiest to maintain and to support and then replace process where you can with technologies that is suitable.

The business unit has taken consideration in terms of automation of process. Knowledge about the change that comes with automation.

5.4.4 Case Unit D: Summary of the study findings

According to the respondent, the systems are out of date. The most serious problem raised was live surveillance. Another problem raised by the respondent was a lack of formal training or instruction on how to utilise the system.

I don't know about basic computer skills, and stuff but as I've said, for example, with JDe when I started working here, and I requested for formal training. They said there was no formal training, but I must find somebody to assist me (7_16238293896_Protection Services Superintendent)

As a result, if you do not update your antivirus software and software files, you will be vulnerable to ransomware, viruses, and malware. The respondent indicated that electronic communication is the primary mode of contact through emails and phones. This has only increased as a result of the ongoing Covid-19 challenges. Following the procurement of services via tenders, GPS tracking is used to monitor security guards to ensure that they perform their patrols as expected. Access control is a critical role at the mine in terms of our suppliers. Contractors handle the whole access control portion. Furthermore, all management of the site is essentially left to the contractors.

The whole access control portion is done by contractors (7_16238293896_Protection Services Superintendent).

The businesses were chosen based on the tender, which was focused on local economic growth and black economic empowerment. CCTV, electric fencing, and alarm monitoring were suggested as ways to enhance value. The respondent said that fewer security personnel were required than in the past.

According to the respondent, local suppliers are superior than foreign suppliers. The researcher used riots and disruptions as an example of when local security would be needed since outsourced security personnel not within the parameters of the mine location, it would take days to react. There have been a number of gate closures in the past, as well as volatility in terms of community issues. That is one danger. The second danger is the theft of business assessments and even products, followed by apparent misappropriation in terms of procurement and all those procedures. The respondent said that once a year, various departments are audited to check whether they are following the regulations.

The next section will discuss the Procurement and Quality Office Business unit.

5.5 Section 5: Case Unit E - Procurement and Quality Office

This section analyses the results of the Chromine's Procurement and Quality Office Business unit.

Case Unit E description

The business unit ensures routable equipment products and services supplied by external or internal service providers meet the required standards, and safeguard stock availability. The role is to continuously evaluate/analyse current practices and services, and make recommendations for improvements/changes regarding quality, reliability, costs, and efficiency responsible for the procurement off and on-site repairs.

5.5.1 Case Unit E: IT Capability

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

> *The main objective is to produce Chrome for the overseas market mostly. The role of my section is to ensure that there are enough spares in terms of the ones that are routable. Routable in a sense that you send something to be repaired it comes back and replenishes your stock levels. So you need to keep that circle going, it means if I give you a repaired item, you give the damaged one. I sent it out, it gets repaired, it comes and replenishes the stock level. So if we get to a point where you have repaired it several times, you need to buy a new one. Because now the cost of repairing it would be almost or more than the cost of buying a new one. So we normally call it a Beyond Economic Repair item (BER).*

The core business of the organisation is to mine chrome ore and sell the chrome to its international markets. The business unit deals with repairs, replenishes or stock and responsible for spares available for production of the product.

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

My specific daily task and routines is to ensure that the purchase orders have been created. We normally get quotations from the suppliers; we get them attached and then the buyer creates orders. So when the order have been created, we need to ensure that the supplier has received that purchase order. So if the suppliers confirmed that they have received it, we need to determine when will they be able to supply us with that component. Like sending it back to the mine so that we replenish our stock levels. So it is more like expediting purchase order creation and ensuring that damaged components gets send away. We use the JDe system to create requisitions. When a requisition has been created, we create something we call the Request for Quotation (RFQ). When its created, the system send an email to the supplier to notify them that there is a component that they need to come and collect. The other system is Qilkview. But qilkview is for reference purposes, in terms of like checking your outstanding purchase order and to check for the spares that have been withdrawn and the cost that have been allocated to certain budget cost. But merely we use the JDe.

The business unit's role is made sure that orders are created. The business unit, use JDe system to create orders and requisitions. While there is Qilkview system that allocate budget and spares utilised.

IT systems value, limitations, and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

Value, it depends because in my own perspective, and that's my own opinion. I think we are working for the system, instead of the system working for us. So that's how I see it. I come from a background whereby I was using SAP. I was using global SAP, I used one SAP, I used Sappinah. So, it's a system that works for you. You are able to run reports without having to go to on external link and check what is done. You can run a report like on the system, so you just export your data to whatever. So in my opinion your current system does not add any value because you work for it. You need to rely on for instance qilkview. Of which qlikview and JDe they are not talking to each other. So whatever information you get on qlikview, level of integrity in terms of the data that you get you cannot be so sure to say whatever I get from qilkview is what have been uploaded from JDe.

The current system occurs to have limitations, there is incompetent in terms of convenience. Systems are not linked which makes data readable from one system to another not consistent.

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

> *There is no clear guidance in terms of who to conduct. You just do things, some of the things you learn as you do because there is no process. Like for instance if you can ask me now the number of the support system that you are talking about. I don't even know it. I don't even know the contact people that I need to contact.*

There is no support system process according to the business unit, meaning there is an area of improvement.

> *It can improve by making it transparent. People need to know which number to call, what are the steps and the procedure to follow, when you need to log the call.*

IT Systems weaknesses and opportunities

Which challenges do you experience with the systems within your business unit? Please describe the issues encountered with the systems, and how do you wish they can be resolved?

> *There are many other things that we encounter. To mention few, for instance if I can create a requisition for me to delete that requisition, I need to contact a lot of people so that they can delete it for me. Whereas if I had been given a KPT (Performance type) that allows me to be able to delete the requisition. Because if you delete it, it will show electronically what I have done on it, they will be fingerprint on it. To say this person did that, on this day, at what time. So currently its difficult for one to work on it. So those are the challenges we experience. Sometimes the system freezes, while you are working on it and then it bombs up. Then you lose whatever transaction that you were doing on that moment. Those are some of the challenges.*

The system currently used by the business unit has too many loopholes and makes it difficult for the users to conduct their daily task. This is a concern because IT systems have to make one's work easy however in the business unit sees no value of the system.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

> *If system is not working, then the business still need to go on. Then you do a manual system. Whereby after when the system is back on operation then you have to recapture whatever you created manually. Manuel purchase order. For instance, the system is not working then the business still need to go on. Then you do a manual system. Whereby after when the system is back on operation then you have to recapture whatever you created manually. If disasters where to happen, then for instance you need to do a manual work. The manual system allows end uses to come with the paper and then there is a booklet where you create manual orders. So that booklet is the one being used to recapture back in the system so that the process can be followed as if the system was live again.*

Manual process is still utilised in case of system dysfunction. This process creates backlog because all manual orders have to be created on the system when its running again which is time consuming.

IT systems dysfunctions

What measure is in place if the systems were not to function accordingly?

> *The measure that is the manual system in place. The only thing that we can do is write down data so that when the system comes back we can transfer to the system.*

The manual utilisation of process take place in accordance of system dysfunctions. This process is utilised by other business unit.

IT Systems dysfunctionality measures

How would you mitigate systems dysfunctions to optimally function accordingly, going forward??

I think it can be mitigated by improving the systems. I do not know if there are other versions to this one we currently using but if there are other ones we can rely on and use them.

System upgrade to latest version of the system with improve function is desirable by the business unit.

Change of business operation

If you were to change your business unit operations, what would you change, and how would you go about it, especially with regard to IT systems?

I would change the system that we used to work for us because JDe system is not working. We are working for system instead of the system working for us. So you go for a system that will be able to work for your business unit instead of them working for the system. So I will come with the system that will enable them to have enough time to do other things instead of working for the system.

The is desire to change the system completely because of its failure to meet end users needs.

Usage of IT in the business unit

Describe how you use information technologies in your business unit for your daily routines?

Desktop, laptop and the telephone are technologies used.

End users' competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

The new systems get introduced via emails and the preparation part is the poor one because you end up getting emails and when it comes to the implementation part, there is no strict regulation of that change management to say all people need to go through this change management. Everybody who's willing to come and learn, then will come. So if people don't have time to go there then they won't be able to learn on those new changes.

Proper system implementation and training. Employees learn on the job and get assist as they do their daily tasks. No formal process in place;

> *There is no formalised system, whereby you need to go and do a certain course, certified and then found competent. It is more like a trial and error. You learn as you do.*

IT systems maintenance

To what extent are the systems regularly updated or enhanced? In your view, which risks can be imposed if systems are not regularly updated or enhanced?

There are no measures to regularly keep the systems operating effectively.

Disaster Recovery plan

What recovery is in place if disaster were to happen, and the systems were to be dysfunctional?

> *Not that am aware of, but am sure that is somewhere risk mitigation in terms of what should happen in case such things where to happen. But I haven't come across one.*

Various business units do not know of any measure for disaster recovery.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

> *I know is that there is personal development plan that each employee should have so that they can develop them and train them and skill them according to their occupation. The development of the employees is that there is personal development plan that it needs to be in place whereby they need to identify employee development needs.*

The main tool in place to develop employee's competencies, skills, and knowledge is individual development plan.

Communication culture

What is the communication culture imposed by the organisation?

The communication culture is normally via emails. They sent memorandums and communications via email. And those who do not have emails the messages are communicated to them through meetings.

Communication channels accommodates all individual with or without emails.

5.5.2 Case Unit E: Resource Dependency

Outsourcing business process

How do you determine what business operation to outsource, and why? Please describe the procedure of outsourcing within the organisation?

Outsourcing part, I think is in conjunction with the management. If the reason for outsourcing help save the company cost, then you go for outsourcing however if insourcing cost the company money the you use other method. The processes of outsourcing, firstly you check the skills of your employees you have the capacity and the knowledge to do that thing. If not, then that's when you think of the alternative of outsourcing versus training them and then countering a lot of issues because maybe you do not have the resources to perform that task so you go for outsourcing.

Outsourcing for the business unit is determined by the unavailability of relevant skills within the business unit cost.

Selection criteria

What are the criteria used for selecting the suppliers?

You normally check couple of things, one is the quality of that product you will be getting back from the company. Secondly the pricing, you check the prices between if there maybe finances can select three suppliers. Then you do comparison in terms of the cost because you will find out they charge different prices for the very same product. Thirdly is the commitment on the delivery date, are they delivering on time as promised or they take longer. So if one scores best on all three then we get that person as a preferred supplier versus the other ones that are lacking on either they costing the delivery.

Criteria is used is price comparison, Quality, and delivery date.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

> *We are working in an environment that needs to do lot of things, because currently we do not have any SLA with the suppliers, its only maybe out of 145 suppliers we only have SLA with less than 10 suppliers. What currently is happening, a decision is reached to say will use the current suppliers. Will try the supplier for two years checking at what cost, delivery at their quality and after two years will sit down and review all these three aspects and determine which one scores better amongst them. Say like it's a supplier that repairs engine, we compare that supplier with the other engine repairers so that we can be able to determine which should repair for us. Who should go into SLA with. so we don't have a lot of suppliers, in actual fact I would say 90% of the mine suppliers we don't have SLA with us.*

SLA is not signed between the mine and the suppliers for most of outsourcing work. This is inconsistence and shows an area of concern. SLAs must be utilised throughout.

Selection and critical function rendered by suppliers

What is the critical function of those services rendered by suppliers?

> *The critical part is that if something breaks it needs to be fixed, so if it does not get fixed then the mine will stop, they won't be any operation. So it's a critical service.*

The need to remedial any breakdowns on equipment because breakdown not fixed course production stoppage.

Competency shortage

Describe any competencies that you cannot do without that a vendor or supplier has?

> *I think that should be the product knowledge. We do not do component striping, like strip and code of repairs. If component fail, we take out and sent for fixing. So we don't have the expert knowledge of the supplier whereby they know how to rebuild that component.*

Product knowledge.

Service delivery challenges

Besides cost, which other challenges do you encounter while working with a supplier/vendor or a third party? Going forward, how would you like that to be done?

> *Commitment to a delivery date. That's the challenge. Going forward is to get a person that is appointed permanently for that position. For the expeditor. because if you do not have a full-time expenditure it means now somebody need to multitask now. So you won't be able to do it on a daily basis, whereby you'll be checking if you need this, what went out last week, need to get a quotation. Therefore, I need to contact the buyer and say I need a purchase order for this thing, this one has got a purchase order when is it coming back to the mine? That is a full time job.*

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

> *I think local, because it's more like. Firstly, there's no much red tape in terms of compliance and all those things and secondly its people that you can easily go and see and visit and interact with when you have other things that you need to discuss with them*

Local suppliers are preferred based convenience.

Change recommendations

What change would you bring given the authority to bring change to the way the mine does things, especially regarding the suppliers?

> *To have SLA with the suppliers because it makes life easier and for budgeting. I know what price, how much to commit and everything. so when I go and ask for capital, I already know how much I will be spending, even if I cater for breakdowns and emergencies then I'll still be within what I have went and asked. So I would not be in a position where I'll be over spending. You understand.*

Because the business unit outsource service without SLA, going forward SLA can be used for all suppliers.

5.5.3 Case Unit E: Upper Echelon Theory

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

> *My current role is to do procurement and quality. Procurement in a sense of ensuring that we got enough spares when it comes to routable. We have repairs and then the other functions are to ensure that whatever we receive from the supplier meets the standards in terms of safety, in terms of quality of that component.*

The role of the Procurement quality ensures routable quality of spare and availability with safety measures.

Competency skills, experience and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

> *In terms of the academic background, it just a matter of knowing the basics of supply chain management in teams of technically just a matter of either you have a trade or you exposed to doing requirement of trial learning. I'll give you example the data captures has been here for 8 years and she knows what has been happening there, so don't need specifically person with a trade. Just a need a person who will understands the processes. What to plan, what should happen. And understand supply chain management. To understand where this thing starts and everything and the internal processes.*

Procurement quality business unit requires no qualification; one can learn on the job.

Lack of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

> *It will cost financial loss, because firstly you will be spending more money because now you don't have a person who understands that this thing needs to be sent out, return back on*

time. Secondly if you do not have a person who understands that this thing needs to be expedited to ensure that it comes back to the mine. You will find out that you experience lot of things that are outstanding for years. Because somebody did not appreciate the fact that the thing needs to come back at the mine. So it's a huge financial risks to the operation.

Resource theft and non-traceable may be experience with the business unit if relevant skills are not utilised or know. It is critical for one to know the process.

Qualifications and value added

Is there any qualification needed for your position, if then, please list them? What value have they added to your experience, and career?

Supply chain certificate and operational knowledge in terms of what happens with the repairs and everything. And basic knowledge of Microsoft office, so that you able to do the reports, send emails and communicate with the people.

Certification is needed and basic computer knowledge.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.;
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views ;
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

I think there is old business model that is being followed. It is more of autocratic system whereby somebody needs to tell you; micromanage you into doing your job. But I what I prefer, I prefer a bit of a transformational leadership and a participative one because if you are a participative you engage your team and if you engage your team whatever outcome it does not become your decision. Therefore, it is easily achievable. Everybody

sees the value of doing it and why are they doing it. That ownership makes your job easier, as a leader of that team to easily accomplish what objective.

Autocratic leadership style is mostly used in the business unit.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow, and acquire new resources like human personnel?

With the current changes in the top-level management, I think if we get more people who are coming from a different background and perspective then the mine can head in a different direction but if they going to source internally from the same people that we are exposed to the way of doing things here then the mine won't go anywhere. We need people that have worked in different places, different areas where they get to be exposed to different setups, different systems, different leadership styles and everything. What works and what doesn't work. So when they come here they will infuse whatever they have learnt whoever with what you currently doing and they will come up with a different something.

There is movement of movers and joiners with the current management. However, the mine if sourcing new human personnel, they can utilise external people so that they can bring changes in terms of how things are done.

Employees performance measures

What measures do you have in the business unit that may help improve employees' productivity? How does the company manage the employee's performance?

Employee performance are managed through KPIs.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

In ensuring that the business is compliant, we ensure that everybody does what they supposed to be do. Either by means of motivating them to reach those things, empowering them, making sure that they see a future in that organisation in terms of self-development.

Employees are motivating and assure in terms of how they should conduct themselves.

Business process governance

How does the current organisational structure ensure proper governance, and maintenance of business processes?

> *No there still a gap there because when I got here there where was a lot of audit findings for the past two years. Like same audit findings of which means that there was nothing done to remedy whatever that had happened and then we needed to do something different to prepare for the audit which was better than before. But we still find the very same things that were picked up in the previous audit. This is because there are no proper controls to mitigate or ensure proper governance in place.*

There is no measure to follow to ensure proper governance.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

> *Automation, a different level of expertise and knowledge from employees. And it's less human error. So manual process ill prefers. Ill prefer manual process because that's where you interact with human beings and everything else. Yes, in terms of cost and everything is cheaper than to automate. But ill prefer to work with manual processes.*

Currently, the business unit prefers manual.

5.5.4 Case Unit E: Summary of the study findings

Respondent when seeking systems support, there is no clear direction as to whom to contact; you learn as you go. When they need assistance, they have no one to turn to. People need to know which number to contact, what actions to take, and what process to follow when it comes to logging the call. The respondent mentions numerous issues with the system, such as sudden freezing, which means that whatever work was being done is lost and must be redone. These difficulties may be addressed by upgrading the existing system. It is critical to use the most recent version of software with the fewest difficulties.

When asked about the competence of system users, the respondent emphasises the informality of using the system. The phrase "trial and error" indicated that management is doing little to guarantee that everyone is up to speed with the system.

It was highlighted that with the system being updated, financial risks associated with correct reporting and expediting of goods were no longer feasible. There is no understanding of what is going on in the business unit. According to the respondent, each employee should have a personal development plan so that they may grow, train, and upskill them according to their profession. When it comes to outsourcing, the respondent states that pricing is the most important consideration in determining how, and when to outsource. As long as it is less expensive, they will outsource or find inside employee solutions.

The respondent cites the strategy for choosing the providers. The first consideration is the quality of the goods you will get from the provider, and the price. A comparison study is conducted between different prospective providers, with price being the deciding factor. Thirdly, it is the delivery date commitment; do they deliver on time, or do they take longer? The respondent states that if the company wanted to employ internal personnel for some of the listed duties, training would take time. Working with suppliers presented difficulties due to long lead times, a lack of delivery, and a promise to a delivery date that was missed. Because of accessibility, respondents favored local providers over foreign ones.

Because of the supervisory nature of their job, the respondent mentions people management as a major skill required to do their job. It was also stated that the organisation primarily employs an autocratic system in, which someone needs to tell you and micromanage you into doing your job.

I think there is more of the old business model that is being followed. It's more of an autocratic system whereby somebody needs to tell you, micromanage you into doing your job. Nevertheless, I prefer a bit of transformational leadership, and a participative one because if you are a participative one, firstly, you engage your team, and if you engage your team, whatever outcome, it does not become your decision or your idea. It is our idea; therefore, it is easily achievable. (6_16238293895_Procurement & Quality office)

Because of the mine's reliance on teamwork, the respondent believes that transformational leadership is more appropriate. KPIs are a management technique for determining

organisational performance. According to the respondent, ensuring that the business is compliant is simply safeguarding that everyone does what they are supposed to do. This can be done by motivating them to achieve those goals, empowering them or ensuring that they see a future in that organisation in terms of self-development.

The next section will discuss the Financial Accountant Office Business unit.

5.6 Section 6: Case Unit F- Financial Accountant Office

This section analyses results of the Chromine's Financial Accountant Office Business unit.

Case Unit F description

The role of the business unit is to manage the cash, debtors, and creditors functions, and ensure accounts processing occurs within IFRS, and statutory compliance requirements. It ensures efficient management and control of the Financial Accounting function.

5.6.1 Case Unit F: IT Capability

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

> *We are mining Chrome, and we sell to our major customers, international customers mostly Chine. That's actually our biggest customer we do have a few local customers as well but our revenue comes from selling through China.*

The core business of the organisation is to mine chrome ore and sell the chrome to its international clients.

The business unit deals with: *financial accounting, we are responsible for basically reporting finances and not cost accounting. But we do the financial part, so for example on a monthly basis like payment. We make the payment from our side. We receive the money from our side so we report on the sales that we make, every single month. I think that's the merger thing. And for year-end we are the ones that prepare current reports for the financial statement.*

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

> *Am doing two. Ill describe the current one I do on a daily basis. The standard things are your basically reviewing payments but our payments we make them. We have a schedule for when we have them which is normally the 15th. At the end of the month and at the beginning of the month. But we have those adhoc ones that comes in whenever we need to pay. Am also basically looking after accounts payable. And also we have an accountant, so I review the work of the accountant. There is reporting whatever there is a request for something that I'll do course we are a subsidiary to either specific request that are coming from head office in terms of our financial reporting. JDe and Hubble are systems in use.*

The business unit's role is to ensure efficient management and control of the Financial accounting functions.

IT systems value, limitations, and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

> *In any business you need to keep track of what is happening for all your transactions, so everything that is going in the business its recorded on JDe. Nothing can happen without it recorded somewhere. And our main system is JDe.*

The current system occurs to have limitations such as: *is reporting in terms of the capital expenditure. So that's another thing that we do daily. We monitor the cost on capital expenditure expected. So one of the issues that we have is very difficult to, the system is not automated so if I want to pull the report and let's say the ransom ones are information about a specific project. We do this that manual. And we should be able to do it on the system. Because everything is going into the system.*

The current System is used for all transaction records however certain reports cannot be pulled out. The system is incompetent with reporting.

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

> *There is an appointed service provider for support services.*

The appointed service provider offer support when there is an issues.

> *For example, because am the senior, if they are issues with the accounts payable based on the system. I will raise it. We sent emails basically. so there is a specific email address that we use to send for our queries.*

IT systems strength

Please describe the value of those systems, and how can you not function without them?

> *It will be very difficult to function without them. I think almost every week I sent a query to service provider, so I can just imagine. It will be a disaster.*

The business unit cannot function without the current system and support in place.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

> *Business would stop, I mean we have requisitions. When other business units want to buy, we capture the requisition to be approved. The orders are made on the system; they need to be approved. So imagine if orders are not going out. They are certain sections that will not work like engineering, mining they are the ones that actually use a lot of expense of the money. So meaning they would be no mining, they would no be engineering. The reason why we are having service provider that assist us, we classify issues as high priority. For example, if the system JDe does not work at all, at a certain point that is regarded as a high risk. Because we cannot have a system that is not running then everything stops. So yeah that's one of the measures. But something like that we report to IT.*

There is high risk the organisation will imposed in case of system dysfunction. Support service and IT Business Unit are responsible to solve such issues based on their category or impact.

End user's competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

> *On the job training, which is a bad thing. That's the downside honestly. On the job course I was trained on the job. I did not get a training manual or option to go for a training like with a lot of organisations. You normally go for training before you get start but here, we learn the way.*

There is no proper training or competent programme in place, which is a problem most business unit encounters. The business units learn on the job and get assist as they do their daily tasks.

> *If you are able to perform the duties that they need to do, for example if you need to capture an invoice, if you able to capture the invoice and you capture everything correctly then you able to do it.*

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

> *Runs through by HR. We have Individual Development Plan were we look at your position, the skills that are required for that position and then we see if there is a gap, and also looking at the next level and see if one need anything to go for training. If you needed training because is for development of your next position then you can go without issues.*

The main tool in place to develop employee's competencies, skills, and knowledge is IDP and training.

Communication culture

What is the communication culture imposed by the organisation?

> *Mostly it's via email and notice boards.*

5.6.2 Case Unit F: Resource Dependency

Outsourcing business process

How do you determine what business operation to outsource, and why?

> *It depends. You look at the cost, I think the biggest thing is considering the cost if we need to outsource something and also whether we have the resources.*

Outsourcing for the business unit is determined by the cost and unavailable of internal resources.

Selection criteria

What are the criteria used for selecting the suppliers?

> *The first thing we look at is the price course you need to compare see who is charging more but also what is important is the specification whether they will be able to deliver, they are capable of delivery on the specifications that you have or what you want or what are you looking for.*

Criteria looks at cost and delivery time.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

While I don't really engage in SLAs but from my knowledge, I know that, management relies mostly on the end users. But I know one of the things that they do is our general manager now signs in all invoice above R500 000 onwards, so that he can also see if and by the time the invoices come he will be knowing that who is that supplier, what are they providing and looking at what are they invoicing us is it really , did they deliver but then you've got your end users those are the ones that would know because they are on the ground so they know exactly what the end user, service provider came to do. Or the supplier came to do. So that's one of the things and also even procurement they also check the invoices. So for example your service invoices if you charging for labour for example remember we have a clocking system so they check that in the clocking system that where this people really here did they come and if the charge me for 8 hours where they here for 8 hours.

Supplier evaluation in terms of service delivery is conducted.

Skills development

Why are you not building the capability within the organisation for the tasks that are done by suppliers so that you can reduce the outsourcing role by the suppliers?

It's a challenge. But the one that I give is the support guys I think is something that you need. Course our organisation is small, I think if you were in a big organisation remember they have big IT section where you have someone who deals with specifically finance issues whatever issue you have under finance, they would know whatever you raised. So I think for us because our organisation is small.

The business unit emphasise that the organisation is not big enough to render other capability internally.

Change recommendations

What change would you bring given the authority to bring change to the way the mine does things, especially regarding the suppliers?

I think they need to cut down supplier. Is too much. But also I do feel remember I raised the issue of procurement, we need a very strong procurement section. The store guys are doing too much and we need people that know exactly what they are doing so before you even bring supplier here to do something you need to make sure you getting people that are

competent and they would be efficient and active so that you not always bringing a supplier all the time probably for the same thing.

There is a need to cut down suppliers and more skilled procurement personnel.

5.6.3 Case Unit F: Upper Echelon Theory

Leadership role

What is your current position, and what role do you play in your position?

I am acting financial accountant. I think I have mention I do reviews, I approve your vendor application, payments a, invoices, receipts whatever journals that we put in our system. I approve all the those.

Acting financial accountant is responsible for the approval of payments, invoices and all other transactions of the business.

Competency skills, experience and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

This role need five to ten years' experience. Academic, a Bachelor of commerce in accounting degree. Actually I think for this one you need chartered accounting.

A highly skilled position in a management level. One has to be certified as a chartered accountant. This shows that the positions carry a lot of load for the business.

Lack of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

You would have a lot of challenges course of tax related staff. So I do tax calculation, and if you don't know how to calculate tax you going to have a big problem with SARS. You don't know how to calculate vat and submission of Vat on time you going to encounter so many penalties. So yes that's one of the things that you need.

While all registered companies in SA has to comply with tax and SARS regulation. The role comes with such responsibility which can course a serious legal battle.

Qualifications and value added

Is there any qualification needed for your position, if then, please list them? What value have they added to your experience, and career?

> *You do need an accounting degree and chattered accounting. So much. Especially for me course this is first time that I work in mines, first time that I work in the private sector. So I have always worked in a government sector. So the change from public sector is quite glamourous and a lot. But I have learnt so much, and the thing is in a public sector because they are not driven by standard and tax, there's no tax, there's no vat. They are some vat in some municipality. Yeah so all those things I have learnt ever since I have joined to the organisation.*

A qualification plays a huge role in running daily operations of the business unit. For one without qualification, it would not be possible to handle such roles. This means that academic background plays a crucial role.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.;
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views;
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

> *I think there is a bit of all of them, I cannot pick one. Course I mean in certain instances you need to be autocratic and certain instance you need to be participative, yes. I think there is all three and it is very hard to pick one course it depend on all the situation that you in, right. You cannot one, we going to do this. you need them to participate. Does why you even have a union, right*

Combination of various leadership style cut across the business unit.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow, and acquire new resources like human personnel? How does management influence the daily operations of the mine?

> *I guess and I know it is something that our marketing team works on is getting new customers course you also want to have an option of having another customer or reliable relationship with your customers so that you able to sell. So even if customer says no, I am okay I don't need tons right now, then you able to move on to another one. And I think it becomes difficult though for us because our biggest customer really its chine. I mean they are the ones having chrome more than anywhere in the world. So I mean the version is to see our profits grow course right now we are dipping.*

New customer engagement in needed because currently China is the only biggest customers. So the mine needs to market the product and establish more new customer rather than rely only on one source.

Organisational growth

Explain briefly how the organisation grows, and acquires new resources like recruitment, and retention? How does the organisation (or the different units) ensure that the targets are met?

> *I know one of the things that they want to do is sell (PGM)different type of chrome sell instead of only selling chrome. So that's one and also we have tailings dam. so they want to sell whatever chrome that is there course there is chrome in the tailings dam they want to start selling so the business can grow. I mean they have built something at the plant and the intention for building that it was to enable the mine to grow and make more tans.*

There are plans in place to grow the mine which shows intentions to grow.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

For example, we deal with mostly SARS laws course we do tax and staff. So yeah on a monthly basis you know that we need to submit VAT returns on a specific date and documents that's support the VAT returns if SARS does need the documents and then what SARS wants is your TAX that you paid for the year you don't pay it once a year you pay it bits and pieces so for the first six months of the financial year, you will estimate the TAX for the whole year. so you also have specific dates of when you need to submit and pay your provisional payments the first one and also the second one will come at the end of the financial year. That's after you done with everything for the year, so you actually have the figure. And then there is also a month or two months after end of the financial year you can top-up if maybe you did not pay enough during the financial year. So all those thing you need to pay attention to, if there are changes in TAX law you also need to be aware of them so that you amend them correctly. So if that you implement them correctly then if you don't know your tax calculation is wrong and if is wrong and you underpay you going to have charges and penalties and interest charges.

This is a business unit which cannot afford not to comply with TAX and SARS. There is no room for any failures.

Business process governance

How does the current organisational structure ensure proper governance, and maintenance of business processes?

I mean in terms of just the reporting lines we have general manager and he has all his managers that report to him and then we have D band that reports to the managers so on and so forth.

Governance is ensured through reporting by following the organogram.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

Too manual here. For example, your leave application. A leave application it's an issues we still far behind in terms of automation really. Still lot of work that still need to be done but I mean they are trying really to automate some of the staff. But I guess also you need to take

into account that not everyone has access to a computer, I mean your miners don't have access to a computer. So whatever changes that you make in term of automating the system you need to take them in to account on how I you going to accommodate them.

Currently, the business unit uses both manual and automation of processes. However, moving to automation of process completely would not work for other business units.

5.6.4 Case Unit F: Summary of the study findings

The respondent reveals that China was their biggest customer with regards to chrome. This shows the impact that IT has had on the growth of the mining company. The respondent notes that they are responsible for basically reporting finances.

Therefore, we are in financial accounting, so we are responsible for reporting finances. I do not want to mix it with cost accounting. However, we do the financial part, for example, on a monthly basis like payment. We make the payment from our side. We receive the money from our side so that we report on the sales that we make every single month. I think that is the merger thing. Then, for the year end, we are the ones that prepare current reports for the financial statement (3_16238293891_Financial Accountant).

The financial accounting office notes that everything that is going in the business is recorded on JDe in order to be a link with the entire organisation. The respondent notes that they have a service provider in their department who provides support for every query that they have. The financial accounting office notes that business would basically be on a standstill if the system ever went down. Everything done within the financial accounting office requires the system to function effectively. In the case of any challenges, the respondent reports to the IT department, in addition to outsourced help. Thus, any challenges faced are mitigated in this manner.

The respondent bemoans "on the job training" as a bad aspect of how they learnt about the system. There is not much support in ensuring the respondents understand the system before they are tasked with using it on a daily basis. The respondent states that when evaluating the competency of persons on the job, they utilised Individual Development Plans (IDPs), in which they look at their position, the skill sets that are considered necessary for that role, and then see if there is a gap, as well as looking at the next level,

and seeing if anything is needed for the worker to grow. Emails and notices were stipulated as the main communication mechanisms used in the organisation.

The respondent mentions that the cost of the supplier was the biggest factor in determining whether business was outsourced to the mine. Overall, the procurement department handled all those issues in determining the suitability of a supplier to meet organisational objectives. The reason for outsourcing is to ensure that there are a lot of skilled personnel working to achieve mining objectives.

I actually believe that we need highly skilled people in our procurement sections, and contract management. (3_16238293891_Financial Accountant).

The respondent claims that the turnaround of the supplier seems to be difficult to meet. The current staff at the procurement section of the mine may not be enough to meet their targets.

The respondent states that they ensure they are tax compliant with SARS. “A bit of both” was the answer given pertaining to the leadership styles in place because there are certain decisions, and roles that require a more autocratic manner whilst others require everyone within a department to share ideas on improvement. KPIs are used to measure employee performance within the organisation. This gives them a framework to determine their output against the organisations’ targets. The respondent notes that the organisation has a clear hierarchy with all departmental managers reporting to the General manager to ensure targets are met.

The next section will discuss the Lab Superintendent Office Business unit.

5.7 Section 7: Case Unit G - Lab Superintendent Office

This section analyses the results of Chromine’s Lab Superintendent Office Business unit.

Case Unit G description

The business unit oversees and ensures the effective and efficient performance of sample preparation and analysis, a safe and clean working environment, and accurate reporting of analytical results to optimise and continually improve metallurgical and technical

operations within a designated area. The unit overseas monitoring of the ore as it comes from the underground, and as it goes to the client, and even during production.

5.7.1 Case Unit G: IT Capability

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

> *To beneficiate the chrome and sell it to the client. My section is responsible for monitoring the ore as it comes from the underground and as it goes to client and even during production.*

The core business of the organisation is to beneficiate chrome and sell, the business unit oversee and ensure the effective and efficient performance of sample preparation and analysis.

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

> *Monitoring of results, in the morning the most important thing is to monitor the past three shifts and also to report to the plant team or the production team if there are any issues that they need to be aware of and even the dispatched material, the logistics team.*

The business unit's role is to monitor and check if there is any issue with product. There are three shifts that runs the production 24 hours. The shifts differs with time allocation.

> *Mostly we use the MES, JDE, qilkview and firefly not always basically occasionally.*

JDe and MES are the most used systems across various department.

IT systems value, limitations, and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

MES it makes life easier. It makes like your recording and keeping track of what happened. So it helps but the other ones I guess they just take off the manual transactions to make them electronic but the one that I know the most that I work most and make things faster and nicer. Limitations is on JDe. For example, the requisition is a bit tedious. They are too many drop downs and all those and even I think even with the ones that are not being used them much like qlikview it also has a lot, they are not limitations, but they are those annoying little things that you wish you could shorten the paths and things like that. Again, if you want to trace an order you need an auto generated link to track the order, you don't go into an inquiry course some inquiries they are very long steps.

The there are no limitations with the system, users seem to have difficult way of processing certain things on the system.

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

The support is not bad but it could be better because I think maybe because they are too many systems for too many functions and then you end up having too many people that are handling one system like firefly is someone else your isometrix is someone else and all those. So the support is there but you have to know where to get the support. All system support can be done telephonically or via the system itself. Unlike if you have to do it in person, it saves time. So I think on the support the how part I like.

They are various personnel who support different systems, and one has to know whom to report which system to. Support options available is to assist employees remotely.

IT systems strength

Please describe the value of those systems, and how can you not function without them?

The value of the systems, they are some that I can function without, like JDe. I can do without JDe. But with MES there is a link of different processes like production, plus analysis plus dispatch and then we have to have that link.

The value of the system is convenience of data availability and sharing from one business unit to the other.

IT Systems weaknesses and opportunities

Which challenges do you experience with the systems within your business unit? Please describe the issues encountered with the systems, and how do you wish they can be resolved?

> *One that I can think of now would be JDe for example, there are times I think once a week or once in two weeks they do the financial integrities. I wish they can do them; I don't know when but if they can be done after hours when they are less people.*

Issues encountered are system availability which once in month financial integrities are conducted during office hours which inconvenience employees' work.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

> *Well, if the systems where to not function we would go manual. It's a bit of a disaster.*

Manual process is the only backup available to functions when the system is dysfunctional.

Change of business operation

If you were to change your business unit operations, what would you change, and how would you go about it, especially regarding IT systems?

> *In terms of the system, I just would integrate everything. I would put everything in one system like not to have too many systems that do separate staff but somewhere I still have to go excel and join them. I would integrate everything.*

The integration of system is desirable because systems run in silos.

Usage of IT in the business unit

Describe how you use information technologies in your business unit for your daily routines?

> *While a lot. We trying to move away from paperwork especially in my section we trying to move away. Like everything we try to do either on the systems themselves or on your basic staff like excel, or your spreadsheets and yeah.*

Technologies are used by the business unit.

End users' competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

> *How they are introduced would be by a general email from the mine communications department and the way they are introduced to the team. It's a bit tricky because most of the system you figure them out as you go. Like you learn, you jump in just swim and you'll see.*

There is no proper training in place. The business units learn on the job and get assist as they do their daily tasks. You know if you are competent if;

> *If you do not make too many mistakes but there is no way really to tell unless they make mistake honesty like if you don't see too many mistake you know you are getting it.*

IT systems maintenance

To what extent are the systems regularly updated or enhanced? In your view, which risks can be imposed if systems are not regularly updated or enhanced?

> *I think they updated often because, it has been a while since we had a problem where a version or whatever that we using is old. I guess they are updated as we go as frequently as they should.* Else if not we could be seating with the older systems. For example, you might be using something that takes ten minutes to complete a task where else you can take two minutes in the newer revised system, or you could be dealing with incorrect data.

The business unit does not know of if system updates are conducted however because the system are not encountering any issues then it is assumed they get updated.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

> *Besides the training. I think the training department come in very handy but it is up to the supervisor. It depends on the supervisor and maybe how they see the need if they are open section. So yeah through training department that is the best and effective way.*

The main tool in place to develop employee's competencies, skills, and knowledge is through training.

Communication culture

What is the communication culture imposed by the organisation?

> *Communication culture I think the organisation has got a repetition that is not very nice. Whatever you do or say you have to back it up. Course it might come back to catch you. So the culture and the way we communicate is that we have to have everything in writing and that leads us to a lot of emails and a lot of reports and lot of unnecessary letters and memos and staff. So the culture itself I don't think is the best.*

One could consider the communication culture as suitable while other may think it is not noble.

5.7.2 Case Unit G: Resource Dependency

Outsourcing business process

How do you determine what business operation to outsource, and why? Please describe the procedure of outsourcing within the organisation?

> *It would be the operations where I fill like we do not have enough skill or expertise basically. outsourcing is a procurement thing, so if you need to outsource you ned to consult with your head of department. Then you go through the procurement so they can find you someone who can do that, if you already know who can do that for you. You already know who you are looking for. You just give them the names and the recommendations that they will take it through the outsourcing procedure.*

Outsourcing for the business unit is determined by the unavailability of relevant skills and expertise within the business unit.

Selection criteria

Please describe the procedure of outsourcing within the organisation? What are the criteria used for selecting the suppliers?

> *The supplier has to be competent; they have to be proven competent. And depending on the kind of job that you are looking for. Like in our case for example let's say we are outsourcing the laboratories as the third-party debts or something. We look for their certifications, what are they accredited or certified for and obviously the pricing as well. And their turnaround times their lead times, how fast can they give you what you want and things like that and then you can compare.*

Criteria used is to look for competent, certification or accreditation, pricing and turnaround time.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

> *Currently they are no much, once the supplier is in the system I have noticed that they are not monitored. Unless as the end-user you push. So if you don't push they are not monitored. They can be give you the worst service ever but no one picks it up until you make some noise. So I don't think there is a way that to monitor and do the performance management of the suppliers hence sometimes they would get in to the system in to the company doing well and after a couple of months they start slagging and even maybe change the prices or the conditions without noticing.*

Currently no contract evaluation is used in the business unit.

Skills and knowledge transfer

Does the SLA include a clause to enforce suppliers to upskill your internal staff? How do you make sure the supplier skills are passed over to the internal employees?

The SLAs that we have they do suggest that the supplier must empower our people but they don't. they don't, like unless you force them.

Selection and critical function rendered by suppliers

What is the critical function of those services rendered by suppliers? Describe what influence you have in selecting a supplier?

Usually it would be the services. They critical because for example if you've got an outsourced company, outsourced ref that you want to use as a ref normally we use them when there is a dispute between us and the client. So if you get someone who doesn't know what they are doing or who know what they are doing but they are not doing it well. You could either get a customer complain because you now depend on their results. So it would lend a customer complain because of that. Or you could be ripping a customer off because of their results so we need to have people who know what they doing course their jobs are really critical their role is critical in deciding who is right and who is wrong.

The critical function is choosing the right person.

Competency shortage

Describe any competencies that you cannot do without that a vendor or supplier has?

I think it would have to be the certifications. Like for example. Is it called certification like where you check someone can do this but how do you know if they have done it. You have to go and check how they do it. You check with the other people that what work they do for them. References, so you check with their reference to see if they can do what they say they can do and obviously it need to be without the knowledge of the supplier. And if they can get to the standard that you want them, like if everyone says no they have done this and they have done it well. Then you good to go ahead.

Competencies of the supplier would be to do background check on supplier service offered.

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

Okay local suppliers are preferred basically because of the economic reasons that you trying to boost small businesses and you also trying to upskill the local communities.

Local suppliers are preferred based motivation to upskill local businesses.

Skills development

Why are you not building the capability within the organisation for the tasks that are done by suppliers so that you can reduce the outsourcing role by the suppliers?

I think is the issue of the money I could be wrong but that is mostly the reason that okay money and politics honestly. They are politics around outsourcing suppliers and staff.

Change recommendations

What change would you bring given the authority to bring change to the way the mine does things, especially regarding the suppliers?

I would change almost everything. I would change 90% of the things and this would mean I have to start over with the process of how the supplier are accepted in the mine. The process of how their performance are evaluate because I don't understand why we should have 500 suppliers with only 50 of them are performing and other 450 are useless. I would get rid of maybe have an annual check or whatever if you are not performing we would remove you and bring someone new. And also to help the smaller suppliers because usually we term to forget about the small businesses while we focus on the big ones because the big ones are hogging all this contracts for themselves while the smaller ones are not being developed. So I would change all.

Change of the procurement process for selecting and performance evaluation.

5.7.3 Case Unit G: Upper Echelon Theory

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

My current position is a laboratory Superintendent and I basically help the client which is our main client to run the plant, so I coordinate the back utilities sort of. Three to five years of working experience is sufficient.

Superintendents in the mining firms are on the management level however business unit requires three years of working experience.

Competency skills, experience and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

I think the competencies definitely they impose skills, because you work with lot of people. Your own team and your client and supplier you interact with them a lot. And because of the nature of laboratory you are a police. So you get attached and need to have also the certain level of emotional intelligent. As for the experience the way the lab superintendent position is, is that it is not complicated in a sense that the people that are reporting to you, you have the same qualification. You have analyst and a practitioner, they all have the same qualification. So whether I have the a Btech and the other one has got a masters but reporting below me does not make much of difference. The work itself, the nature of the work. But at the same time the person must have the basic of chemistry . So that is why the minimum of analyst and practitioner is a national diploma in chemistry. Whereby a person has got to understand the chemistry because even though the work is contained every now and then you need to think and apply your mind as you go higher in a practitioner level you need also to have the national diploma at least on some managerial qualification to be able to handle those pressures from client and also you have a team of lab personal that you deal with. They come with their issues, the HR issues that you have to handle so yes that would be the competencies and yes the experiences like I said would be maybe three yes to five yes at least not more than five.

*V*arious competence skills and experience are required.

Lack of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

It would frustrate everyone. The risk would be that everyone will end up being frustrated because we are running the operation and production company, there is no time to waste and if you still trying to figure things out while the plant is running you are frustrating everybody. You cannot come later and say those results were wrong. Already they make decisions on a continues basis based on what you giving them.

Product specification is one of the risk associated with the production of the product.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.;
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views;
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

I think unfortunately maybe it is not a bad thing but in this mine they are too many autocrats. Because everybody wants to have a final say. Everybody wants to give instruction and everybody wants to appear powerful. It is not always a good thing but maybe is not such a bad thing at all. But I would I think the transformational leaders are what we need because those are less stressful because if you take the autocrats the people that are reporting to autocrats are always stress out. Because its like you can't think you are told what to do and how to do it and that's it. You do it this way or you go home. But the transformational ones are what we need to have happy people, happy employees and the results of what we want in this mine.

Autocrats leadership style cut across the entire mine.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow, and acquire new resources like human personnel? How does management influence the daily operations of the mine?

Okay how the mine would grow would be unfortunately letting go of the older generation not that am against the old people but I think most of them must go home and rest now. There is Covid and they must go, then you involve the newer generation. The vibrant, the crazy generations that has the bussing minds, course right now we have them but they are suffocated. We suffocating them. We are suffocating these young ones and once they get suffocated they get tired and they rust and we lost all that energy. So for the mine to grow we need to introduce more young people in the managerial positions and obviously okay maybes it is not so obvious, I think also involving more women.

It is desirable for change in management to have more young personnel and women leadership.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

My role as a lab superintendent is easy because we deal with facts, we deal with numbers. So if whatever data that you are producing is not good it should be is easier to communicate it. So my role is quite easy in a sense that you just produce what you have.

Compliance is communicated throughout.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

I'll definitely go for the automation of lot of things because it takes out the human error in most of the things. But how it should be introduced it must be in a way that does not, threated the jobs of the people but it must be settled. Like for example introduced ii in such a way that we agree that we introduce this system but we keep the people. We just agree that whatever someone resigns we don't replace them. But I'll go for automation any day.

The business unit would consider to use automation of processes but only if humans are not replaced.

5.7.4 Case Unit G: Summary of the study findings

The lab superintendent's job is to monitor the ore as it comes out of the ground, and as it travels to the customer, beneficiates the chrome, and sells it to the client. If there are any problems that the plant team or production team should be informed of, the lab supervisor will notify them, as well as the sent material. The method was designed to make it simpler to record and maintain track of what occurred. The respondent, claims that assistance is good but it might be better since there are too many systems for too many tasks, making it tough. A bigger staff may be advantageous to both the department, and the system. In the event of a catastrophe, the respondent did not believe there would be anybody to help. A manual system, which is very difficult to operate, would have to be developed. The system's disadvantage was that it had many components that would be better integrated to make operations simpler.

The respondent reports that the company is attempting to reduce paperwork, particularly in the lab department. The email was reported to be used to introduce new systems. The respondent claims that the systems are frequently updated. Failure to update would result in issues such as a sluggish system that delays how tasks are completed. The organisation's communication culture requires that everything be communicated through email to guarantee that a record is maintained at all times. The respondent said that they prefer local suppliers since this will benefit local companies, and communities to support local businesses, and upskill local communities. When it is selecting suppliers, the most important criteria are competence and price. The respondent notes that outsourced activities were done since it was too costly to perform certain of those duties in-house. They would alter 90% of how the mine works, which would need one to restart the process of how suppliers are approved in the mine. The method of assessing supplier performance on a scale of 500 only 50 are performing and the other 450 are not. The respondent withdraws incentives from those who did not do well, and replace them with someone else. Also, they assist smaller suppliers, since small companies are sometimes overlooked when choosing suppliers.

The respondent notes that if a position is not performed correctly, it would irritate everyone. The danger is that everyone will get irritated since the mine has no time to spend and anybody attempting to sort things out while the plant is operating would annoy everyone.

According to the respondent, leaders are usually authoritarian in character since everyone wants to have the ultimate decision. Everyone wants to be a teacher and to look strong. The respondent reports that transformational leaders are what the mines need since they are less stressful, while autocrats create tension in those who report to them. The respondent thinks that in order for the mine to develop, the older generation must be let go, and the younger generation promoted to managerial roles.

Okay, the mine would grow by letting go of the older generation but not that I am against old people, but I think most of them must go home, and rest now. (5_16238293893_Lab Superintendent)

Management guarantees that goals are fulfilled by creating fear of losing one's job if they do not achieve the target. The primary motivation is danger. The respondent said that they leave supplier compliance to procurement stuff, but if there is a possibility of interacting with them, they remind them of the competition. They may speak to your supplier, and not conceal the fact that they are contemplating changing them if nothing changes. The respondent chooses automation over manual job completion because it eliminates human mistakes in the majority of cases.

The next section will discuss the Environmental Superintendent Office Business unit.

5.8 Section 8: Case Unit H - Environmental Superintendent Office

This section analyses the overall results of Chromine's Environmental Superintendent Business unit.

Case Unit H description

The business unit ensures environmental legal compliance for the operation regarding water management resources, related disciplines, and sustainability of the operation.

5.8.1 Case Unit H: IT Capability

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

We are producing chrome and the we export. We do provide support to the organisations in terms of the environmental approvals. Because the operation to conduct their activities they must obtain their approvals from environmental organisation. Like department of water affairs or DMR. So we provide support because they cannot initiate any activities without those approvals. So this is where we come in. Cannot operate the mine without any environmental approval or mining rights. So we assist in terms of obtaining that. We have to compile or conduct any environmental impact assessment if you want to have some activities there and here doing every month.

The core business of the organisation is to mine chrome and export. The business unit support the mine with environment approvals from the government.

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

Okay because we are having different activities at the operations we have to interact with different organisation and explain about the roles in terms of complying with environmental legislation. Then we provide guidance to them if they are not complying. And we also conduct the environmental audit. Which are both internal and external. We also do environmental inspections. We compile the monthly reports. We also submit some of the data from the authority, for the authorisation that we have because there are conditions that we have to comply with. So on a monthly basis or quarterly we have to submit some information to the authority to check whether are we complying with their conditions. We submit some of the report to them as per authorisation. But then we do a lot of things, we also manage the waste management for the mine. We also manage the water because the operation cannot operate without water. We also assist in terms of that. So we also check the water quality the people are consuming at the mine, if quality is good for them to consume it or not. Then if it is not we decide whether we have to appoint a service provider to assist or ourselves we add some chemicals because we have to do some dosing in terms of that.

The business unit's assist with compliance with environment legislation and waste management of the mine.

We have JDe for the invoices, if they are invoices that we receive or if we want to pay or generate some orders we use JDe. We also use MES for the waste management to obstruct data there in terms of the tailings. We use MES, we also use the Isometrix when we compile our environmental inspection report. The other system that we use is just the computer because our day to day work as well you must also be familiar and have some skills in terms of using the computer and also the internet course we also do some research as well. so you must how to research of some of the information.

The Environmental business unit uses three main systems: MES, JDe and Isometrix to render their daily operations and support to the mine. These three systems are mostly used by other business unit as well.

IT systems value, limitations, and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

The system is good because we have to keep the data, most of the people having access to the system they can for example, they can be able to extract the data and check the tailings or the product. How much are we having on the ROM, you can get the information right there. So it does help. It provides value and also in terms of the Isometrix. You can just put some project with the timeframe so you can monitor and check whether how far I you with those project. So that you can close them. So it does assist in terms of managing whatever your day to day duties.

The systems provide convenient because with the records capture one can access them and check availability of product produced. While Isometrix can also be used as a project or daily management of tasks. One can be able to track and monitor their daily tasks easily. However, Isometrix has limitations;

The problem with Isometrix is the issue of the approval system, because people can manipulate it and also do some extension in terms of the tasks that they supposed to do. So I think it was supposed to not allow people to extent the date and if they have to, they must complete some activities. And also if you not complying it supposed to send the message to your HOD so that they can monitor it and check whether you doing what is expected from you. So I think it requires some more improvement in terms of that. With regards to JDe and

the MES I cannot say much for me course I don't deal with it. It just that I must get the data from the MES and for the JDe I do the invoices and so forth.

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

They provide the training for us because you cannot use the system without the training. so the people who are users like the people who are managing or controlling those systems they have to provide the training to you before you can start using that system. I wouldn't say they something wrong with it course I don't deal with the some of the other system but with regards to Isometrix I am working with it. Some of the people complain about it, the system failure like others would say that the Isometrix is not user friendly. So it depends on how you are using it on a daily basis. But others they become so frustrated by using the system.

While the support system process applied in the mine is training.

I think maybe they can compare with other operations and check course some of other operation you will find that their systems are using maybe level three and us we still on level two. They can check with them, with the challenges they are having and why did they change to move maybe to revision number four while others they are using revision three. So maybe they must do some bench marking with other operations to check how is the system working from their side.

The system current version has limitations. Decision makers of the systems can look at other latest version and do research to see if the latest versions do not have same limitations.

IT systems strength

Please describe the value of those systems, and how can you not function without them?

Okay for the JDe you cannot function without it because remember for example if you want to start a project you must obtain the approval first. So you cannot allow somebody to come and work without an approval. So it requires the interventions in terms of the approval from

the procurement as well as the HOD and supervisor. So you cannot function without that. And for the Isometrix you can use another data like excel but I think excel in terms of managing the data is not good compared to Isometrix. Isometrix other people can also access that information while they are away from the office. So I think it is important to work with that.

The JDe system is a system where approval of labour and budget occurs. So without JDe, they work be any work that is done.

IT Systems weaknesses and opportunities

Which challenges do you experience with the systems within your business unit? Please describe the issues encountered with the systems, and how do you wish they can be resolved?

The challenges might be in terms of the JDe approvals. It takes long to do the approvals because other manager they don't check and take some time to do the approval. So it might even end up delaying the process of you achieving what you want to do because they take some time. Because you cannot do anything without an approved order. So those are the other challenges. Sometime when you deal course I know that when you have to do some project you must get three quotations. You have to, you cannot get the quotation yourself you must involve the guys from procurement they must do that. If they don't do that for you it might will also hinder your progress. So it is one of the challenges because even though we have to do it. It is managed by other department. I think they can resolve it. The guys that are responsible for the requisition if they can have the meeting with their supervisors to check the progress of what they've receive and priorities the work as to what came first. I think that can help.

While systems occur not to have issues, however the approvals have to be done and that is where things get delayed.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all?

> *The employees might misuse the funds for the company if there was no system. Because at least they can monitor that because they also do some audit just to check for the project that have been done by the organisations. Whatever that you doing you must get an approval so they won't be a risk. So if you can just make your own decision on your own and people they can even appoint their own people to do their work. So corruption might also be an issue if we don't use that system.*

Corruption and theft is one of the main elements that the system assist the organisation with. If there is no system in place, budget can be misused.

IT Systems dysfunctionality measures

How would you mitigate systems dysfunctions to optimally function accordingly, going forward??

> *The managers have to be strict in terms of the system and monitor it and also understand the system how it works. And also provide the training where people are lacking and communicate with everyone.*

No proper mitigation process in place.

Usage of IT in the business unit

Describe how you use information technologies in your business unit for your daily routines?

> *We compile the report, we receive the invoices, we use it for JDe as I indicated earlier that we have to do some research. We also get some information from other regulators if they sent some information you must also have access to some information. So I think we are using it based on that.*

Technologies are used for compiling of reports.

End users' competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

If something that have been introduced in our unit, normally our supervisors will call a meeting with us and explain about whatever system that have been introduced and explain the reason and provide the training. If training cannot be provided internally then he can recommend external training.

Training is in place either internal or external.

However, there is no proper competent programme in place. The business units learn on the job and get assist as they do their daily tasks. For example;

We provide some work to check whether they understand or not, if they don't then you check if there is a need to provide training again.

IT systems maintenance

To what extent are the systems regularly updated or enhanced? In your view, which risks can be imposed if systems are not regularly updated or enhanced?

I think it depend on the system failure or if there is a problem whereby the organisation decide whether they can update the system or maybe if employees are complaining about the system they currently using. Or if it is not user friendly or is not working for them. Then the managers or HODs make a decision to be updated or not. It's going to be an issue course remember in terms of the system there is always new technologies and changes. If we keep on using the old system, we are not going to be familiar with any changes that are being implemented by other operations. So it is important to update the system.

There are no regular updated of systems current, systems are updated if there is a failure or issues.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

The process that are in place they provide training to the employees and then we also do your yearly performance assessment to check if a person does his work. We also have training centre where they have to contact some training. IDP we also do some IDP for employees just to check and assist in terms of improving.

The main tool in place to develop employee's competencies, skills, and knowledge is IDP that caters for all required training.

Communication culture

What is the communication culture imposed by the organisation?

> *The communication I would say, sometimes if you want to highlights some issues as an employee you feel scared. Course you fill like if you raising something they might be victimised. So I don't think that the employees are free to communicate whatever they want to communicate with the employer. So I don't think that we are free course we are scared we might be victimise.*

There is on open communication platform where employees could express their view. The communication culture is not conducive to employees.

5.8.2 Case Unit H: Resource Dependency

Outsourcing business process

How do you determine what business operation to outsource, and why?

> *The business unit to outsource you check the project and competencies. Some of the business unit roles you cannot do on your own you need somebody who specialised in doing that. Someone who has the experience and the knowledge to contact those business. So that's how you decide whether to outsource or you also check the available resources within the unit. If we have those resources or not, if we don't have then you outsource. And from our side they are some of the activities whereby you are not allowed to do it internally. You know it supposed to be done by somebody outside for example the audit which are external audit. You cannot do external audit yourself, it has to be done by somebody whose outside because that person will be able to see if there is something wrong that you did and not be bias. So some of the authorisation that we have require us to use external people.*

Outsourcing for the business unit is determined by the unavailability of relevant skills within the business unit and audits.

Selection criteria

Please describe the procedure of outsourcing within the organisation? What are the criteria used for selecting the suppliers?

> *There is a department that deals with the project and compile some scope of work. There is tender or whatsoever that they have to do but you must also have some funds available on your business unit before you can even try to outsource something courser you cannot do that if there are no funds available. So certain department supposed to approve whatever that you want to do. Before you can start to make the tender process so they must provide with the approval of what you are planning to do. So if you don't involve them you cannot outsource. Because at the end of the day you must pay those people and somebody has to approve the invoice. If there was no order that was generated initially, one will approve that. Criteria used is, we look at the experience, we look at the experience and the qualifications. The cost course it doesn't help for you if somebody is costing a million and the other one is R500 but if the person that is saying is R500 can still do the work and you also look at the experience that this person has you must also use that criteria to appoint that person.*

There is a business unit that deals with outsourcing, and they are the ones responsible for all the procedure. Criteria they look at experience, qualification, and cost.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

> *There is a form where you have to rate the suppliers when they are doing some work. To check whether they delivered within the timeframe that was specified. And they also take some retention money that has been held by the organisation to check whether they delivered what they delivered.*

Contract evaluation is done through rating of the service.

Skills and knowledge transfer

Does the SLA include a clause to enforce suppliers to upskill your internal staff? How do you make sure the supplier skills are passed over to the internal employees?

I don't think there is a clause regarding that, I don't think. As far as I understand I don't think there is a clause that says they have to provide some training or whatsoever from the internal staff. It depends on some an individual if you having an interest in terms of learning and understanding what is the supplier doing. Course I know from our side what we normally do is if the suppliers coming to do some project we also go with them to check what they are doing. So you can also learn. But there is no clause that enforce them to uplift the employees or whatsoever.

No clause for supplier to transfer the skills to internal employees.

Selection and critical function rendered by suppliers

What is the critical function of those services rendered by suppliers?

It depends, like they might be water quality, water treatment plant, that will require some volume from external or they would be the cutting of the trees which is invading the intensive species that requires somebody external to identify the tress that are not required. And they will be water quality monitoring, they would be external audit as well. They are lot of project or maybe the environmental authorisation for the tailings dam they must conduct an EIA (Environmental Impact Assessment). So internal person cannot do it, so you need somebody external to conduct those activities.

They are variety of critical function that has to be done by external suppliers.

Competency shortage

Describe any competencies that you cannot do without that a vendor or supplier has?

Waste management, water quality, biodiversity, habitation and intensive species, external audit.

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

The problem with the local suppliers in terms of costing, they don't know how to do the quoting. Some of them you will know that they know the job but because they will think that is a mine instead of the person quoting R400 000 the person will go for R500 000. So that's the different between local and the external suppliers.

Using local suppliers cost more.

5.8.3 Case Unit H: Upper Echelon Theory

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

I am senior environmental officer. Years of experience is five years.

Competency skills, experience, and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

Honours degree, or Btech in environmental management, the environmental law and auditing.

Lack of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

They can lose the licence to operate at the mine.

Licence to operate is one of the risk associated with having no skills or expertise.

Qualifications and value added

Is there any qualification needed for your position, if then, please list them? What value have they added to your experience, and career?

You can do short courses such as water quality. They are other unit or organisations that provide external training, so you can check what can you do to improve on your work. You know like biodiversity rehab as well, but is not that requirements but you can also do that one.

A qualification is needed, and certifications are recommended to understand the broader context of the business unit.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.;
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views;
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

Transformation because if they are any changes it is also good to communicate and involve the people so that they may know what the change happening at the mine.

Transformational leadership style cut across the mine.

Organisational growth

Explain briefly how the organisation grows, and acquires new resources like recruitment, and retention? How does the organisation (or the different units) ensure that the targets are met?

They do grow especially when they are doing under mining, and they will end up requiring other skills in terms of the miners or the shift boss that would be responsible for the exploration or doing whatever the job that they have to do underground. Sometimes they need people, engineers that will assist with the project that they are busy doing it. They do monthly meetings with the other managers or the sub managers and check their progress and performance and check how far and what can they do to improve on what they are achieving.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

> *We do conduct meetings with our supervisor, to check if we are complying with what is expected from our business unit. If you think that what you want to propose will add value to your section, you are free to talk to your supervisor and his not that strict.*

Compliance by contractors is done through contact meetings.

Management support

How does upper management envision/support your business unit?

> *They do support because we always having the meeting and they listen to our challenges and what we supposed to do and they provide and allow us to appoint the external contractors or service providers to assist us if we cannot perform the way that we have to. But they do provide the support to our unit.*

Management support give various channel to support business units.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

> *I think maybe they must change this system of using manual like this invoices or approval of the leave whatever. Like you don't have to print because we are wasting some papers, for example the invoices you can sign it electronically or sent it to the relevant person to sign it instead of printing it courses we are wasting papers as well. And it is also time consuming. So I think they must improve on that.*

Currently, the business unit uses both manual. There is a need for automation.

5.8.4 Case Unit H: Summary of the study findings

The environmental office assists organisations with permissions that is the Department of Water Affairs (DWA) or DMR. This unit provides assistance since it cannot start any operations without receiving permission from those authorities.

We do provide support to the organisations in terms of approvals. For the operation to conduct their activities, the mine must obtain legal authorisation from the Department of Water Affairs or DMR. Therefore, we provide support because they cannot initiate any activities without those approvals. Operation only cannot begin without any environmental approval or mining rights. Therefore, we assist in terms of obtaining that. On the other hand, we must compile or conduct an environmental impact assessment if you want to have some activities here and there monthly (2_16238293890_Environmental specialist).

If there is a problem with the system, they just follow the instructions or if they are needed to know about environmental inspection, they use that system. Consequently, it is unknown if they communicate or are linked in any manner. When providing assistance, they do some benchmarking with other operations to see how the system is performing on their end. If the system fails, the money might be misappropriated by workers. Technology simplifies monitoring, and editing.

They use IT to create reports, receive invoices, and get information from other regulators who provide information. When implementing the system, supervisors will convene a meeting to discuss the new system, explain why it is being implemented, and offer training. If they are unable to offer training internally, they suggest that workers seek training outside. System updates are determined by whether the system has failed or if there is a problem or if users are complaining about the system they are presently using for whatever reason. The processes that are in place are to offer training to workers, and to conduct annual performance assessments to determine if an employee is capable of doing their job.

When choosing suppliers, the department considers the individual's experience, as well as their credentials. There is a form where you must grade providers while they are doing work to ensure that the goods are delivered within the given period. Additionally, the organisation removes some retention money that has been kept by the organisation to

ensure that they fulfilled their promises. They prefer international providers due to the inconsistency of local vendors' quotations. Most will charge a greater price than normal just because they believe the buyer is a mine. The respondent likes transformational leadership because as changes occur, it is important to inform, and engage employees so that they are aware of what is occurring at the mine. To guarantee compliance, the respondent indicates that they meet with their supervisor to determine if they are fulfilling their business unit's expectations.

The next section will discuss the Human Resources Office Business unit.

5.9 Section 9: Case Unit I - Human Resources Office

This section analyses the results of Chromine's Human Resources Office Business unit.

Case Unit I description

The business unit designs, develops, and implements relevant training material, and supervises its team's activities whilst ensuring safe working practices. The purpose of the unit is to contribute, and assist in planning, scheduling, execution, monitoring, moderation, and reporting on relevant HRD interventions. The objective of the unit is to ensure the successful transfer of the required knowledge, skills, and attitude to enable a learner to perform his/her duties at the required set standards in a mining environment through continuous moderation, and verification of job-specific training.

5.9.1 Case Unit I: IT Capability

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

> *The role of the organisation is to mine Chrome and that we also supplier it outside countries. Whereby that's where we get our return on investment. The role of my department is to provide people and train them on the legal requirements of their particular jobs, so that they can be competent in their jobs.*

The core business of the organisation is to mine chrome and export it international. The business unit is responsible for training employees.

IT Applications and functions

Which systems or IT applications do you use for your daily tasks?

> *I use my computer most of the time, little bit of manual, computer maybe 80% of my time I use computer. My computer includes all the system on the computer.*

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

> *There is a helpdesk that we have, if you have a challenge that's where you normally report any IT related issues. I don't normally use the helpdesk myself because I think it's not that user friendly*

While the support system is offer through helpdesk which it not user friendly.

IT Systems weaknesses and opportunities

Which challenges do you experience with the systems within your business unit? Please describe the issues encountered with the systems, and how do you wish they can be resolved?

> *The only system that affect me is the dover system because at the moment the outcome of the assessment is in the computer the very same computer that the candidate is using. The outcome because its confidential. If the outcome could come directly to me so that I am the only one who can see it and make recommendations. But now the candidate can access it of which it does not longer be confidential. So unfortunately, the candidate does not know where it is, so if they can watch where you press they will be able to access it. So now what we do we just say get out so that you can be able to access it quickly while the person is looking away. But if the person can when you are looking they can turn and watch you. They can easily know where to access of which is a risk.*

The system challenge is the confidentiality of the assessment results.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

> *With the dover system, we need to certify people and give them a licence or not. So if it is not working we won't be able to advice who must get a licence and who must not. And then it means people they will stuck here without being released to go back to the workplace and that will affect production.*

The system the business uses is for certifying if an employee is competent enough to go do their duties and if the system is not working then employees cannot be released to render their services to the mine.

IT Systems dysfunctionality measures

How would you mitigate systems dysfunctions to optimally function accordingly, going forward??

> *The only thing that can be done is to make sure that the system is always working, make sure that the licences of the system are up to date so that we don't have an issue where they say the licence has expired or we cannot use the system.*

The business unit cannot afford to have system not working. Measures to prevent system dysfunction must be in place.

Change of business operation

If you were to change your business unit operations, what would you change, and how would you go about it, especially with regard to IT systems?

> *Ill introduce psychological assessment for all the recruitment because we need to get the right fit, so apparently, they are relying on interviews. So if we can rely on assessment we may know what we bringing the ability to perform optimum.*

The current method of recruitment is interview and the business unit sees it fit to also introduce assessments.

End user's competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

> *Ideally, they should be a change management which I don't think there is. People are not getting prepared. Okay previously I intervene when they introduced a new system and I was part of the project I made sure that people were made aware and made the sessions but going forward I don't see it happening because am no longer involved in the project.*

There is no change management to prepare people to use new or upgraded version systems.

IT systems maintenance

To what extent are the systems regularly updated or enhanced? In your view, which risks can be imposed if systems are not regularly updated or enhanced?

> *The systems are randomly updated by IT and then the specific system that I use like the dover system we have a licence and then before it expires, we normally renew the licence and if we don't the system shuts down. An unwanted information can be destroyed in the process through viruses. Also new programs must be updated so that they keep up to date the versions of the program that we are using and also updated for better performance.*

Regular updated of systems are run accordingly.

Disaster Recovery plan

What recovery is in place if disaster were to happen, and the systems were to be dysfunctional?

> *I remember the was a time when the system was not working for some days , there was no recovery plan. We had to wait. So according to me they was nothing at that time unless if that has been rectified and that I won't know course am not at IT.*

The business unit relies on IT Business unit for system recovery measure.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

> *The skills and training, we have IDPs in place whereby employees can get training whether formal training or short training, workshop, seminars, the CDP points to be to continuously know what is happening in the area of work. So we've got both study assistance and external training that the employees can use.*

The main tool in place to develop employee's competencies, skills, and knowledge is IDP that caters for all required training.

Communication culture

What is the communication culture imposed by the organisation?

> *The communication culture is centralised. So it is either communication officer will communicate or the general manager secretary will make the general communication.*

There is an appointed communication specialist and secretary that send out all communication.

5.9.2 Case Unit I: Resource Dependency

Outsourcing business process

How do you determine what business operation to outsource, and why? What are the criteria used for selecting the suppliers?

> *We use contractors for psychological services, so sometimes the employees they fill like when they talk to someone that they know they don't really trust them. They fill that whatever they say in confidence can be shared with other people and that they may lose trust in the system. Hence, we use an external person that doesn't know anyone only knows the contact person which is me where we know that the information it will remain confidential, and it will serve the purpose that it was intended for. We use the credentials, years of experience and subject matter experts, accreditations, registration, reliability, and qualifications of the*

people that will be actually doing the job whether they are competent and skilled to do the job

Psychological service is outsourcing for employee's confidentiality. Accreditation, expertise, registration, and reliability plays a role when selecting a supplier.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

Management wouldn't say course am not part of that but on the SLA its if you have a contract that is for a longer period is good that you have a service level agreement just to make sure that whatever you agreed about is whatever is will take part. So by the management am not sure how they actually deal with it but from where am standing what is important is to make sure that whatever is promised gets what is delivered.

Skills and knowledge transfer

Does the SLA include a clause to enforce suppliers to upskill your internal staff? How do you make sure the supplier skills are passed over to the internal employees?

There's no skill transfer because in business you would not want to share what they do because if we know what they do obviously we don't need them then we can do it ourselves. Not done at the moment and there is no clause according to my knowledge. There is no clause that tells them that they should transfer the skills.

No skills transfer from supplier to internal employees.

Competency shortage

Describe any competencies that you cannot do without that a vendor or supplier has?

Competence, qualifications, good communication skills, good interpersonal skills, presentation skills.

Service delivery challenges

Besides cost, which other challenges do you encounter while working with a supplier/vendor or a third party? Going forward, how would you like that to be done?

> *The only challenge time, sometimes they come late then the program start late. Sometimes they say we cannot be able to come, they postpone so it all revolves around time management. If we have our own people that can do the job, then it will be better course time will be effective course this people will be employed by the organisation. They will know that the time to come to work is this time.*

Time management is the main challenges.

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

> *Local, because local needs to be developed. So if you get someone from outside even if is international as long as they promised that they will do the skills transfer they will hire them so that the local can continue to work on their own.*

Local suppliers are preferred based on sustainable development.

Skills development

Why are you not building the capability within the organisation for the tasks that are done by suppliers so that you can reduce the outsourcing role by the suppliers?

> *Costs, Ability, Interest, Preference. So you can have this but if someone doesn't like it or doesn't prefer it you cannot force someone to go and study in that line. So the person must prefer, have the ability to study and must be able to provide the quality service so if you don't have all that and of which you cannot force it that will be challenge.*

The capability lies with individual if they would be willing to study.

Change recommendations

What change would you bring given the authority to bring change to the way the mine does things, especially regarding the suppliers?

> *The change that I can bring is what I have observed is only suppliers are used. So there is no option like you have three suppliers all the time and from the three suppliers you chose one. You should have database to rotate so it is only one supplier all the time with no opportunity of giving other people a chance to rotate and even if they are they are not partner, no skills transferred. And also doing like in training having this for example first aid that is done we know that is done throughout the years but we are also accredited we can do it ourselves, but we don't invest on getting someone to do it permanently. Instead we rely on outsourcing of which is too expensive for us.*

There are loopholes with supplier selection. One supplier mostly does the service and opportunities are not given to others.

5.9.3 Case Unit I: Upper Echelon Theory

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

> *My current position, I am sustainable development officer and my role is to ensure that the organisation develop employees in training and development. To function optimally at least three years minimum or maximum five.*

To role ensures successful transfer of the required knowledge and skills to enable an employee to perform his/her duties.

Competency skills, experience, and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

Academic background at least an honours level in industrial psychology with registration with HPCS. You must be able to have communication and presentation skills, report writing , you must have emotional intelligent so that you able to control your own emotions and emotions of other people. You must have listening skills, so that you listen to what other people are saying before you respond you must be analytic. Information that is presented to you, you must be able to analyse it without being judgemental and state the fact as they are. You must be ethical, you must be professional, you must have honesty and integrity.

Various competence skills and experience are required.

Lack of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

The risk is that if you are not professional and ethical some valuable information from the organisation can be lid and put organisation at risks. Another thing is if you do not have the good communication, presentation, analytical skills especially analytical skills you can make wrong judgement and that can impact somebody's future, maybe you said this thing is not recommended, and it must be recommended. So someone can lose an opportunity because of your lack of non-analytical skills.

Adherence to ethics and professionalisms is very important in the business unit.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views;
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

I think in this organisation, most of the time they use Autocratic but if it was me ill use the combination of all. Because there is a time when we need to be autocratic like I want this done

by this following the due dates and there is a time you need to call everyone and get participation and there is a time when you need to make changes as a leader you need to follow. So I think in this organisation they use Autocratic and sometimes they call mass meeting of which I can class it under participation and then transformational is very rare that they use. So if all styles are used in balance I think they would be a difference according to me.

Autocratic leadership style cut across the mine.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow, and acquire new resources like human personnel? How does management influence the daily operations of the mine?

For mine to acquire new resources, currently we are only mining Chrome, but I don't think that it is the only source that they get underground. So they need to check what other things that they can mine and be able to use and sell to make profit other than chrome, that will grow the company. Management influences the daily operations because on daily all managers have their departments meetings where they plan ahead for their daily activities for weekly or monthly so that they can reach the targets that are required.

Management influences daily operations through meetings.

Target

How does the organisation (or the different units) ensure that the targets are met?

By putting in action plans that must be followed and putting in due dates and set goals and targets that must be reached.

Action plans and target goals.

Employees performance measures

What measures do you have in the business unit that may help improve employees' productivity? How does the company manage the employee's performance?

I don't think we have any measure, but I think if we can have continuous motivation, continuous meetings as a team like HR we've got HR that side, systems, a community,

recruitment and selection and HRD.so we are working too much in silos. So if we can come and be one team and work as team I think that can improve a lot of things.

Engagement and teamwork.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

As HRD we make sure we are governing by the Mine Health and Safety Act which clearly stipulate that we need to train and make sure people are competent so that we can work safely. Our role is to make sure that people they know what they are doing so that they can do the right things. And we make sure that we also follow the legislation of accreditation NQA and ISO audit they come. The NQA they come annually, the ISO every three years to make sure that they can still give certification. Supplier before they come in we refer them to the safety officer to ensure that the safety file is up to standards to comply with all the safety regulation and we make sure that part of that safety it will include their qualification and everything that they need to come and do the job.

Legislature governs the business unit and suppliers to comply.

Business process governance

How does the current organisational structure ensure proper governance, and maintenance of business processes?

The current structure is a mess. It needs to be restructured because they are other positions that they are not there you find out that there is someone at B5 reporting to C5 so there is a gap. It Is not easy for someone to teach someone below because the cognitive ability there is very low and there is very high. So they need someone in between. So one can train this one, one can be able to transfer the skill.

There is no measure to follow to ensure proper governance.

Automation of process and manual processes.

Automation of processes versus manual processes. How do you view this? What needs to change, and how should the change take place?

> *Okay automation is good, but it comes with job losses. So that is the main challenge and again there are other things that you cannot automate so you need to check and then reskill your people because even machine sometimes they need to be operated, they need to be directed. So you need to before you can say no you are going automation you need to think which ones must automations and which ones must not go. And then the ones that must not go what must happen and the ones that must go also what must happen and then what are the resources, what are the people. It's a lot of aspect that you need to look at. You cannot just wake up and say guys let's do this but you must work toward automation because it's the things of the fourth industrial automation.*

Automation comes with whole lot of things to consider, and the concern is with job losses.

5.9.4 Case Unit I: Summary of the study findings

IT is critical function of the Human Resource Office. No work can be done without a computer, and the IT system. In the case of challenges that arise, the IT help desk is seen as important in addressing those issues as they arise. However, the respondent notes that the system itself is not user-friendly. Therefore, more work needs to be done to improve that area. This could be through more training seminars to ensure all users are comfortable with it.

The respondent also notes that psychological assessment tests are important in getting the "right fit" staff into the mining organisation.

The role of the respondent's department is to provide personnel, and also train them on the legal requirements of their particular jobs so that they can be competent in their jobs.

More needs to be done in ensuring employees are comfortable with the IT system as many are not. The respondent noted that if the system is not working, they have no other way to work but just to wait for the IT department. Counselling (4_16238293892_Human Resources Development office)

Great care is taken to ensure the psychological welfare of staff, and credible and experienced professionals are taken in to help with that. Training and counselling were the key areas outsourced within the IT department.

In my department is training and counselling (4_16238293892_Human Resources Development office)

With regards to the system from suppliers, key staff needs to be trained on all the different facets and work full time. Waiting for suppliers in the event of problems has been shown to negatively affect production. Outsourcing can also be more expensive.

They sometimes support but sometimes support comes slow. (4_16238293892_Human Resources Development office)

The autocratic style of leadership was chosen as the most used leadership style by the HR officer. This may be key in meeting targets faster. These targets are monitored weekly, and monthly to ensure they are being met. Appraisals are made as a key motivational technique, and bonuses are offered if targets are met. Automation of tasks is seen to be effective, but job losses are often the results. Adequate strategising is key in ensuring the automation process runs smoothly.

The next section will discuss the Sustainable Economic Development Business unit.

5.10 Section 10: Case Unit J - Sustainable Economic Development Office

This section analyses data and discusses the findings from the Sustainable Economic Development Business unit.

Case Unit J description

The main goal of the unit is to ensure legal compliance with the Social and Labour Plan and the Mining Charter, whilst establishing and maintaining a good stakeholder relations unit. The focus is on socio economic development, whereby the unit is responsible to make sure that they maintain the licence of the company and focusing on the socio-economic upliftment of the local communities, specifically enterprises, and supplier development and

compliance with the statutory bodies like the Department of Trade and Industry (DTI) in the mining charter.

5.10.1 Case Unit J: IT Capability

Role of the mining firm and Business Unit

What would you say is the core business of this mine? Please describe the role of your business unit relative to the mine's business?

> *We are operating we are operating under the sector of mining. Our unit we are focusing more on the socio-economic development, whereby we are responsible to make sure that we maintain the licence of the company and one of the things that we are focusing on is looking at socio economic upliftment of the local communities focus more on the small business, specifically enterprises and supplier development and the compliance with the statutory buddies like the DTI in the mining charter.*

The core business of the organisation is to mine. The business unit ensure legal compliance with the Social and Labour plan and the Mining Charter, whilst establishing and maintaining good stakeholder relations.

IT Applications and functions

Please describe your specific daily tasks and routines. Which systems or IT applications do you use for your daily tasks?

> *Most of the things that we are focusing on we look at the challenges that are faced by the local communities and focusing on the development of the small businesses around here and on socio economic upliftment of the local communities and the business around here.*

The business unit maintain effective stakeholder engagements and liaison. Systems used daily are:

> *Microsoft Office, JDE and then Hubble.*

The business unit uses three main systems: Microsoft office, JDe and Hubble to render daily operations of the mine.

IT systems value, limitations, and area of improvement

What is the value-added by the system to the business unit? Which limitations do the IT systems have, and how can these be improved?

> *Makes the communication easier with our stakeholders and then internally I think is one of the things that speedup the process and I think it makes most of the things to operate smooth. I cannot say the system has limitations course it depends on how you operate. You are given access to perform certain tasks and depending on the approval on the level that you are, certain things are being approved by senior officials. But it's the internal control that are put in place to make sure that the organisation comply with certain corporate governance and we comply with certain internal controls.*

The system in place makes operation easy to work with. Limitations on the system are because of the access level a user is given.

IT skills support

What support do you have in place using the systems in terms of system dysfunction? How is the system support offered, and how can it be improved?

> *We have the proper structure. IT department, we get support from the IT team and then where we struggle they intervene and they try by all means to make sure that we get proper training so that in future we can be able to use the system.*

While the support system process applied in the mine seems to be satisfactory and reliable.

> *The support is offered in different ways. Certain things you have to log a call and then other things you make a direct contact with the responsible person internally so I can say both it depends on the availability of the resources available.*

IT systems strength

Please describe the value of those systems, and how can you not function without them?

> *On JDe they are some technical things that if you are not IT person you cannot be able to function without them. The IT personnel sometimes they can offer online assistance, whereby they can access your system wherever you are and then they can be able to assist you*

depending on the type of the problem that you have. So in short I can say they add value because sometimes you are not available where the business is happening, you are operating from home but they can still be able to assist you and you can perform your daily tasks while you are at home.

Remote support and skilled support are available to assist.

IT risks and disaster plan

Which risks does your business unit or organisation impose if the systems were not to function at all? Which measures are in place if such disaster were to happen?

The risk currently, Is the way in which we store the information. We use the backup systems, we have the servers where you backup your information but unfortunately we don't use those facilities and then should anything happen we loss the information. I cannot say is the system problem but I can say is the way the people are applying or are using the system. The system automatically I backup the information. I think after it depends on the time you set on the system. 5, 10 minutes, 30 minutes a day yeah so in the short term. You would be able to get the information back but if you leave it longer than that I don't think you'll be able to get that information.

Human behaviour is the main challenges of data lose. Mostly they turn to not backup their records whereby the systems fail to enforce the backup.

IT Systems dysfunctionality measures

How would you mitigate systems dysfunctions to optimally function accordingly, going forward??

I think they should be a proper a reminder, an automatic reminder to all staff that the information needs to be under the relevant folder for archive and then another thing is maybe set a weekly reminder or maybe a daily reminder of the important information on how to store the information.

Business unit rely merely on IT and expect IT to have measures in place.

Change of business operation

If you were to change your business unit operations, what would you change, and how would you go about it, especially with regard to IT systems?

> *I think firstly I'll have to look at the records, our weekly reports and just compare the information that has been restored to check whether all the staff members are using the available resources and then if not I think they will have to send some of the staff members for retraining. Just to make sure that they restore the information. I think based on that it will give us proper guidance on how to operate going forward and the IT will be able to advise the best way of storing the information.*

The business needs to train user on records keeping to be able to backup and restore the records in case of disastrous.

Usage of IT in the business unit

Describe how you use information technologies in your business unit for your daily routines?

> *It depends on the type of system that you are using. We use outlook. We use excel and the word but outlook I think is one of the things that is performing for everyone within our team.*

Various technologies are used by the business unit.

End user's competency training

How are new systems/applications introduced to your unit, and how are the users of these applications get prepared to use them? How do you determine if a user is competent to use these applications?

> *The end user most of the time organise training for their staff and then the IT personnel will provide the training and then show everyone how the system works. And then we have an opportunity to ask question and then the way in which the system is managed and then a way in which it has to be apply. That's how we deal with the new system.*

Training is in place for users to familiarise themselves with the systems in the business unit. However, there is no proper competent programme in place. The use mostly manuals.

I think we have the training manuals. Is one of the things that will determine whether somebody is competent or not competent.

IT systems maintenance

In your view, which risks can be imposed if systems are not regularly updated or enhanced?

I think if the system is not updated there is a risk of the system being hacked. I think proper control must be in place so that even the senior officials cannot play around with the system.

No proper measure are conducted regularly to keep the systems operating effectively.

Individual Development training

What process is available to improve employees' competencies, skills, and knowledge? Please explain.

Okay employee skill is one of the things. Employee sometimes are being guided. It depends on your section. Some changes of legislation we have proper training and then other things that are in place are the internal trainings we get the specialist from the training providers who come here time and again and provide training depending on the area of workers.

The main tool in place to develop employee's competencies, skills, and knowledge is training.

Communication culture

What is the communication culture imposed by the organisation?

If we want to communicate something to all employees the email is sent to everyone and then we put the communication on the notice boards and then another thing for those people who don't have access to the laptops, they can access the information on the laptop. Like for instance if they want to raise their concern maybe to reach the management, we have a way on the document. Every time we put the questions, we have a briefing pack where employees get the opportunities to raise their concern.

Communication is open platform for employees to raise their concern.

5.10.2 Case Unit J: Resource Dependency

Outsourcing business process

How do you determine what business operation to outsource, and why? Please describe the procedure of outsourcing within the organisation?

> *It depends we do the business analysis whereby we look at the risk of employee depending on the challenge that you are facing during that time. Sometime is a long-term thing and sometimes is a short-term thing. So you cannot employee someone for a short period whereas you want immediate results and after that is going to be a risk to the business in terms of financial part but sometimes we don't have the skills internally whereby we look at the consulting companies to assist with the analysis of the problem and come up with the recommendations. That's some of the things that are guiding us to outsource certain services.*

Outsourcing for the business unit is determined by the unavailability of relevant skills and turnaround time.

Selection criteria

What are the criteria used for selecting the suppliers?

> *Okay the technicalities is one of the thing that we are looking at, we look at the BEE compliance, we look at locality and then we look at impact. We do the impact analysis before we can even appoint.*

Various criteria can be followed before the contract is awarded.

Suppliers' performance measures

How does the mine leadership ensure that the suppliers do what is expected of them, including their performance? What kind of SLAs do you often engage in with suppliers? How are these important?

> *For service companies we have a service level agreement where it details everything what we expect from them and then sometimes if the SLA doesn't suit the changes or maybe let*

me put it in this way. The changes because the legislations changes and then sometimes we look at the compliance and the systems maybe the systems are designed in such a way that it doesn't carter certain things that it needs to be included. So we have to change the SLA, so where the contractor maybe some of the things are not included we have to review the SLA and redraft the new one for improvement. Does how we monitor our services and the for contractor we have the agreements that are detailed in the contract and then the details of the contract depending on the type of the project that we doing. So it depends on the contract.

Contract review is done, and redraft is provide to accommodate any new changes to the SLA.

Skills and knowledge transfer

Does the SLA include a clause to enforce suppliers to upskill your internal staff? How do you make sure the supplier skills are passed over to the internal employees?

When an established contractor with enough knowledge perform a particular task we encourage the smaller companies or the bigger companies to develop smaller companies so that the can pass skills to smaller companies. So what we normally do we draft an agreement whereby an internal people or the end users will monitor that the agreement that was made between the supplier, the big supplier and the emerging companies, that's how we monitor. And then we receive the reports every month to check whether that whatever that is detailed in the contract is actually happening.

Established companies are given clause to develop small companies.

Selection and critical function rendered by suppliers

What is the critical function of those services rendered by suppliers? Describe what influence you have in selecting a supplier?

Specialised skills in. Number one they are certain services that are only limited to certain industries originally equipment manufacturers. You can only get it from certain companies. So in that case we only focus only on those companies. So we have services that are being performed by too many companies around here but we look at the competency and the grading. One of the things that we look at. Another thing we look at the BEE compliance

which is one of the things that is giving us knowledge that this company is committed to transformation. Another thing we look at the technicalities and the quality. That's what we looking at because our department as I indicated earlier on, we are focusing on the socio economic upliftment of the local areas.

Because the business its role is mine, the critical functions that the mine does not specialise in outsource. Selection criteria are specialist skill, BEE compliance, technicalities, and quality.

Service delivery challenges

Besides cost, which other challenges do you encounter while working with a supplier/vendor or a third party? Going forward, how would you like that to be done?

Is to meet the targets. And sometimes I think the delay is coursed by certain things being delayed internally and yes is one of the things and other than that I don't see any challenge.

Meeting targets are merger challenges of the supplier's business unit.

Supplier preferences

Describe your preference, between international or local suppliers, when awarding supplier contracts? Which qualities do you look at when selecting a supplier?

Local suppliers are preferred because the business unit's role is to uplift local business development.

Change recommendations

What change would you bring given the authority to bring change to the way the mine does things, especially regarding the suppliers?

I would want to make sure that they outsource other services to smaller companies. Build the relationship with the local people as well and then to contribute to the corporate social investment of the mine. And assist the mine as well because the more they make business with us is the more they have to contribute to the socio economic upliftment of the local people.

Engagement with local business to establish more corporate social investment.

5.10.3 Case Unit J: Upper Echelon Theory

Leadership role

What is your current position, and what role do you play in your position? How many years of experience would you say are desirable for your current position?

> *Local Economic Development (LED) Officer, I focus on the local business development and then supplier development, enterprise development and compliance.*

The role of the LED carries development of local business.

Competency skills, experience, and expertise

In this role, what do you think are the necessary competencies in terms of skills, experience, expertise, and academic background?

> *You need to have financial skills first of all, maybe have little bit of accounting background. And then another thing, you need to have interpersonal skills as well. And then in terms of academically yeah just a business diploma or a business degree.*

Various competence skills and experience are required.

Lack of skills and expertise

What risk can an organisation be exposed to if the skills and expertise for the role are not fulfilled?

> *One of the risk that we are imposing is the disablement of the local people. Another thing noncompliance with mining charter and the triple BEE code and then another thing you putting a risk of the licence to operate as well because failure to comply those things it puts a risk to stop the operation.*

Noncompliance with the laws in the business unit has the potential have mine not to operate.

Organisational leadership style of the business unit

They are many types of organisational leadership (give them examples), which one would you say manifests in this mine? Which one would you prefer, how/why?

- Autocratic leadership is a management style in which one person makes all of the decisions with little participation from other members of the group.;
- Participative leadership style involves input from all employees, resulting in a decision that reflects the majority's views;
- Transformational leadership is someone who actively communicates any changes to employees and is always motivational.

  Is transformational leadership and the one to consult everyone yes but on the other hand might have a negative impact because is not everyone's view on certain view.

Transformational leadership cut across the mine.

Mine growth and resource expansion

Briefly describe how you envision the mine to grow, and acquire new resources like human personnel? How does management influence the daily operations of the mine?

I think one of the things is to have the consistent engagement with the employees internally, number 2 you need to allow employees to voice their concern without fear, another thing is to get an independent organisation just to gauge employee on how they view certain things internally. And then last thing is to do proper consultation on the change management because ones you view certain things differently it will affect certain things in negative other things in a positive so I would prefer that process to be conducted by an independent company doing proper enjoyment internally with everyone.

A change management be conducted by external companies.

Employees performance measures

What measures do you have in the business unit that may help improve employees' productivity? How does the company manage the employee's performance?

I think one of the things that we normally do, we have the meetings every time and the we actually detail our challenges and unfortunately we don't have this thing of team building.

We don't have and is one of the thing that I believe is still required so that we can be able to understand each other on how best can we improve. We have the KPIs, key performance indicators which we do at the beginning of each and every financial year and then we are being measured on that and then we have the scores. We are being measure based on the scores are allocated to different tasks. So based on that I think that system will assist everyone to check whether we meet our targets or we don't.

Internal employees' performances are managed through performance appraisal.

Business unit compliance

Describe your role in ensuring your business unit is compliant? How do you engage with the supplier to be compliant?

From our side we work with different department internally. Finance, procurement, human resource and then I think the plant part. So depending which legislation am focusing on mining charter detail two different legislation but now on the mining charter side we have the guiding principle which are in the mining charter and then we do the monitoring each and every month and then on the quarterly basis we give the report to the different end users and where to improve and what is expected from them to meet our targets. Telephonically they are supplier which are based on site that are based outside. Those who are only suppling we engage them telephonically and by email and then the ones which are around here we call them to come to see us in the offices depending on the type of the problem to make sure they comply if is something very serious we can even arrange a meeting to meet.

The business unit is guided by the principle of the mining charter. Suppliers are compliance are communicated.

Business process governance

How does the current organisational structure ensure proper governance, and maintenance of business processes?

Every department has its own management system whereby we are being guided by documents. It is a policy to run our department and then each and every person working in that department is catered by that and that document when they develop that document is guided by the internal control systems and they came reports as well.

5.10.4 Case Unit J: Summary of the study findings

The role of the business unit relative to the mine is to support business operations by managing the Protection Services portfolio towards minimising potential risks relating to the security of company employees and assets. It also serves to support the General Manager and coordinate daily protection services operations. This includes close liaison with subordinates, ensuring compliance with operational policies, and procedures. It manages resources, and investigates breaches of security, initiates and manages appropriate systems to minimise risks relating to the security of employees, and assets. The business unit utilises various information systems that are integrated daily. Although there are no limitations encountered within the business units, internal controls are measurements in place for complying with governance controls.

I cannot say the system has limitations as it depends on how you operate. You are given access to perform certain tasks depending on the level that you are in certain things that are being approved by senior officials. I cannot say it is the system itself. But, it's the internal control that is put in place to make sure that the organisation, and us comply with corporate governance, and certain internal controls. (10_16238293899_Sustainable Economic Development Office)

The technologies are in place allow virtual assistants who do administrative functions remotely. That goes to show that in this current state, technology plays a vital role within the business units. Training is offered depending on the units. However, from time to time, internal training is outsourced from specialised training providers. There is dependency between organisational and external suppliers.

Sometimes, employees are being guided. It depends on your section. Ther are some changes in legislation; we have proper training, and other things that are in place are the internal pieces of training. We also get specialists from the training providers who come here time and again and provide training depending on the field of the workers (10_16238293899_Sustainable Economic Development Office).

This business unit is dependable on external engagements. This means SLAs and gaining power over their external supplies lays a vital role.

From our section, we rely more on other stakeholders, and one of the resources that we are using is consultation with different directories, which have an impact on our business decisions, for instance, in DMRE, we use them. We use other mines around here. The reason why we use other mines around here is for consistency in terms of what we are doing, and what will affect the areas around here that are being guided by too many documents including the integrity development plans, and the municipality around here. In addition, there is consultation with the traditional leaders, and before then, we could consult all our stakeholders, and then make informed decisions. (10_16238293899_Sustainable Economic Development Office).

There is a guideline in terms of outsourcing service, and there are several things taken into consideration such as finance and internal skills. We set criteria for selecting suppliers. It is the responsibility of the business unit to develop the local communities, which means SLAs are drafted for suppliers, and get reports every month to check if whatever is detailed in the contract is happening.

The technicalities are one of the things that we are looking at; we look at the BEE compliance part, we look at the locality, and the impact. We do the impact analysis before we can even appoint. This is one of the things guiding us. (10_16238293899_Sustainable Economic Development Office).

Skills needed are a major concern. Education qualification is not an area of concern since the most critical role needs financial skills.

I think you need to have financial skills first, and maybe with a little bit of an accounting background. Then, another thing, you need to have interpersonal skills. In terms of academics, yeah, just a business diploma or a business degree is fine (10_16238293899_Sustainable Economic Development Office).

5.11 Summary of the Chapter

This chapter analysed data and discussed the study findings. The analysis and discussions were done per theme and subthemes, synonymous with study objectives and elements of the theories underpinning the present study, respectively. Each subsection denoted a business unit or case unit, and the findings were summarised at the end of each case unit.

The next chapter interprets the study findings and subsequently provides the framework for information systems capability for the South African mining firms.

CHAPTER SIX

INTERPRETATION OF FINDINGS AND THE FRAMEWORK

Chapter five analysed data and discussed study findings. In this chapter, the interpretation of findings is done against the existing literature and the context. Informed by the interpretations, a framework for information systems capability in South African mining firms is subsequently conceptualised under section 6.1.5.

6.1 Interpretation of the Study Findings

The interpretations of the findings are presented in accordance with the study themes. Findings that appear to be similar throughout the ten case units are articulated and interpreted as one. To recap, the study used IT Capability Model, Resource Dependency, and the Upper Echelon theories as analytical and interpretation lenses.

6.1.1 Interpretation of theme one findings: IT Capability

Theme One/Objective One: To understand the current IT and business resources in a South African firm.

The study examined the roles of the business units, the daily tasks, and the applications in place. Participants responded to questions related to IT applications/system usage, advantages of these systems, challenges, risks related to the systems, insights into system improvements, and operation effectiveness.

Figure 15, below, shows the subthemes making up the IT Capability Theme.

Figure 15: Theme one - Findings

Figure 15 shows identified patterns and reports on the codes from all various case units. The similarity throughout all the 10 case units was articulated and interpreted as a single unit. The identified themes that emerged from these codes are; IT applications/systems usage, system value-add, system limitations, business risks, available support and measures, and participant recommendations.

6.1.1.2 IT Applications/System Usage

The participants specified systems they use daily across various business units. The system includes JDE, MES, Isometric, Hubble, QlikView, MS Office, and firefly. The majority of the participants emphasised that these systems are not interlinked.

The study found that business units have various systems, and these systems operate in silos. This means there is a lack of system integration or information synergy. Information synergy refers to the pooling of resources in an organisation in which individuals or business units collaborate and employ information technology across roles or subunits (Dewett & Jones, 2001). The findings showed that ITCs align organisations to collaborate and, as a result, generate greater information synergy. This means that for the organisation to profit from the value of IT, the systems in various units must interact rather than operate in silos. More interaction results in greater information synergy, which impacts organisational performance.

By encouraging interaction, synergies, and core competencies among business units, information systems may increase the overall performance. In these synergy settings, one use of information technology is to link the processes of separate business units so that they may function as a whole. Any information system that facilitates knowledge exchange across corporate divisions improves capability.

6.1.1.3 System value-add

The value derived through the systems includes easy monitoring, information integrity, transaction recording, access control, easy communication, and smooth operation. These findings show that IT plays a vital role in the organisation, and without IT, it cannot be possible for the organisation to achieve business goals. This means the organisational IT systems play an important role, and IT capability can influence organisations' ability to adapt to change, thereby improving, and preserving the performance of the organisations' tasks in a dynamic, and complex business environment (Kim *et al.*, 2015). While the organisation invests heavily in IT, the benefits, and the system value-added are well understood by the participants. Thus, the participants acknowledged how information technologies enabled the organisation.

6.1.1.4 System limitations

The major issue raised was that the systems are not interlinked with one another, hence making the process of data exportation tedious and time-consuming. Live tracking challenge was raised by the protection service case unit, whereby it is hard to prevent theft when a variant is observed. Others raised challenges regarding approval delays, and the use of outdated systems. Business operations should meet emerging organisational challenges. Santham and Hartono (2003) state that organisations with skilled IT skills may meet competitive demand by aligning IT strategies with business objectives, and building dependable, cost-effective systems. The system's capabilities in place for the organisations are hindering the striving organisation’s performance. However, the findings showed that there is a lack of IT expertise, which can meet the demands by aligning the systems to meet end users’ demands. Therefore, this shows that IT capability, if not understood well, can negatively affect the organisation’s performance. The organisations are not able to reap the advantages of IT investments due to a lack of related skills.

6.1.1.5 Business risks

The findings showed the greatest risks with regards to the business operations such as systems not functioning at all, which will cause business closure. This is because there will be no flow of various business operations that allow mining to happen. Another risk is that funds might be misused if there is no monitoring. Other risks include loss of the license to operate the mine, theft, and corruption. Literature has extensively explored, and analysed risks associated with organisations. However, managing risks and their vulnerabilities remain a challenge for many businesses.

IT is the driving force behind businesses, and organisations; it carries risks and other vulnerabilities that pose threats to the organisation. This implies that to stay in business, every organisation must be able to effectively limit, and manage their risks and hazards. Miller (1991) defines risks as “uncertain external factors that diminish performance predictability, and a lack of predictability” in the business's outcomes. IT risks are widely defined as “anything that may go wrong with IT and have a negative impact on the business” (Jordan & Silcock, 2005: 48). According to Mseteka (2014), IT risks are vulnerabilities in information technology/systems that might disrupt a company's day-to-day operations. This means the organisation needs a precautionary measure to stay in the business. The findings showed that the organisation is left vulnerable to business risks. There is a lack of required skills to effectively manage and evaluate risks internally; there are no IT skilled employees devoted to Information Security; resources are limited, while management frequently overlooks the dangers connected with information technology.

6.1.1.6 Available support and measures

There is support in place that assists in terms of system failures. IT support and a helpdesk are also reliable to assist. Participants also indicated that there are backup systems in place. Manual systems are also used in times of system failures.

6.1.1.7 Recommendations

A key recommendation for the organisation is to have an integrated system that can allow processes to be interlinked. Systems should also be regularly updated, and backup

systems should be leveraged. Participants mentioned that the systems should be effective, and also consider a focus on product quality. Consequently, the findings suggest that integration plays a crucial role in ITC. To assert the value of IT, the study recommends that organisations implement or adopt an ERP system to assist in benefiting from IT capability. However, where many businesses have adopted the same ERP system, such as SAP, not all of them have been successful after implementing the ‘best practice' system. Although an IT system may be easily replicated, a successful installation process is difficult to copy. Furthermore, even if an organisation follows the same implementation method as another successful company, it may still fail because that could experience different internal, and external environments than the successful organisation (Chen & Huang, 2006). For these reasons, the best practices, and market specialists must be considered for the organisation to produce market value through its IT resources, and "know-how" (Chae *et al.*, 2018).

To manage their information systems within the organisation, the organisation must adopt an IT capabilities framework, and be knowledgeable (Tippins & Sohi, 2003). As a result, organisations can acquire distinctive organisational abilities to combine existing resources, and maintain outstanding organisational performance (Hamel & Prahalad, 1994). In summary, IT capability may shape an organisation's assets, competencies, knowledge, processes, and relationships to enable firms to effectively acquire, deploy, and manage IT products, and services in shaping innovations, and business strategies (Sambamurthy & Zmud, 1997; Feeny & Wilcocks, 1998).

6.1.2 Interpretation of theme two: IT capability

Theme One/Objective Two: Explore and describe how information systems capability manifests in South African mining firms.

This objective explored and analysed information systems capability in terms of business processes, and how information technologies enable the organisation to operate. The study focused on understanding how information technology is used in different business units, how systems/applications are introduced to the staff, and usability competence measures, system updates and related risks, recovery plans, availability of skill competency processes, and communication culture in place.

Figure 16 below shows the subthemes making up IT Capability Theme.

Figure 16: Theme two - findings

Figure 16 shows identified patterns and reports on the codes from all various case units. The similarity throughout all the 10 case units is articulated and interpreted as a single unit. The identified themes that emerged from these codes are; Information Technology Usage, Systems/application training process, Application Usability Competency, System updates and related risks, Disaster Recovery plans, Availability of Skill Competency Processes, and Communication Culture.

6.1.2.1 Information Technology usage

The main use of Information technologies includes reporting and research, communication, approvals, and conducting day-to-day running of the business. In today's changing environment and technological evolution, information technologies have become an essential element of businesses. While the majority of organisations rely on IT to increase productivity and performance, IT also plays a significant role in completing many important activities. The use of information technologies by businesses is a critical component in improving management, service as well as increasing productivity (Anaçolu, 2018). However, the usage of technologies comes with challenges, and issues related to skills and knowledge. To overcome challenges, organisations must maintain pace with ever-changing IT developments, and acquire and sustain changes and innovations. To date, employees may easily access, manage, and utilise information using information systems, and they can do so from a variety of locations. In this regard, the finding shows that IT

technology has been shown to have an impact on organisational performance, and its usage by organisations is essential.

6.1.2.2 Systems/Application training process

The findings showed that training is offered on new applications. Communication is mostly done via email, noticeboards, and meetings. However, the mode of training is unreliable in all business units. Some of the training is not formal. Others rely on learning new applications from colleagues or self-learning.

The organisation has systems in place to assist workers who have taken up information technology duties in the business, as well as other standard jobs from top managers whose duty is to make strategic decisions. When we talk about the systems utilised in the business, we also mean the training of personnel on how to use the systems. The benefits of training on system usage are extremely significant to ignore, and it has become one of the most critical instruments for organisational success. However, if not properly trained, the systems are deemed invaluable. Organisations are faced with a fast-evolving technological environment. Findings recommend that businesses that aim to compete in their market share must be faster than their competitors in identifying, and applying new technologies, as well as employees' ability to understand the technologies. The industries will be operating in a technologically advanced environment in the future. In this technologically driven world, the first to compete will acquire their market share, while the others will lose. In other words, organisations that handle technology successfully, and maintain their employees' expertise by providing continuous training will attain a technologically based organisational advantage. Therefore, the study recommends continuous training for the organisation to retain and enjoy the value that IT comes with.

6.1.2.3 Application usability competency

Participants get evaluated on application usability competency through work assessment, signing of attendance sheets, pragmatic testing, and notice through errors. Based on the data provided, it is clear that usability competency evaluation protocols have not been explored accordingly. As previously recommended (6.1.2.4), continuous training for the organisation to maintain, and enjoy the value that IT brings should consist of creating new knowledge by upgrading existing knowledge (Norman, 1976). Existing users' knowledge

and new users' knowledge will be better integrated and absorbed if linkages are created between them. Techniques for assessing an employee's understanding of application usability are so required. It is feasible to assess employees' expertise in realistic circumstances. The organisation must assess the availability of personnel with basic technological expertise. Technological literacy refers to the fundamental technological competence of being able to use and manage any technologies or tools (UNESCO, 2018). According to the Task-Technology Fit (TTF) model, when people have sufficient ability to use technology, it will be appropriate for the tasks it supports (Goodhue, 1995). This means that if users' competencies match technological functionality, the technology will be suitable for carrying out their responsibilities (Mpekoa &and Bere, 2018; Erskine *et al.*, 2019).

6.1.2.4 System updates and related risks

The system updates are dependent on various factors and are based on the participants' responses. Some business units update their systems regularly; others do not have any updates at all. These factors include cases whereby users complain, systems failures, licenses expire, and audit findings encountered. The major risk that was raised is the virus attacks, and systems hacking. Other risks include system logs, financial risks, and system functionality errors. In many instances, software companies no longer offer their systems as monolithic packages, but rather continuously improve, and extend their products after their initial release, while the software is already in use by their customers (Fleischmann, 2015). In practice, updates are sometimes given as individual updates or as bigger update packages, including many new features at the same time. According to Dunn (2004), Software updates are self-contained modules of software that are distributed to users for free in order to modify or extend software that has already been distributed and is in use.

The concept of software updates is discussed continuously throughout the software engineering literature, using various terms like update, upgrade, patch, bug repair or hotfix (Sommerville, 2010). The literature on software systems and maintenance focuses on the later phases of the systems life cycle when updates are used to adapt the software to future demands or to correct developing faults in software that is already in use (Shirabad *et al.* 2001). If the basic functioning of the system is modified, the user's engagement with the system may likewise change. These feature upgrades can impact users' perceptions, attitudes, and actions towards the upgraded programme.

6.1.2.5 Disaster Recovery Plans

The majority of the participants were not sure of any disaster recovery plans (DRP) in place. Only three business units mentioned that there is a backup system in place. Participants know the importance of disaster recovery plans, according to Andrew (1990), planning is "the process of establishing, and maintaining an effective documented plan of how organisations will continue to operate in the event of business function disruptions." Persson (1994) explains that DRP “enables the preservation of primary assets of the company, and the systematic recovery of business activities in the case of a disaster,” and “offers an organisation security, and integrity of its data processing capability,” (Toigo, 1992). is this study emphasise that DRP is an IT disaster recovery process that is put in place ahead of time to prevent mission-critical data from being destroyed. It typically includes a strategy designed to protect business operations of the systems, and processes that protect the organisation from lost revenue, prolonged downtime, and (worst case scenario) complete business failure. This study emphasises that the organisation needs to adapt the DRP process, which is well studied through risk management literature (Samimi, 2020; Samimi *et al.*, 2021).

6.1.2.6 Availability of skill competency processes

The process utilised by the entire organisation is Personal Development Plan (IDP), and induction training. There is a PTO system that is used. However, one business unit mentioned that there is no formal training in their department. Through ongoing moderation and verification of job-specific training, the Human Resource Development department ensures the effective transfer of the needed knowledge, skills, and attitudes to enable an employee to perform his/her tasks at the required established standards in a mining environment. The department's responsibility is to provide employees, and to ensure that those individuals are trained on the legal requirements of their specific occupations so that they may be competent in their positions. This is accomplished through developing, producing, and implementing necessary training materials, as well as assuring safe working procedures.

The study points out the inconsistency in the training process in place, but one element of any organisation's larger workforce development scheme is training. The literature strives

that any organisation that wishes to grow well, and succeed in today's diverse, and dynamic economy has found it necessary to engage in continuing training, and development to enhance production skills, and obtain the most return on human capital investment (Truitt, 2011). Consequently, there is no generally accepted training matrix for any form of training.

A pull of matrix has emerged in the literature, but even those supported by the policy community at the highest levels have failed to drive mainstream training research, and practice (Bills & Randy, 2007:21). The study argues that employees must be proactive learners who engage and manage their learning to get the most out of formal training. As a result, they have a major influence on the effectiveness of training transfer (Nesbit, 2012). Feedback-seeking develops self-evaluative thinking to include other sources such as co-workers and enables a quasi-objective assessment of the efficacy of training transfer efforts (Atwater & Waldman, 1998).

Reflection is a fundamental process of workplace learning, since it allows sense-making from work experience to direct future conduct (Knipfer, Kump, Wessel & Cress, 2013). Two types of training transfer are essential for the HRD department to develop learning capabilities in the workforce.

6.1.2.7 Communication culture

The majority of the participants revealed that most times they use electronic communication such as emails, noticeboards, centralised communication, meetings, and memos. However, few responses raised concerns about the communication culture. There were concerns related to fear of being open, for the reason that anything that gets said can be used to victimise the employee. Organisations and their employees are now tasked with maintaining workplace privacy and ensuring the confidentiality of organisational information while protecting employee rights (PoPi Act). Organisations are faced with additional challenges after September 11, 2001, which include the implementation of new regulations. Therefore, workplace privacy regulations must be explicitly and efficiently addressed to all people of the organisation (Dillon *et al.*, 2008:25).

6.1.3 Interpretation of theme three: resource dependency

Theme Two/Objective Three: Explore and describe the influence of Resource Dependency on a South African mining firms information systems capability.

This objective explored and examined how resource dependency manifests in the organisation. The objective examined all the various internal entities that are incapable of producing all the support needed to sustain themselves or the organisation. Findings sought to explore factors considered when selecting suppliers or outsourcing services, the procedure and criteria used, performance and improvement insights, qualities considered, challenges faced, business unit delivery independence, and recommendations on what can be altered for improvement.

Figure 16 below shows the subthemes making up the Resource Dependency Theme.

Figure 17: Theme three- findings

Figure 17 shows identified patterns, and reports on the codes from all various case units. The similarity throughout all the 10 case units is articulated and interpreted as a single unit.

The identified themes that emerged from these codes are; Outside resources dependency, Factors considered when outsourcing, Procedure, and criteria used when outsourcing, Supplier Performance monitoring, Suppliers' Critical Functions, Business unit delivery Independence, Supplier preference, Reasons hindering in house capabilities, and Change recommendations.

6.1.3.1 Outside resources dependency

Some business units rely on external resources while others completely do not use any external services. Pfeffer and Salancik (1978) provide a comprehensive theory of how organisations may decrease environmental dependency, and uncertainty. They explain the effectiveness of pursuing the theory of resource dependency and characterise the theory as an organisation seeking to optimise its strength. With this finding, the study urges the organisation to seek and reduce its dependence on other organisations. The reason an organisation may strengthen its power is by reducing its dependence on other organisations, and by doing so, it can minimise the potential uncertainty caused by its interdependence on the external surroundings (Fraczkiewicz-Wronka & Szymaniec, 2012). Pfeffer and Salancik's (1978) theory articulates how they can achieve power by having the right resources, which give the business power because power allows them to create an advantage for themselves and ensure that they can use their power to partner with other enterprises, creating dependency for other enterprises.

6.1.3.2 Factors considered when outsourcing

Factors considered when outsourcing are resources availability within the company, skills, and expertise, and cost. Organisations must seek to reduce their dependence by reducing their needs, acquiring new suppliers of resources or maintaining influence over those resources (Pfeffer & Salancik, 2003). Managers must subjectively understand and interpret resource allocation in the organisation. Pfeffer and Salancik (2003) expand RDT theory to include interactions with both the external, and internal environment. According to the theory, the organisation attempts to eliminate uncertainty. The degree of uncertainty changes depending on how critical resources are distributed in the ecosystem. The research recommends that organisations transmit external authority, and the management of interdependency connections.

6.1.3.3 Procedure and criteria used when outsourcing

The main procedure followed is the tender process. Criteria used to select suitable suppliers include BEE compliance, and impact analysis results. While the literature and this study emphasise several recommendations, this study is aligned with the literature. As a result, this study explored the organisation's resource dependence, and constructs essential resources. Critical resources that might risk an organisation's capital may thus have the option to maintain it by adopting strategic decisions based on dependency exchange, such as collaboration, joint ventures, partnerships, and so on. Then, to manage a changing environment, organisations must understand active decision activities.

6.1.3.4 Supplier performance monitoring

The study's findings demonstrate that performance monitoring is diverse. The majority of the business units indicated that they do not have any SLAs. Only a few business units indicated that they do have SLA. However, other methods used for performance monitoring are the rating form, SHEQ agreement, and a performance evaluation process. One business unit indicated that if there is a need to pass the skills to internal staff, then an agreement would be drafted. Talluri and Sarkis (2002:26) develop an approach for evaluating and monitoring supplier performance by various performance measures. In the context of supplier monitoring, the model's development generated intriguing insights for procurement managers involved in supplier monitoring and ongoing performance monitoring. Literature about supplier performance monitoring extensively studies production and economics. Organisations may efficiently use such literature to provide feedback to suppliers, therefore increasing performance. However, this study correlates with Talluri and Sarkis (2002:26) by making use of selecting input, and output criteria as performance monitoring. The selection of these measures is essential in putting this technique into action. Any resources utilised by the supplier might be considered inputs, and the outputs are often some types of performance measure.

6.1.3.5 Suppliers' critical functions

The critical functions rendered by suppliers include reliable safety performance, external audits, assessment, training and counselling, instant repairs, product certification, access

control, and gas detection. One basic assumption of the Theory of Resource Dependency is that dependency on "critical" and significant resources impacts the activities of the revenue of organisations (Nienhuser, 2008). Hillman *et al.*, (2009) emphasise a synthesised approach to provide insight into the competitive advantage of businesses and organisations by controlling critical resources, and how the development of resource interdependencies around critical resources affects their benefits. For an organisation to maintain its power over suppliers, it has to control critical resources.

6.1.3.6 Business unit independent service delivery

For the organisation to be able to deliver the services rendered by suppliers, the employees need training, be accredited, and ensure they have the necessary qualifications. The other aspect is to ensure there are proper facilities in place. Recruiting supplier employees was also captured. Three participants indicated that it is impossible to deliver the services themselves, for example, in terms of external auditing and assessment. Literature states that an organisation needs to attain its independence through merging M&As. The reasons why organisations can participate in M&As include: "To start, the organisation can reduce rivalry by absorbing an essential competitor organisation; followed by, to manage the interdependence of either input sources or output buyers by absorbing them; and lastly, to diversify operations and thereby to reduce reliance on the current organisations with which they are engaged'' (Pfeffer, 1976: 39). Walter and Barney (1990) note that one of Mergers / Vertical integration's (M&A) management priorities is to minimise company reliance on other companies in their climate. Finally, the Pfeffer (1972a) analysis shows that M&As are mostly used to eliminate direct competition.

6.1.3.7 Supplier preference

The majority of the business units indicated that they prefer working with local suppliers since they are cheaper, and convenient, and also offer support to locals to grow their businesses. Reliability, quality service, competence, accreditation, leadership, and pricing all form part of supplier preferences. This is an important element in selecting suppliers. However, there is a substantial subjective dispute in procurement, and business unit preferences (many differing viewpoints), especially when managerial leadership, skills, and knowledge are limited.

6.1.3.8 Reasons hindering in house capabilities

Challenges that hinder in-house capabilities include a small IT section, limited funds, the need for quality services, and politics.

6.1.3.8.1 Change recommendations

1. Reduce suppliers and enrol required suppliers only.
2. Incorporate highly skilled people into the mine.
3. Improve the supplier performance evaluation process.
4. Provide staff training for all mine workers.
5. Support local small businesses.
6. Implementation of SLA throughout all suppliers.
7. Conduct continuous supplier monitoring and evaluation.
8. Engage in corporate social investment, thereby contributing to socio-economic upliftment of the people in the local communities.

6.1.4 Interpretation of theme four: Upper Echelon Theory

Theme Four/Objective Four: To describe, using Upper Echelon theory as a lens, the influence of leadership on building IT capability in a South African mining firm.

The purpose of this objective was to explore key competencies that are required in the mine from all various business units. The primary goal was to understand how leaders participate in business strategy and operational activities. Participants responded to questions related to their experience, education, and leadership styles.

Figure 18 below shows a subtheme making up the Upper Echelon Theme.

Figure 18: Theme four- findings

Figure 18 shows identified patterns and reports on the codes from all various case units. The similarity throughout all the 10 case units is articulated and interpreted as a single unit. The identified themes that emerged from these codes include Experience, competencies, and education, Risks related to lack of skills and expertise, Value added by experience, Need for additional qualifications, Leadership style, Governance and maintenance of business processes, and Upper management influence.

6.1.4.1 Experience, competencies, and education

The theory that underpins this study (Upper Echelons Theory) argues that the leadership's experiences, values, and personalities have a significant impact on how leaders perceive situations and, as a result, that is how they make decisions (Hambrick, 2007). The leadership experience is significant in the acceptance or utilisation of the information system. Based on the findings from the participants' experience ranges from 3 to 10 years, depending on the business unit and its role. According to the findings, soft skills desired

include leadership skills, communication skills, listening skills, people skills, honesty and integrity, and commitment. The Upper Echelon Theory (UET) presented by Hambrick and Mason (1984) is used to characterise employees within an organisation who control its operations, and make decisions. The UET also links leaders' characteristics and behaviours to organisational outcomes. Mumford *et al.* (2002) emphasise that to have excellent and well-recognised leadership characteristics, leaders must have technical, professional competence, and innovative/creative abilities to manage or handle complicated and critical challenges inside organisations. The study has the same results as the literature, whereby a Diploma or bachelor's degree, certifications, and technical knowledge are the minimum educational requirements. In this context, leaders need to direct business towards IT capabilities, and to accomplish that, leaders need to grasp the value that IT brings to the organisation with their expertise and competencies.

6.1.4.2 Risks related to lack of skills and expertise

Risks form part of every organisation and the organisation has a human resource development unit that ensures proper skills and competencies are deployed to the employees. If there is a lack of capabilities and experience to develop new skill sets that need new competencies, as well as new attributes of leadership, the organisation might suffer greatly in all parts of the business (Kohnke, 2017). This being said, a lack of the required skills would jeopardise the mine in various ways such as revenue loss, information linkage, operational risks, tax penalties, loss of opportunities as well as the termination of the license for the mine to operate. The mine would be in non-compliance with the mining charter and BEE code. Overall, the findings on expertise given do not contradict the Upper Echelons Theory, since it was discovered that organisations led by young employees are anticipated to risk more and take on the greater burden. Hayden (2012) reports that organisations led by younger employees are anticipated to risk more and take on greater leverage. This study, as well as studies by other authors, support the idea that younger people take greater risks, and make more rash judgments. The mine would be in non-compliance with the mining charter and BEE code. However, with more middle and elderly experience, their experience of running the mine would play the role and continue complying with reducing risks of operating the mine. This goes back to providing more training in all areas of expertise by the organisation. If training is not conducted, then risks are bound to take over.

6.1.4.3 Value-added by experience

Findings indicate that employees have been able to learn and acquire new skills, especially in decision-making and problem-solving. Employees have grown their technical expertise and gained the confidence to work at different levels.

6.1.4.4 Need for additional qualifications

Majority of the participants mentioned that they see it necessary to add more qualifications, starting from certifications to the master's degree level within their respective fields to enhance their work capability.

6.1.4.5 Leadership style

According to Larjovuori *et al.* (2018), leadership is now regarded as a dyadic, shared, interpersonal, strategic, diverse, and multidimensional social dynamic, rather than an individualistic characteristic. Modern leadership theories, in one way or another, emphasise the significance of social contact and organisational learning techniques (Larjovuori *et al.*, 2018). The findings show a diverse range of leadership styles in place. In most cases, individualistic characteristics play a role. However, participants stress adopting various leadership styles for the reason that there is a need for various leadership aspects, especially when dealing with different types of people. There was also a great concern about using transformational leadership, since it allows change in different processes. Several participants also mentioned that the mine runs under autocratic leadership, which limits decision making, and is one-sided.

Employees drive organisational goals, thus having effective and efficient leadership and employees is vital for optimising organisational outputs (Nene & Pillay, 2019). According to Kane (2019), "the truth is that it is your employees who will drive or hinder your IT capabilities." The value that people provide to an organisation is mainly intangible, and the same is true for the technologies and systems that are in place. To execute effective and efficient leadership, an organisation needs to have a proper set of leadership capabilities. This is because having top talent in those leadership roles allows an organisation to use the top talent to its maximum potential, therefore maximising the advantages of the

operations. Leaders are expected to establish direction and have a more creative leadership style. Teams perform better when a leader walks with them. Culture also plays a role in the organisation's leadership style. However, if culture flows from the top, the mine is bound to face some turbulence in various business units.

6.1.4.6 Governance and maintenance of business processes

Objective three of this study sought to address how leaders engage in business strategy and operational activities. The study revealed several findings about governance and maintenance of business processes. Participants indicated that there is no proper governance currently. Organisations and business units rely on an internal audit process that is rendered yearly in various business units. The study stresses the implementation of IT governance, which covers various components such as business strategy, policies, practices, and key stakeholders to generate business value. There are various governance frameworks such as COBIT, ITIL, and others that can be utilised by the organisation. Frameworks such as COBIT and ITIL had fewer adopters than expected. Furthermore, Literature has shown that although there are several IT governance frameworks an organisation can deploy, the studies have shown that most organisations often do not follow any. This has been observed and practically proved to be true in mines where there are no sound IT governance measures.

Meanwhile, the purpose of IT governance speaks of management practices that allow business and IT management to collaborate in determining the level of IT investment, deciding where to invest IT resources, monitoring IT performance, and developing IT management strategies and principles (Motlautse, 2009). Cadre and Moir (2009) define IT governance as a “matter of optimising the use of IT investments through strong collaboration and communication between the business and its leaders and their strategies”. Therefore, IT governance can be a driving tool that drives the organisation to control its IT investments, decisions, standards, and processes of the organisation. Managing IT governance in the mine indicates that less attention is rewarded, while literature emphasises the need for IT governance for businesses to have transparent governance mechanisms. Mine information resources and processes are managed to obtain maximum benefit from the investment in information, information systems, and processes. Organisation strives to generate value from IT, and to be effective, managers

must design and implement IT governance (Weill & Ross, 2004b). Therefore, good governance of IT, is critical in supporting and enabling enterprise goals (ITGI, 2003).

6.1.4.7 Upper management influence

The Upper Echelon Theory sought to determine how upper management has a twofold influence on their organisation. To begin, the theory considers factors such as a leader's age, gender, work experience, and education. The demographics are evaluated to see if they serve or hinder organisational performance, and the underlying psychological distinguishing qualities of leaders are measured to see if they are related to organisational performance. Findings stress that there is little or no support in the business unit by business units' managers, which contradicts the literature. Mumford *et al.* (2002) emphasise that, to have superior and well-recognised leadership characteristics, leaders must have technical, professional competence, and innovative qualities to manage or handle complicated and critical challenges throughout organisations. Organisations are what their leaders think, feel, perceive, and believe, and it is an approach in terms of business, strategy, and operational interactions (Martin & Matlay, 2003; Simpson & Docherty, 2004; Galloway & Mochrie, 2005).

6.1.5 Interpretation of theme five:

Theme One/Objective Five: To determine a framework for improving information systems capability in South African firms.

This subsection conceptualises how South African mining firms may optimise and improve information systems capability. The subsection is a summarised interpretation of findings. That is, the conceptualised framework is a set of recommendations for practice and theory informed by the interpretation of study findings, literature, and the underpinned theories (UET, RDT, and IT capability model). The framework is conceptualised following the technique adopted by Jorfi *et al.* (2011). The elements of the framework are IT infrastructure, IT human resources, and IT relationship resources. The framework, figure 19, depicts the three aspects as well as the leadership and external resource dependency elements that play a crucial role in influencing information systems capability within South African mining firms.

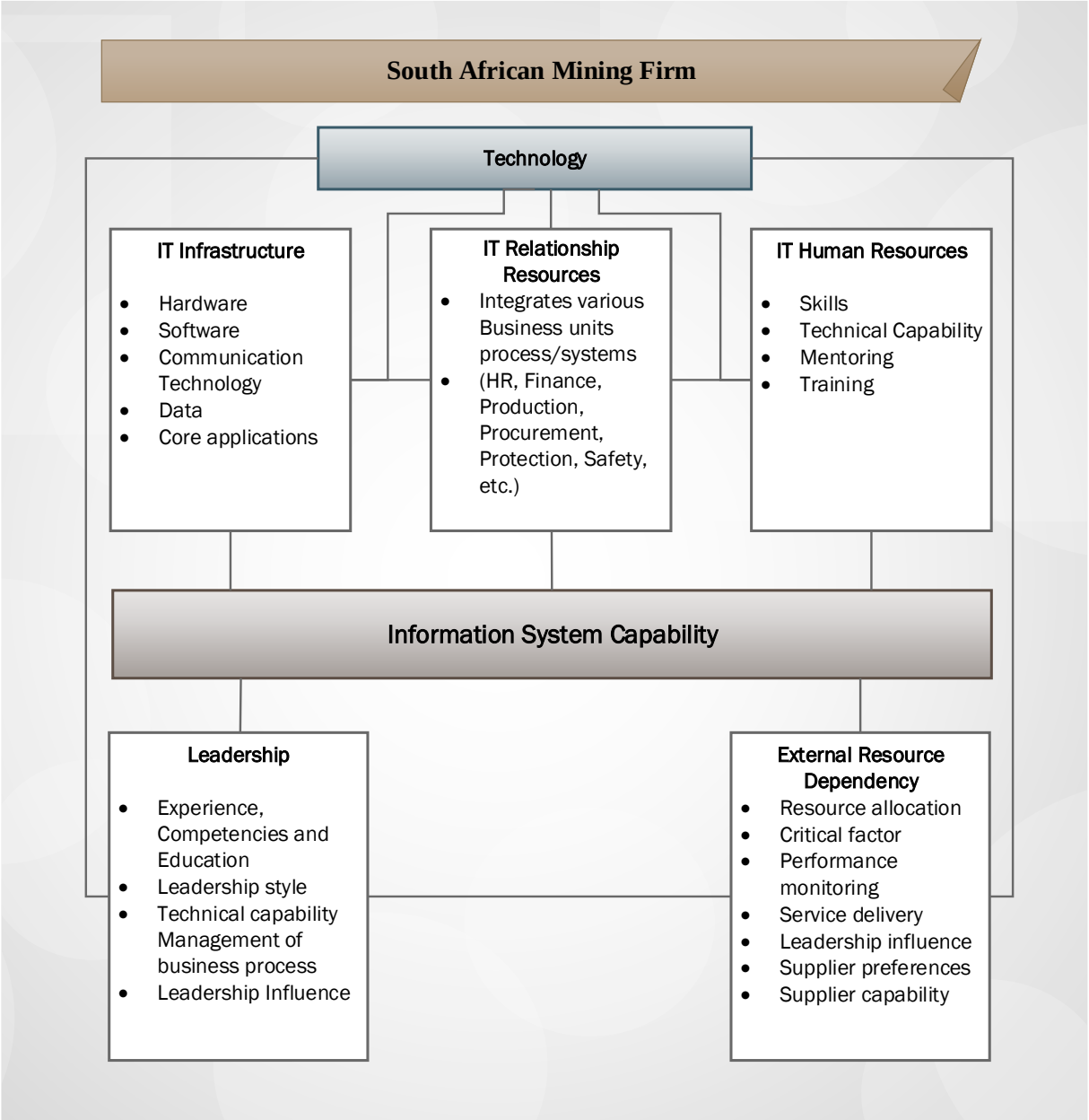

Figure 19: Information Systems Capability Framework for South African Mining firms

The pillars for an improved information systems capability in the context of South African mining firms include IT infrastructure, IT human resources, and IT relationship resources, leadership, and external resource dependency. The framework shows that information systems capability is improved when there is an appropriate integration of the preceding elements, and the sub-elements. The elements are summarised and then discussed next.

Table 14: Elements of the conceptualised framework

Factors	Elements
Technology	
IT Infrastructure	Enables organisations to deliver services and solutions to customers, partners, and employees. Software, hardware, network services, and resources.
IT Human Resources	An umbrella term for software, and associated hardware for automating the human resources function in organisations. HRMS (Human Resource Management System) or HRIS (Human Resource Information System), talent acquisition and management, workforce analytics, performance management, training and development, screening, recruiting, and training, and administering the employee-benefit programme, Organisation development, and culture, etc.
IT Relationship Resources	Building communications networks for the organisation to deliver and exchange data across various technological platforms in the organisation. Social media platforms, conferencing technology, collaborative documents, communication technology, etc.
Leadership	An approach in which leaders engage in the setting of strategic goals for the business while also guiding employees to achieve those goals. Experience, competencies, and education, leadership style, technical capability, management of business processes, leadership influence, training/mentoring , etc.
External Resources	Engaging in transactions with other actors and organisations to get access to the resources that are required to thrive. Resource allocation, critical factors, performance monitoring, service delivery, leadership influence, supplier preferences, supplier capability

6.1.5.1 The framework as recommendations

The factors and elements of the framework, presented above, are further discussed as recommendations and ways to improving information systems capability within South African mining firms:

a) IT Infrastructure

IT Infrastructure is the most valuable asset and when properly managed, it can assist the organisation in achieving its business goals. The value of IT infrastructure enables organisations to deliver services and solutions to customers, partners, and employees. However, this study shows that information systems capability has an impact on organisation performance when the investments in infrastructure and resources are aligned with the business strategy and the operational context of the organisation. Empirical evidence shows that information systems capability value as a phenomenon is not well understood. To simplify this, the value added by the infrastructure, and the limitations were examined. The evidence shows that the organisation does not utilise information systems capability to its full potential. This is true as business units have various systems, and the systems operate in silos. Some do not feature integration with other applications while others can be integrated. System support exists; however, service to all sections of the mine is hampered by staff shortages. Some functions still run manually, such as contract management. However, IT is utilised 100 percent throughout the organisation for the daily running of all business units. Participants see the failure to work together towards a common objective or to realise how they complement one another because the multiple business units' systems are not connected as a key issue.

Literature highlights the common knowledge that collaboration in an organisation generates information synergy. The study recommends information synergy to be aligned throughout operations for organisation to produce more information synergy. This means that the systems in various units need to collaborate – rather than run in silos – for the organisation to benefit from the value of IT. Greater collaboration produces more information synergy, which therefore influences organisational performance. The study

stresses that information systems capability should be enhanced for the organisation to stay competitive, and for business units to work together using IT across subunits.

b) IT Human Resources

IT human resources (HR) is classified as knowledge transfer, skills, and technical capability. The ability to affect procedures in an efficient manner that suits a given workplace is necessary for performing work that is crucial for an organisation. Mentoring, training, and practice can provide the requisite skills. The findings have shown a shortage of staff and skills internally. For that reason, the study recommends enough skilled human resources with extensive experience within the sector. An employee who can solve business difficulties without fail – and handle tremendous changes in technologies – is a vital human asset for every organisation today. As the significance of technologies develops in organisations, the skills of an employee become imperative. Empirical evidence indicates the need for a proper training matrix for all employees. An individual development plan is in place, whereby an employee sits with his or her supervisor for the outlining of training, and competency that aligns with the employee's role. Although participants showed some understanding of the need for an IDP, some findings point to the lack of a change-management system when a new application is introduced to the organisation. Training and assessment are needed to establish whether the user is competent.

Scholars, Lin and Hsu (2010) consider the firm's most important resources to be knowledge and expertise. Human resources are capable of promoting a sustained competitive advantage (Barney, 1991). Many experts stated that HR is the main contributor to excellent corporate performance (Chang & Huang, 2005; Song *et al.*, 2008). Therefore, the study argues that, from a change-management perspective, the mine needs to consider its staff when introducing a new system or upgrading existing versions. That is, there is a need to teach people, and to improve their competence, not just as a matter of procedure, but to make them aware that their knowledge, and expertise contribute to outstanding organisational performance.

c) IT Relationship Resources

The inevitable linkage between IT and the organisational units is explained by the IT relationship resource. Information must be delivered and exchanged across various technological platforms in the organisation. Knowledge sharing in the organisation is done via memos, emails, procedures, and policies in place as per results. Compatibility is regarded as the capability to distribute information through the company (Duncan, 1995). The IT infrastructure may also remain compatible. This is achievable since the company can share information on any kind of technology platform. The degree of communication throughout the whole organisation is significantly increased thereby, facilitating the provision of information at rapid speed for users throughout the organisation.

d) Leadership

Mines organisations operate and manage their business in a market sector that has to abide by government policy and regulations. The mine leaders are legal appointees following the Health and Safety Act, and other appointees are authorised and competent. The organisation has a well-structured organisational leadership. However, the business leadership, and the IT leadership appear to be in conflict over prioritisation, and decision making. The findings recommend that other business units should focus on capabilities that they are good at, and not on what they are not good at. For example, the mining business unit should focus on the production underground and leave the technological services to be rendered by the IT business unit. IT will be able to source the best application to efficiently interact with the internal applications in place.

Other units have leaders with various leadership styles. There is a lack of skills and not enough years of leadership experience across other business units. The evidence indicates that such failures might negatively influence the performance of the organisation. Too much management mobility (joining and leaving the organisation) also leads to unstable leadership. This does harms organisational performance.

The study recommends that IT value is derived when there is an integration of appropriate competencies, skills, leadership, experience, infrastructure, human resources, and stakeholder relationships. That is how information systems capability impacts organisational performance. This can be achieved by organisations stabilising

management mobility, and engaging in a leadership style that best works for their business units, and the organisational strategy. However, the study acknowledges and recommends that certain IT capabilities cannot provide work efficiency on their own, as people in the organisation eventually choose how this technology is designed and used to deliver organisational performance. Social factors, such as human resources, infrastructure, relationship resources, and leadership, are favourable when the benefits of information systems capability are recognised, supported, and sought in the organisation.

e) External Resources Dependency

In this study, external resource dependency is regarded as engaging in business transactions with other actors, and organisations to get access to the resources that are required to thrive. This process is critical for the survival of the organisation as the organisation engaged with others because it lacks some competencies it needs to reach organisational goals. The problem is that the criticality of the resource's dependency has the potential to place the enterprise at risk of not working based on its absence. However, some services such as audits enforce external resource dependency as some of the business units cannot internally audit themselves. It is a mandate to be audited externally as enforcement by law. For instance, the mines operate in accordance with the Mine Health and Safety Act regulated by the Department of Minerals (DMR). Therefore, DMR inspects and audits the mine regularly. The findings indicated some of the critical services rendered by the suppliers including services such as reliable safety performance, external audits, assessment, training and counselling, instant repairs, product certification, access control, and gas detection. The factors considered when outsourcing include resources availability, skills, expertise, and cost. This study recommends the mine to incorporate highly skilled people into the mine' improve the supplier performance evaluation process, train employees, support local small businesses, implement SLA across all suppliers, perform supplier monitoring and evaluation, and corporate social investment, thereby contributing to socio-economic upliftment of the local people.

With this finding, the study recommends the organisation seek and reduce its dependence on other organisations. For the organisation to strengthen its power, and by doing so, it can minimise the potential uncertainty caused by its interdependence on the external surroundings (Fraczkiewicz-Wronka & Szymaniec, 2012). Pfeffer and Salancik's (1978) theory articulates how they can achieve power by having the right resources, which give

the business power. Power allows an organisation to create an advantage over their competitors, and ensure that they use their power to partner with other enterprises, and create dependency for other enterprises.

6.2 Summary of the Chapter

This chapter interpreted the study findings and subsequently conceptualised a framework for IS capability in mining firms. Interesting codes that emerged from data collected and analysed across all 10 case units were interpreted against the existing literature and the theoretical lenses to inform the framework. The elements of the framework were discussed as recommendations for improving information systems capability.

The next chapter reflects on the research journey, the relevance of the thesis and the contributions.

CHAPTER SEVEN

EVALUATION OF THE RESEARCH AND CONTRIBUTIONS

The preceding chapter, Chapter 6, interpreted the findings of the study. The theoretical and practical recommendations were discussed as a framework for improving information systems capability within mining firms. This chapter reflects on the research journey by evaluating how the study objectives were met and the goal achieved. The contributions of the thesis are then articulated.

The sections of this chapter are as follows; 7.1 is an overview of the research, then 7.2 revisits the research objectives while 7.3 discusses how each objective was addressed. Then, 7.6 is the study limitations. 7.7 is the recommendations for future research. Thesis contributions follows. 7.8 discusses the relevance of the research, and 7.9 concludes the thesis.

7.1 Overview of the thesis

The chapters of this thesis are summarized in this section to show how they each contributed towards addressing the research problem and bridging the knowledge gaps.

Chapter 1 contextualised the research by providing the background to the field of study, the background to the research problem, the problem statement, the research goal, and the study objectives.

Chapter 2 surveyed the existing scholarship by reviewing concepts and related works that provided foundation and informed the present study.

Chapter 3 presented and described IS theory and the underpinning theories. The chapter looked at IS theories and formulated a conceptual research framework. The theories were used as lenses to understanding information systems capability in South African mining firms.

Chapter 4 described the research methodology employed in the present study. The chapter discussed the processes and methods followed in conducting the study.

Chapter 5 analysed the collected data following a thematic data analysis method, and discussed the study findings. The underpinning theories were used as lenses and themes to unpack information systems capability within mining firms.

Chapter 6 interpreted the study findings against literature and the given context. Informed by the interpretations, a framework for information systems capability in South African mining firms was provided.

This **Chapter 7** reflects on the overall research study by evaluating the study, giving the contributions, and concluding the thesis. The next section revisits the research problem that motivated the study.

7.2 Recap of the Research Problem

Although South African mining firms invest heavily in technologies, applications, and systems, they tend to struggle to derive value from the investments. This is because information systems capability was problematized as not well understood, in the context of mining firms. That is, there was no known study that would inform the “know-how” and the “know what” regarding IS capabilities, particularly in the context of South African mining firms.

7.3 The Research Goal and Objective Revisited

The goal of this study was to conceptualise an information systems capability framework in the context of South African mining firms. This goal was achieved, and the information systems capability framework for South African mining firms is provided in the previous chapter.

7.3.1 Reflection on Study Objectives

This section discusses how each objective was met.

Objective 1: ***To understand the current IT and business resources in South African mining firms.***

The objective was to explore and describe how the mining firms in South Africa conduct their business and the effects IT and resources have on the organisation. The objective was met, study findings are provided and interpreted.

Objective 2: ***Explore and describe how information systems capability manifests in South African mining firms.***

The objective was to explore and describe information systems capability in terms of business processes and how information technologies enable organisational performance. This was met by understanding the "know how" of information technology use in various business units of the mining firm. What and how the systems and applications are used, the competency measures, the risks related to the systems and the culture in place are provided and interpreted, in respective chapters.

Objective 3: ***Explore and describe the influence of Resource Dependency on a South African mining firm's information systems capability.***

The objective was to explore and describe how resource dependency manifests in the organisation by studying the interdependencies among the varied business units and the external suppliers and vendors. The study findings are provided and interpreted, in respective chapters.

Objective 4: ***To describe, using Upper Echelon theory as a lens, the influence of leadership on building IT capability in a South African mining firm.***

The objective was to explore competencies and leadership styles and describe how that influence information systems capability. The study findings are provided and interpreted, in respective chapters.

Objective 5: ***To determine ways of improving information systems capability in South African firms.***

The objective was to determine and recommend ways to improve information systems capability in South African mining firms. By interpreting the study findings, a framework was conceptualised, in chapter 6, to inform how information systems capability should manifest.

7.4 Contributions of the thesis

This section sums up how the thesis contributes and adds to the body of knowledge. Good business schools of the world are those institutions that not only transmit knowledge, but also create knowledge through academic research, and distribute the newly acquired knowledge to their stakeholders.

The foremost measure of this doctoral thesis is whether an adequate contribution has been made to the existing body of knowledge. It is, however, not always obvious what constitutes an adequate contribution. The overall contribution of the thesis is the conceptualised information systems capability framework for South African mining firms. This framework describes how mining firms could realise the value of IT through an improved information systems capability. The fourfold contributions of this thesis are discussed next, in terms of theoretical, methodological, practical, and contextual subsections:

7.4.1 Theoretical contribution

Triangulation of the three underpinning theories is a theoretical contribution, which helps towards understanding, IS capability from three different lenses and perspectives. Scholars have been studying IS capability (examples, Chae, Koh & Park, 2018a, 2018b; Jorfi & Nor, 2011; Kim, Shin, Kim & Lee, 2011) for decades. However, the concept "IS capability" is inadequately addressed in the context of mining firms, especially those operating in South Africa. The literature underlined the importance of IS capability and suggested that greater thought should be given to the context in which IT is adopted and deployed (Chae et al., 2018; Chae, Koh & Prybutok, 2014). This study identified a gap in the literature on IS capability that calls for more consideration of the setting in which IT is adopted and deployed. The systematic literature review, in the earlier chapters of this thesis, did not reveal prior research or framework that could theoretically inform IS capabilities, within the context of the South African mining firms. That is, this thesis provides the theoretical know how and what on information systems capability in the context of SA mining firms. The conceptualised framework bridges this theoretical knowledge gap.

7.4.2 Practical contribution

The ability to alter actions or to take fresh measures is to provide fresh practical understanding. New understanding should encourage individuals to do something better and differently. This thesis offers practical methods to enhancing information systems capability for South African mining firms. The conceptualised framework provides a set of recommendations for practitioners. The framework shows the practical elements to be considered if a firm desires to improve IS capability through integrating appropriate competencies, skills, leadership, experience, infrastructure, human resources, and stakeholder relationships. The practical “know-how” and “know-what” towards IS capability in South African mining firms is now provided, in this thesis.

7.4.3 Methodological contribution

Most studies on IS capability are often following positivistic research philosophy and through a survey, which tend to offer little description of the actual phenomenon. An interpretivism case study strategy, through conducting interviews and observations, is the methodological contribution of the thesis, by providing in-depth descriptions of IS capability in mining firms. This study used a case study research approach to gain a deeper knowledge of the IS capability phenomena in a real-world setting. That is, the present study has offered and showed an interpretivist case study as an alternative methodology to fully describe and comprehend information systems capability, especially in the context of mining firms.

7.5.4 Contextual contribution

South Africa is classified as a developing country. As a result, it is possible that what works in other countries, particularly developed countries, will not necessarily work in South Africa. For example, unlike in the developed countries, most mines in South Africa are usually shallow mining operations. There are other unique internal and external pressures such as the rising cost of electricity, compliance with environmental legislation, politics, and the drive behind the development and implementation of technology in the South African mining industry. The cultural and environmental contexts are different from country to country. Therefore, information systems capability within mining firms ought to be sensitive

to that uniqueness. The contextual knowledge gap highlighted in the introductory chapter has been bridged, in this thesis.

7.5 Limitations of the Study

Literature acknowledges that it is often impossible to conduct an ideal study. There are constraints that may not make a study perfect and ideal. Some of these constraints are discussed, in this section, as what may have limited the present study.

Firstly, this was a case study of South African mining firms. Although there are 548 reported varied mines in SA, the study purposively selected the platinum group metals (PGMs) mining category. Out of the reported PGMs mining firms currently operational, this is a single case study rather than a comparative or multiple case study. Although the findings of the present study may not be generalizable, they may still be applicable to similar PGMs in the South African setting.

Secondly, the current study was cross-sectional, meaning that data was obtained at a certain period, as opposed to a longitudinal study, which may have produced varying data through time, and a deeper understanding of IS capability throughout a longer time period.

Even though the interviews were done with experts who met the inclusion criteria, it should be highlighted that it was still a subjective sharing of experiences, views and opinions. Nonetheless, the interviews yielded sufficient empirical evidence to provide reasonable informed findings and interpretations.

In this study, the emphasise was studying the IS capabilities such as human resources, technology resources, competencies and skills, resource dependency as well as leadership as they manifest within mining firms in South Africa. The study did not analyse the actual technologies, systems nor applications.

7.6 Recommendations for Future Research

- This study was a single case study of one of the 30 operational platinum group metals mining firm, thus, a multi-case study of various mines may be conducted in the future. A future study may investigate IS capabilities by doing a multi-case study of several mines with different products and technologies.

- The framework conceptualised comprise elements of the IS capability that could be studied individually, in future studies.
- Future studies may do a longitudinal study on IS capability in mining firms.
- Future studies could also follow a positivistic survey research strategy to conduct a similar study. A survey would allow more mining firms to participate in the study, and therefore, yield generalizable results.

7.7 Conclusion

The present study explored and described how information systems capability manifests in the context of South African mining firms. The thesis addresses and bridges four important knowledge gaps in information systems business administration namely theoretical, practical, methodological, and contextual key issues. The identified knowledge gaps and key IS capability issues have now been addressed. Empirical evidence shows that while information systems capability is considered necessary to increase organisational performance, the challenges and issues are that IS capability, and its value is often not well understood nor appreciated within organisational leadership.

The present study has conceptualised a framework that when followed, may help improve information systems capability, and subsequently help an organisation to derive value from IT. Furthermore, the framework given, suggests that IT value is derived when there is an appropriate integration of competencies, skills, leadership, experience, infrastructure, human resources, and stakeholder relationships. The value of information systems capability is in enabling the business and subsequently improving the mining firms' organisational performance. Because information systems capability studies are rare in developing countries' contexts, the present study adds another perspective and context to literature and practice.

The relevance of this thesis and its contributions are acknowledged through the following peer-reviewed publications from the present study:

Mogoale, PD., Lekunze, JN., and Mongale, A., (2022). "Resource dependency evaluation model of service delivery in the South African mining firm". *In the proceedings of the Social Science International Research Conference*, 19 October 2022 – 21 October 2022.

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Mongale, A., Kekwaletswe, RM and Mogoale, PD., (2021). “Business-IT Alignment Through Triangulation of Models*”. International Journal of Computer and Organisation Trends*, 11(4), pp. 15-23. ISSN: 2249 – 2593
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APPENDIX A: ETHICS APPROVAL

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

Private Bag X6001, Potchefstroom
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Economic and Management Sciences Research
Ethics Committee (EMS-REC)
Tel: 018 299-1427
Email: Bennie.Linde@nwu.ac.za

29 November 2019

Prof R M Kekwaletswe
Per e-mail
Dear Prof R M Kekwaletswe

EMS-REC FEEDBACK: 29112019
Student: Mogoale, PD (28743695)(NWU-01418-19-A4)
Applicant: Prof R M Kekwaletswe – PhD in Business Management

Your ethics application on, *Information systems capability framework for South African Mines,* which served on the EMS-REC meeting of 29 November 2019, refers.

Outcome:

Approved as a minimal risk study. A number NWU-01418-19-A4 is given for three years of ethics clearance.

Kind regards,

Prof Bennie Linde
Chairperson: Economic and Management Sciences Research Ethics Committee (EMS-REC)
Potchefstroom Campus

APPENDIX B: INFORMATION LEAFLET AND INFOMRED CONSENT

NORTH WEST UNIVERSITY GRADUATE SCHOOL OF BUSINESS

INFORMATION LEAFLET AND INFORMED CONSENT

PROJECT TITLE: INFORMATION SYSTEMS CAPABILITY FRAMEWORK FOR SOUTH AFRICAN MINES

Primary investigator: Ms PD Mogoale, MTech (Business Information Systems)
Study promoter: Prof Ray M Kekwaletswe, Faculty of Economic and Management Sciences, North West University, Potchestroom Campus

Dear Potential research participant,

You are invited to participate in a research study that forms part of my formal Doctoral studies. This information leaflet will help you to decide if you would like to participate. Before you agree to take part, you should fully understand what is involved. You should not agree to take part unless you are completely satisfied with all aspects of the study.

WHAT IS THE STUDY ALL ABOUT?

This study is about the Information Technology (IT) capability of mines operating in South Africa (SA), for the mines to sustain their Information systems (IS). The purpose of this study is to conceptualize an IT capability framework for South African mines. The research acknowledges the use of IT capability and the level at which mines can comprehend and realize IT value. This study's inference is crucial, as it would align the mines to function efficiently and effectively. The IT investment of an organization resources and capability pays off if it corresponds appropriately with the particular setting in which the organization works and operates. Hence, the study intend to look at SA Platinum Group Metals (PGMs) mines as a case study.

Research works have been conducted on IT Capability. However, most research is mainly theoretical and little empirical research has not been conducted in the context of the mining sector. IT capability has been highlighted in strategic literature as a significant source of competitive advantages, but IT capability development and evolution in the ever-changing company setting are not well-explained (Bai et al. 2011). In order to fill this gap, this study adopts IT capability as the analytical unit, shows a micro-interpretation of IT capability development and development from SA mines perspective. Although mines invest billions of Rands in IT/IS, the study argues that systematic literature review conducted does not reveal prior research that can inform IT capabilities, especially in the context of SA mines. Accordingly, there are no known studies which may inform the "know how" and the "know what" regarding IT capabilities, within SA mines. Therefore, SA mines need an IT/ capability framework that may inform practice and theory in order to improve efficiency and effectiveness of IT with respect to enabling the mining business.

WHAT WILL YOU BE REQUIRED TO DO IN THE STUDY?

If you decide to take part in the study, you will be required to do the following:

- To sign this informed consent form
- Participant will be asked to respond to questions regarding their experience on the

information system capability and usage in a context of working environment. You will complete the questionnaire at the mine in order to get wider views. Representing the diverse population, participant with varied background (age, experience, position, gender and qualifications). Questions will be handed out to participant that should not take more than 30 minutes to complete.

- 4 to 6 participants at the firm will participate in interview who are knowledgeable about the information system capability. You will be required to provide your opinions and/or insights of the study theme during the discussion that will last for approximately 15 to 20 minutes. Note that the interviews discussions will be audio-recorded / video-recorded.

ARE THERE ANY CONDITIONS THAT MAY EXCLUDE YOU FROM THE STUDY?

There are no exclusion criteria from the study.

CAN ANY OF THE STUDY PROCEDURES RESULT IN PERSONAL RISK, DISCOMFORT OR INCONVENIENCE?

The study procedures will not result in any personal risk, discomfort or inconvenience.

Questionnaires: The study and procedures involve no foreseeable physical discomfort or inconvenience to you or your family. Due to the personal nature of the questions, you may experience some emotional discomfort. NO

Emotionally sensitive interviews: In the interview/s you will be sharing emotionally sensitive and intimate details about yourself. This process of self-revelation means that you will have to recall emotions, thoughts and actions regarding your experience which could be traumatic for you. Therefore, I have made arrangements with the counsellors at the Student Support Services for you to visit free of charge should you want to talk to one of them for professional therapy. NO

Venipunctures: The main risk involved with performing venipunctures is bruising (hematoma) and/or infection at the site of needle insertion. Standard aseptic techniques will be used at all times to avoid the risk of infection and blood will be drawn by a register nurse. NO

Minimal risk/discomfort/inconvenience: Participation in the study involves minimal risks, discomforts and/or inconveniences that are no more than the risks, discomforts and/or inconveniences one encounter in daily living. NO

WHAT ARE THE POTENTIAL BENEFITS THAT MAY COME FROM THE STUDY?

The benefits of participating in this study are:

- You will make a contribution towards establishing an IT capability framework for South African mines.

WILL YOU RECEIVE ANY FINANCIAL COMPENSATION OR INCENTIVE FOR PARTICIPATING IN THE STUDY?

Participants will not receive any financial compensation or incentive for participating in the study.

WHAT ARE YOUR RIGHTS AS A PARTICIPANT IN THIS STUDY?

- Your participation in this study is entirely voluntary. You have the right to withdraw at any stage without any penalty or future disadvantage whatsoever. You don't even have to

provide the reason/s for your decision. Your withdrawal will in no way influence your continued care and relationship with the health care team. Note that you are not waiving any legal claims, rights or remedies because of your participation in this research study.

- Protection from harm (emotional and physical) - The questioned asked will be to gather participants' views, experiences and opinions about organizational information systems. Participants will not be asked potentially sensitive, incriminating, confidential or personal questions about themselves That is, participants or his/her family/community will not be at risk or be adversely affected by their participation in the research project, including any form of cultural, social or financial risk/harm

HOW WILL CONFIDENTIALITY AND ANONYMITY BE ENSURED IN THE STUDY?

All the data that you provide during the study will be handled confidentially. This means that access to your data will be strictly limited to the researcher, the supervisors of the study, data coders, translators, field workers, members of the research ethics committee and/or the designated examiners (appointed by North West University). Also, your data and personal information will be kept and stored in a confidential format that will only be accessible to the researcher. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.
The results of this study might be published in a scientific journal and/or presented at scientific meetings, but again without revealing the identity of any research participant. The original questionnaires will be stored in a safe place for three years, after which they will be destroyed.

IS THE RESEARCHER QUALIFIED TO CARRY OUT THE STUDY?

The researcher is an adequately trained and qualified researcher in the study fields covered by this research project, specifically in Information systems

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

Yes. The Faculty Higher Degrees Committee and the Research Ethics Committee of the North West University have approved the formal study proposal. All parts of the study will be conducted according to internationally accepted ethical principles.

WHO CAN YOU CONTACT FOR ADDITIONAL INFORMATION REGARDING THE STUDY?

The primary investigator, Mrs PD Mogoale, can be contacted during office hours at Tel (013) 230-4834. The study promoter, Prof RM Kekwaletswe, can be contacted at 082 685 2903 Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson Prof Bennie Linde of the Ethics Committee of the Faculty of Economic and Management Sciences, during office hours at Tel (018) 299 1399, E-mail address Bennie.Linde@nwu.ac.za.

DECLARATION: CONFLICT OF INTEREST

This research study was funded by the North West University. No publication prohibitions, conditions or limitations were placed on the researcher.

A FINAL WORD

Your co-operation and participation in the study will be greatly appreciated. Please sign the informed consent below if you agree to participate in the study. In such a case, you will receive a copy of the signed informed consent from the researcher.

CONSENT

I hereby confirm that I have been adequately informed by the researcher about the nature, conduct, benefits and risks of the study. I have also received, read and understood the above written information. I am aware that the results of the study will be anonymously processed into a research report. I understand that my participation is voluntary and that I may, at any stage, without prejudice, withdraw my consent and participation in the study. I had sufficient opportunity to ask questions and of my own free will declare myself prepared to participate in the study.

Research participant's name: _____ (Please print)

Research participant's signature: _____

Date: _____

Researcher's name: Phumzile Mogoale (Please print)

Researcher's signature: _____

Date: _____

VERBAL CONSENT

(Applicable when participants cannot read or write)

I hereby declare that I have read and explained the contents of the information sheet to the research participant. The nature and purpose of the study were explained, as well as the possible risks and benefits of the study. The research participant has clearly indicated that he/she is aware of the right to withdraw from the study at any time, for any reason and without jeopardizing his/her relationship with the research team. I hereby certify that the research participant has verbally agreed to participate in this study.

Research participant's name: _____ (Please print)

Researcher's name: Phumzile Mogoale (Please print)

Researcher's signature: _____

Date: _____

APPENDIX C: PERMISSION LETTER TO CONDUCT THE STUDY

LETTER OF APPROVAL

TO: **PHUMZILE MOGOALE**

FROM: **HR MANAGER (ACTING)**

DATE: **MONDAY, JANUARY 06, 2021**

SUBJECT: **REQUEST FOR PERMISSION TO CONDUCT RESEARCH INTERVIEWS**

Dear Phumzile Mogoale,

RE: Request to Interview L Chrome Mine as part of the Ph.D. study on the Information Systems Capability Framework for South African Mine.

Please note that your request to conduct research is approved. As you indicated in your request, please ensure the confidentiality of Company information.

Kind regards,

Original Signed

HR Manager (Acting)

P.O. BOX , LYDENBURG, 1120
TEL: (013) 230 , FAX: (013) 230