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Factors critical to the organisational adoption of artificial intelligence:

A South African perspective.

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Abstract

The purpose of this research is to understand the factors critical to the organisation level adoption of Artificial Intelligence (AI) based technologies in a South African context. Considering the emerging nature of AI based technologies and the relative immaturity of extant academic studies at the intersection of AI and the business context, the current study finds salience in its propensity to support senior management in the considerations that they must make when tackling the AI based adoption decision. Considering the relative immaturity of extant studies an exploratory qualitative approach was adopted to support the direction of inquiry.

The principle findings include the identification of salient Technological, Organisational and Environmental factors that must be considered when electing to adopt AI based technology. Implications for managers in the South African context are the presentation as findings of localised factors for consideration to support the AI based adoption decision.

Keywords: Artificial Intelligence, Technology Adoption, Technology, Organisation, Environment.

Declaration

I declare that this

research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Tarun Rao

06 November 2017

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1 Chapter 1: Introduction to the research problem

1.1 Research Problem

Artificial Intelligence (AI) is swiftly influencing Information Technology (IT) strategies and consequently business strategies. Despite this impact studies around the adoption of AI are in their infancy. The zeitgeist of business today is informed by the need for agility in increasingly competitive environments that will require these businesses to continuously adapt their strategic initiatives to remain relevant (Chakravarty, Grewal, & Sambamurthy, 2013). In support of this view (Grover, Bhardawaj, & Sambamurthy, 2003) posit that business dependency on IT to support this agility is growing. As business agility supported by IT becomes an imperative, IT increasingly intrinsically needs to be viewed as an enabler of business strategy and thus also a profit generating mechanism (Drnevich & Croson, 2013).

Businesses seeking to remain competitive and relevant therefore must leverage IT and seek to adopt the right technologies that will support the strategic direction that the business sets for itself. Consequently, care must be taken in the selection and adoption of technologies. If insufficient due diligence is applied to the selection of technologies for adoption, the business will run the risk of making decisions misaligned to business strategy and thus dilute its case for the allocation of business resources needed to gain and maintain competitive advantage (Pires & Aisbett, 2003).

This dilemma of technology adoption becomes even more complex when considering emerging technologies. Considering the case of Cloud Computing as an emerging technology businesses are reluctant in adopting the technology as the risks associated with adoption are high if critical factors in the adoption of the technology are not addressed (Oliveira, Thomas, & Espadanal, 2014).

Looking at AI through the prism of emerging technologies, it follows that due consideration will need to be attributed to the adoption of AI as a component of IT strategy and thus business strategy. Whilst the adoption of Cloud Computing has seen traction in academic research, studies in AI remain largely technical. Perusal of academic journals for literature on the adoption of AI by organisations identified no published articles in this area and thus the need for this research has been identified.

1.2 Research Objectives & Aim

It is the objective of this research to leverage extant studies in the adoption of emerging technologies like Cloud Computing to understand the factors that organisations and by extension senior management must consider in the adoption of AI. It is the intention of this study to isolate the factors that are determinants in the adoption of emerging technologies and test their applicability to the adoption of AI based technologies. The bridge between research in the adoption of emerging technologies and this study on the factors pertinent to the adoption of AI becomes an imperative because of the relative immaturity of studies in this area.

This study aims to postulate and test constructs that describe factors in the organisational adoption of AI based technologies. The constructs tested will be identified using an integrated approach based on the frameworks of Diffusion of Innovation (DOI) (Rogers, 2003), Institutional Theory (DiMaggio & Powell, 1983) and Technology-Organization-Environment (TOE) (Tornatzky, Fleischer, & Chakrabarti, 1990).

1.3 Scope of the Research

The scope of the research is limited to the organisational level technology and/or innovation adoption decision in the context of South African large enterprises. As the adoption decision is being studied at the organisational level, the scope of inquiry will be limited to senior management with the ability influence the AI based adoption decision (Thong, Yap, & Raman, 1996)

1.4 Significance of this study

Artificial Intelligence is moving out of a purist technical domain and is influencing the spheres of daily human lives like health, safety and productivity (Stanford University, 2016). Applications of AI like assisted intelligence, augmented intelligence and autonomous intelligence have the propensity to solve some the world's most complex challenges (PriceWaterhouseCoopers, 2017). Businesses leaders in turn are starting to see the value proposition of AI for their businesses, a position supported by (Grover et al., 2003) as they posit Information Technology as a strategic differentiator for businesses and an enabler of agility and entrepreneurial ability.

The benefits of AI's applications set aside, AI remains an emerging technology and business leaders are often loathe to absorb the risks that are commensurate with being early adopters of technology. Thus, the development of a framework to augment the decision-making capability in the adoption of AI will prove beneficial for business leaders and lend credence to this study.

Further, from an academic point of view, the majority of academic research on AI was grounded in the technical and research from a business point of view on the implications of a considered AI technology based adoption decision at the organisational level does not exist to the knowledge of the researcher. Considering the emerging nature of AI based technology, it is the intention of this study to contribute to the niche area of research at the juxtaposition of AI and business.

1.5 Chapter Summary

The subsequent chapters of this study are outlined as follows:

Chapter 2: outlines the theoretical background to the research. The chapter outlines a theoretical case for the merger of organisation level technology adoption frameworks like DOI (Rogers, 2003), Institutional Theory (DiMaggio & Powell, 1983) and TOE (Tornatzky et al., 1990).

Chapter 3: The research propositions seeking to address the research objective outlined in chapter 1 are outlined in this chapter.

Chapter 4: outlines the research methodology that will be perused by the study to validate the propositions made in chapter 3.

Chapter 5: seeks to present the findings of the data gathering process

Chapter 6: discusses the findings from chapter 5 in the context of extant theory reviewed in chapter 2

Chapter 7: concludes the research study by highlighting the salient findings of the research, the implications for management, limitations of the research and suggestions for future research.

2 Chapter 2: Literature Review

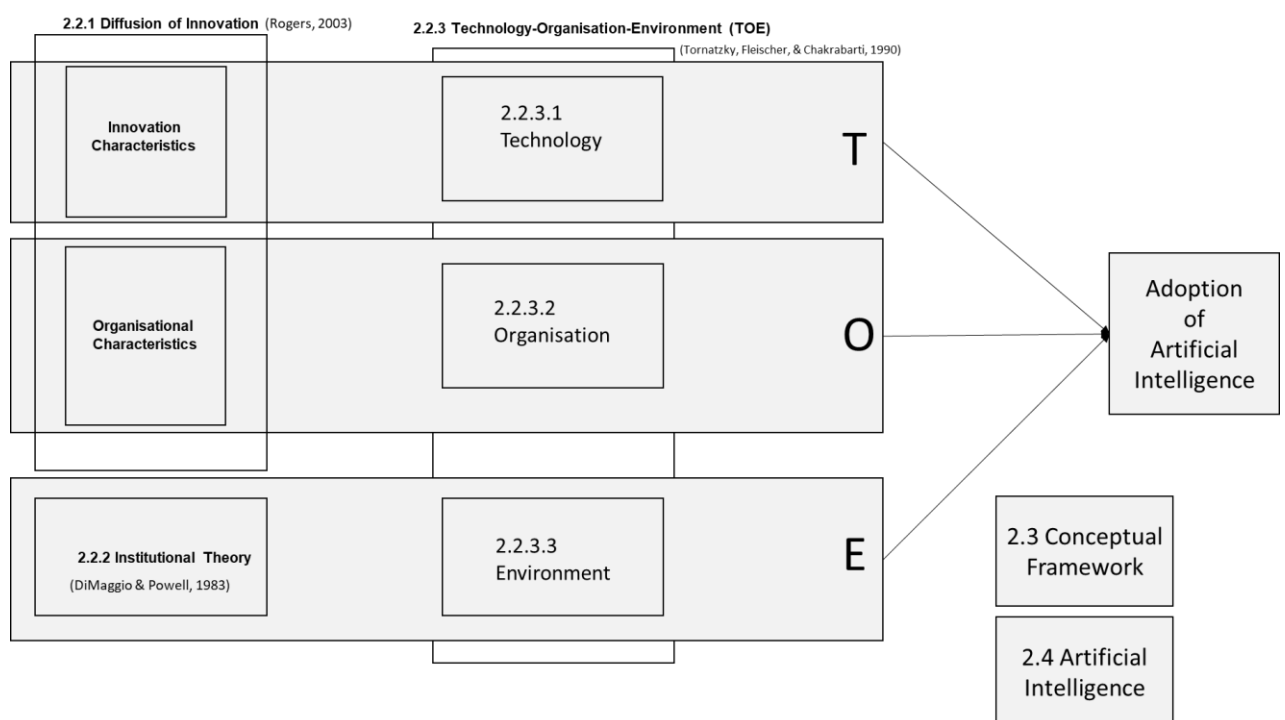
2.1 Introduction

The structure adopted to review the literature evolves from a generic discussion on technology adoption models, to the review of literature supporting three complimentary technology adoption models towards the end of building an argument for their applicability in the AI adoption decision. A conceptual model that seeks to underpin the research is subsequently proposed.

Literature surveyed to construct the argument around factors that affect the AI adoption decision were based on a broad spectrum of technologies and adoption models. The justification for the broadness of the literature surveyed was based on the status quo of no prior research studying the factors involved in the AI adoption decision at the organisational level was found.

The following diagram provides a topic map of sections that follow in the current chapter:

Figure 1 - Literature Review Topic Map



Source: Authors Own

As depicted in figure one above a section is dedicated to:

- Section 2.2 covers a general discussion on technology adoption models.
- Section 2.2.1 covers the theory of Diffusion of Innovation (DOI) (Rogers, 2003) along with a discussion on characteristics that inhibit or enable the adoption decision.
- Section 2.2.2 discusses Institutional Theory (DiMaggio & Powell, 1983) along with a brief discussion on the environmental factors that composite the theory
- Section 2.2.3 analyses the Technology-Organisation-Framework (TOE) (Tornatzky et al., 1990). Subsections detail the arguments around specific TOE constructs that may inhibit or enable the AI adoption decision.
- Section 2.3 proposes a conceptual model that seeks to underpin the current study on the factors that affect the AI adoption decision
- Section 2.4 provides context around Artificial Intelligence and the broad categorisation of technologies that composite this emerging area of Information Technology.

Each of the sections around the proposed theoretical adoption frameworks support discussion around the suitability of the framework and composite factors in the context of AI adoption.

2.2 Organisation Level Technology Adoption Models

According to (Oliveira, Martins, & Lisboa, 2011) a multitude of models exist that seek to study the adoption of technology in the context of both individual and organisation level adoption. It was incumbent upon this research to explore the literature that sought to explain the technology and innovation adoption decision to support the study of factors that could inhibit or enable the AI adoption decision.

Literature surveyed in this area of interest broadly aligned to the consideration of the adoption decision at the individual or organisational level. Theories such as Theory of Planned Behaviour - TPB (Ajzen, 1991), Technology Acceptance Model - TAM (Davis, 1986), TAM2 (V Venkatesh & Davis, 2000), TAM3 (V Venkatesh & Bala, 2008) and Unified Theory of Acceptance and Use of Technology – UTAUT (Viswanath Venkatesh et al., 2003), were perused and considered to be excluded from the purview of this research as they primarily consider the technology and or innovation adoption decision at the individual level (Oliveira et al., 2011).

Frameworks within the purview of the research have been limited to those that have enjoyed maturity and salience through empirical study, thus the theory of DOI (Rogers, 2003), Institutional Theory (DiMaggio & Powell, 1983) and TOE (Tornatzky et al., 1990) will form the subject of further discussion and review.

2.2.1 Diffusion of Innovation

Research in the diffusion and by extension the initial adoption of innovations began with due consideration of the individual point of view. The extension of this research to the organisational perspective was seen as a natural evolution of studies in the area of technology and/or innovation adoption. It is with this context that Rogers, (2003) treatise on the Diffusion of Innovations (DOI) began to explore the adoption and assimilation of innovations and technology within the context of organisations and individuals that composite them.

Rogers, (2003) defined the Innovation-Decision as a process through which a decision-making unit progresses from becoming aware of an innovation, to the formation of an attitude towards the innovation, to the eventual decision to adopt or reject, and finally to the implementation of the innovation or technology. The author went on to describe the Innovation-Decision Process as primarily constituting information-seeking and information-processing activity to decrease the uncertainty around the innovation or technology that the decision making unit sought to adopt. Thus, as suggested by the title, Diffusion of Innovations, is a theory that seeks to explain how innovations and technology progress through the lifecycle of ideation to use. Composite within this lifecycle are the phases of organisational adoption and individual assimilation (P. Hsu, Kraemer, & Dunkle, 2006).

As the subject of this research primarily concerns itself with the factors that senior managers have considered when seeking to adopt AI based technologies. The adoption sequence posited by (Rogers, 2003) namely; Knowledge; Persuasion and Decision criteria that support the organisational adoption decision has been posited as a key focus area. The study of the subsequent activities of Innovation or Technology Implementation and Confirmation were considered to be excluded from the scope of this research.

Theory of DOI has enjoyed the support of a strong theoretical foundation through ongoing empirical study, with numerous studies positing and testing the factors salient in the adoption and assimilation of technologies and innovations (Zhu, Dong, Xu, &

Kraemer, 2006). According to (P. Hsu et al., 2006) the theory of DOI broadly posits that both innovation (technology) and organisational characteristics can influence the adoption decision at an organisational level and that each category of factors have varying effects on the organisational adoption decision.

Figure 2 - Organisational & Innovation characteristics that impact the adoption of innovations (Rogers, 2003)

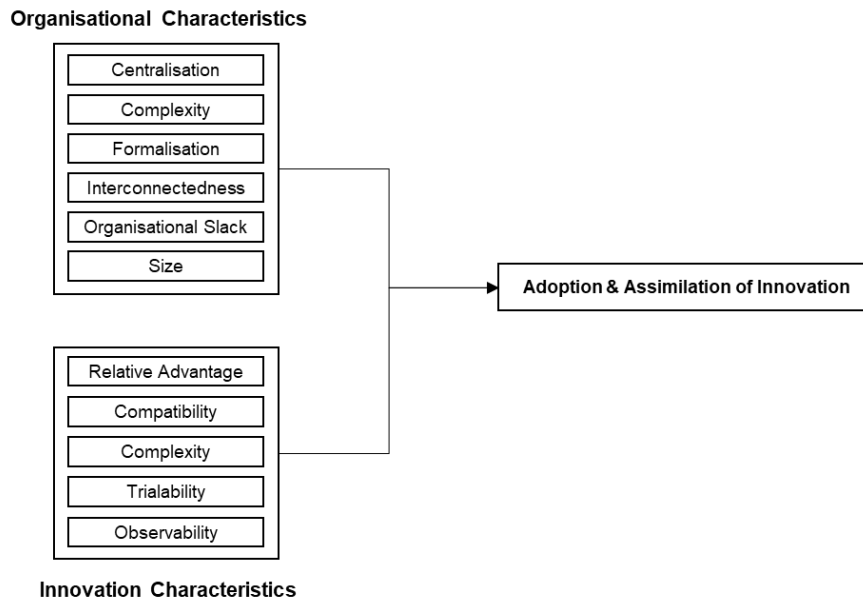


Figure one illustrated above lists six organisational and five innovation characteristics that Rogers, (2003) posited as key to the organisational adoption and assimilation by individuals of innovations and/or technologies. Each of the characteristics listed have been defined below:

Organisational Characteristics (Rogers, 2003):

- I. **Centralisation:** Concentration of power and decision making within an organisation. (Negative association with innovativeness).
- II. **Complexity:** Depth of knowledge and expertise within an organisation (Positive association with innovativeness)
- III. **Formalisation:** Emphasis on procedural conformance and control. (Negative association with innovativeness)
- IV. **Interconnectedness:** Depth and pervasiveness of interpersonal networks that enable information flow. (Positive association with innovativeness)
- V. **Organisational Slack:** Ease of access to uncommitted resources. (Positive association with innovativeness)
- VI. **Size:** Size of an organisation with respect to employee count and budget. (Positive association with innovativeness)

Innovation Characteristics (Rogers, 2003):

- I. **Relative Advantage:** perception of expected benefits and advantages that may be accrued through the adoption of an innovation. (Positive association with innovativeness)
- II. **Compatibility:** Organisational compatibility as posited by (Rogers, 2003) refers to the consistency and alignment with incumbent organisational values of the proposed innovation. Schultz and Slevin (as cited in Premkumar, Ramamurthy, & Nilakanta, 1994) also suggest Technical Compatibility, defined as the ability of a technology or innovation to integrate or be compatible with incumbent technical systems, as a salient factor in technical innovation adoption and diffusion. (Positive association with innovativeness)
- III. **Complexity:** the extent to which an innovation or technology is difficult to understand and/or use. (Negative association with innovativeness)
- IV. **Trialability:** is defined as the ease with which a technology or innovation maybe experimented with on basis that maybe limited in scope in comparison to the full solution. (Positive association with innovativeness)
- V. **Observability:** the extent to which the results of a technology and or innovation are made visible to other stakeholders. (Positive association with innovativeness)

Whilst the theory of DOI was found to be generally applicable to a broad spectrum of technologies and innovations (Moore & Benbasat, 1991), it was interesting to note that the Innovation Characteristics of Trialability and Observability were the only factors amongst the five that did not enjoy prevalence in extant empirical studies (Beatty, Shim, & Jones, 2001). Thus, these two factors have been excluded in the context of the current study.

In the context of the limitation discussed above Beatty et al., (2001) went on to opine that the theory of DOI served as a starting point for guidance and insight on the technology adoption decision, but further research into complimentary technology adoption models had the potential to more specifically address the notion of explaining the factors that may influence adoption. This view had been substantiated by (P. Hsu et al., 2006), who suggested that the combination of DOI with a complimentary theory such as the Technology-organizational-environmental (TOE) framework as developed by (Tornatzky et al., 1990) had served to augment the theory of DOI through the introduction of additional Technical, Organisational and Environmental factors as a means to better explain the adoption decision. Literature pertaining to the applicability of the TOE framework in the context of AI adoption has been reviewed below.

2.2.2 Institutional Theory

The literature reviewed above around the theory of DOI (Rogers, 2003), effectively sought to posit and test adoption factors attributed to Technological (Innovation) and Organisational. However, according to (Teo, Wei, & Benbasat, 2003) extant research had assumed the view that adoption decisions are driven by rationality that sought to maximise technical and/or organisational efficiency gains from making the decision.

In support and extension of this view it was conceivable for (Gibbs & Kraemer, 2004) that whilst it was natural for organisations to pursue these gains, the adoption decision had the propensity to be influenced, positively and negatively, by the environmental context within which an organisation found itself in. The authors went on to attribute competitors, governments, suppliers and customers as some of the elements that composited the organisational environmental context (Gibbs & Kraemer, 2004).

Thus, it bodes the discussion well to direct inquiry towards the precept of Intuition Theory which puts forward that, institutional environments influence the structure and decisions that an organisation might make and further that, these organisational decisions are motivated by the need for social and cultural concerns of legitimacy, as posited Scott and Christensen 1995 and Scott 2001 (as cited in Gibbs & Kraemer, 2004).

Considering the concerns of social and cultural cited above, organisations had displayed the propensity to become similar due to isomorphic forces and pressure for legitimacy (DiMaggio & Powell, 1983). In simpler terms, organisations tend towards uniformity over a period of time as environmental pressures such as competition and customers exert their influence on the organisational need for legitimacy (Gibbs & Kraemer, 2004). DiMaggio & Powell, (1983) suggested that the environmental pressures discussed above effectively break down to mimetic, coercive and normative.

Definitions of Institutional Pressures (DiMaggio & Powell, 1983):

- I. **Mimetic:** are typically pressures attributed to organisations that are motivated by the need to conform to contemporaries that they might have deemed more successful. Soares-Aguiar & Palma-dos-Reis, (2008) suggested that the notion of contemporaries can be extended to include competitors.
- II. **Coercive:** defined as the pressures that can be exerted on organisations by external and third-party organisations upon which the former organisation might depend. These can include strategic suppliers, regulatory bodies and parent organisations (Teo et al., 2003).

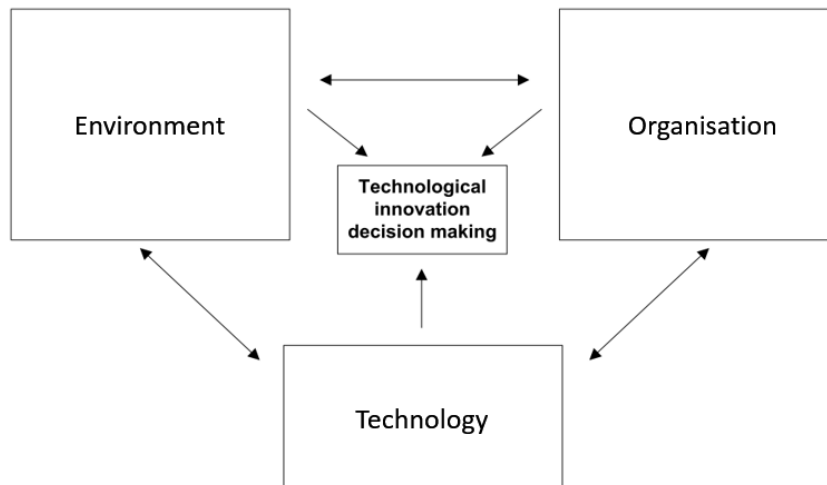
- III. Normative:** typically defined as the pressures exerted upon organisations to conform due to the rules and norms that an organisation might share with external and third-party organisations through dyadic relationships. Typically considered to be organisations not considered to be competition, but those that the former organisation can share norms and rules with e.g. Non strategic suppliers, customers and trade organisations (Gibbs & Kraemer, 2004)

The application of Institutional Theory into the context of technology and innovation adoption and assimilation has been supported by extant empirical studies (Chatterjee, Grewal, & Sambamurthy, 2002; Gibbs & Kraemer, 2004; Teo et al., 2003). Further, as Institutional Theory has the ability to augment the Environmental factor proposed in the TOE Framework (Tornatzky et al., 1990), studies conducted by (Gibbs & Kraemer, 2004; Soares-Aguiar & Palma-dos-Reis, 2008) have combined TOE and Institutional Theory to the effect of exploring technology and/or innovation based adoption. Thus, the considerations made above position Institutional Theory within the context of this research to be tested in conjunction with TOE against the adoption of AI.

2.2.3 Technology-Organisation-Environment (TOE)

The Technology-organizational-environmental framework was developed by (Tornatzky et al., 1990) to understand the organizational adoption of innovations and technology. The TOE framework posited three contexts that influence the organization's ability to adopt an innovation or technology. These included, Technology, Organization and the environment as illustrated below.

Figure 3 - Technology, organization and environment framework (Tornatzky et al., 1990)



The technological context sought to describe both internal (incumbent technologies) and external technologies relevant and available for possible adoption by the organization (Oliveira et al., 2011). The organizational context sought to describe the characteristics of the organization that might influence the adoption of the innovation or technology (Oliveira et al., 2014). Some examples of these organizational characteristics had included organizational structure, firm size, distribution of decision making and access to resources. The external business environment includes the regulatory environment, industry structure and the technology support structure that the organization may have had access to (Oliveira et al., 2014).

The TOE framework has enjoyed the benefit of supporting empirical study. Subsequent studies have bolstered the maturity of the framework while demonstrating that constructs that were used for each of the three contexts described above have differed (Cao, Jones, & Sheng, 2014). This variation of constructs had enabled the use of the TOE framework across multiple technology types, geographies and organisational contexts (Gutierrez, Boukrami, & Lumsden, 2015), thus strengthening the case for the flexibility in its application. As such it is the intention of this study to posit and test constructs used in previous studies that are applicable to the context of adopting AI for each of the three contexts listed above.

The framework despite its flexibility discussed above is not without its limitations. According to (D. Q. Chen, Preston, & Swink, 2015) the TOE framework treats organisational decision making as a completely rational process given available information and does not account for the fact that the rationality of individuals is constrained by the information they have access to, their ability to process and

understand the information and the time they have to make the decision (Stephen & Judge, 2015). A second limiting factor according to (D. Q. Chen et al., 2015) is that extant studies treat each of the three contexts in the framework individually and discount how they might cumulatively affect the outcome of innovation or technology adoption. This view that contexts and their constructs that composite the TOE framework can have varying effects on the adoption of innovations and technology is also substantiated by (Viswanath Venkatesh & Bala, 2012).

It is understood from the discussion of AI above that, this phrase can be seen as a broad categorisation of the technologies that composite this space. It is the intention of this research to study the contextual factors that might facilitate the adoption of AI related technologies and innovations at an organisational level, thus making the TOE framework appropriate in context (Zhu, Kraemer, & Xu, 2006).

The TOE framework is considered a general model and the review of extant literature found that the framework is not prescriptive with regards to the factors of adoption around each of the TOE contexts (C.-L. Hsu & Lin, 2016). Thus, It became incumbent on the current research to peruse constructs for each of the three TOE (Technology, Organisation and Environmental) contexts that might have found salience in past empirical studies.

2.2.3.1 Technology

2.2.3.1.1 Technology Readiness

Zhu et al., (2006) define this construct as the technical readiness of the organisation, with respect to its infrastructure, key systems and access to skills, to adopt the innovation or technology, the authors also go on to call this construct as important in the context of said adoption. This view was also validated by (Oliveira et al., 2014) in their analysis of twenty-two Cloud Computing adoption studies where eight of these studies cited the significance of this construct. Further, according to (Viswanath Venkatesh & Bala, 2012), who define readiness as the ability of a firm to build and support technology through access to human resources and technical infrastructure, Technology readiness was one of four TOE constructs that were consistently significant in the studies conducted by them. With AI being an emerging technology this construct becomes significant in the context adoption of AI as infrastructure, critical technical skills and incumbent systems will factor into an organizations readiness (Zhu, Kraemer, et al., 2006).

2.2.3.1.2 Technical Complexity

According to (Low, Chen, & Wu, 2011) the implementation of new systems is dependent on the time it takes an individual to understand the underlying innovation or technology and it follows that complexity can be an impediment in the adoption of innovations or technologies. Oliveira et al., (2014) extend this view by defining technical complexity in the context of the ease with which a technology can be incorporated into business operations. The significance of complexity as a construct finds synergy in the analysis of (Oliveira et al., 2014) with fourteen of the twenty-two studies citing complexity of the innovation or technology a key construct. This view also finds validation in the studies of (Gutierrez et al., 2015) with complexity featuring in four of the seven studies within the scope of their research. Thus, the construct is posited to be tested in the adoption of AI based technologies at an organisational level.

2.2.3.1.3 Technology Integration

According to (Zhu, Kraemer, et al., 2006) Technology Integration was defined as the extent to which information systems and databases, both internal and/or external to an organisation are interconnected. Zhu & Kraemer, (2005) found that, post the adoption of a technology, back-end integration had the strongest influence in the ongoing creation of value for the technology being supported. Thus, by extension the implication made is that technology integration is posited as a salient factor in the technology adoption decision, a view substantiated by (Zhu, Kraemer, et al., 2006). Thus, the factor of technical integration is posited as a key construct in the study of AI adoption.

2.2.3.2 Organization

2.2.3.2.1 Organisational Innovativeness:

The construct of Organisational Innovativeness is the third of four called out as significant in the study conducted by (Viswanath Venkatesh & Bala, 2012). In the context of AI as an emerging technology the propensity of an organisation to remain open to the notion of innovation and change will be a key area of research for this study. The innovativeness of an organisation is defined as the inclination of an organisation to adopt an open stance on innovation and is typically representative within its culture (Hurley & Hult, 1998).

2.2.3.2.2 Top Management Support:

Thong, Yap, & Raman, (1996) posit that top management support is key to innovation or technology adoption when an organisation cannot rely upon external specialised vendors for support. The view that Top Management Support is a key factor in technology adoption decisions was also supported by (Cao et al., 2014). Oliveira et al., (2014) also found that nine of the twenty-two studies in their research counted top management support as a key construct in their respective studies of technology adoption. From the perspective of AI, it is the intention of this study to test if top management support played a part in the eventual adoption of AI within an organisation.

2.2.3.2.3 Expected benefits:

According to (Zhu, L, Gurbaxani, & Xin Xu, 2006) expected benefits are the instrumental benefits an organisation can expect through adopting an innovation or technology. In their study on the adoption of a technology, expected benefits is another one of the four TOE constructs that were found to be significant in the studies conducted by (Viswanath Venkatesh & Bala, 2012). The benefits of adopting AI have been well documented in the publications of the vendors and technical consulting firms that propose the innovations and technologies, it is the intention of this research to determine if the construct is a significant determinant in the adoption of AI.

2.2.3.3 Environment

2.2.3.3.1 Competition intensity

The pressure from competitors of the focal organisation in the environment is posited to be a construct of the Environmental context in the TOE framework by this study. This assertion finds validation in the study of (Oliveira et al., 2014) where thirteen of the twenty-two studies in the scope of their research found competitive intensity/pressure a key construct. This view is also supported by research conducted by (Zhu, Kraemer, et al., 2006), as they also posit that completion can drive innovation adoption. For organisations seeking to adopt AI as a potential technology, the competitive leverage

that the technology might provide could act as a motivator. Conversely, should organisations find competitors adopting AI as a technology within their business contexts, the competitive advantage this adoption may lend competitors may also serve as a strong motivator for the incumbent organisation to adopt AI.

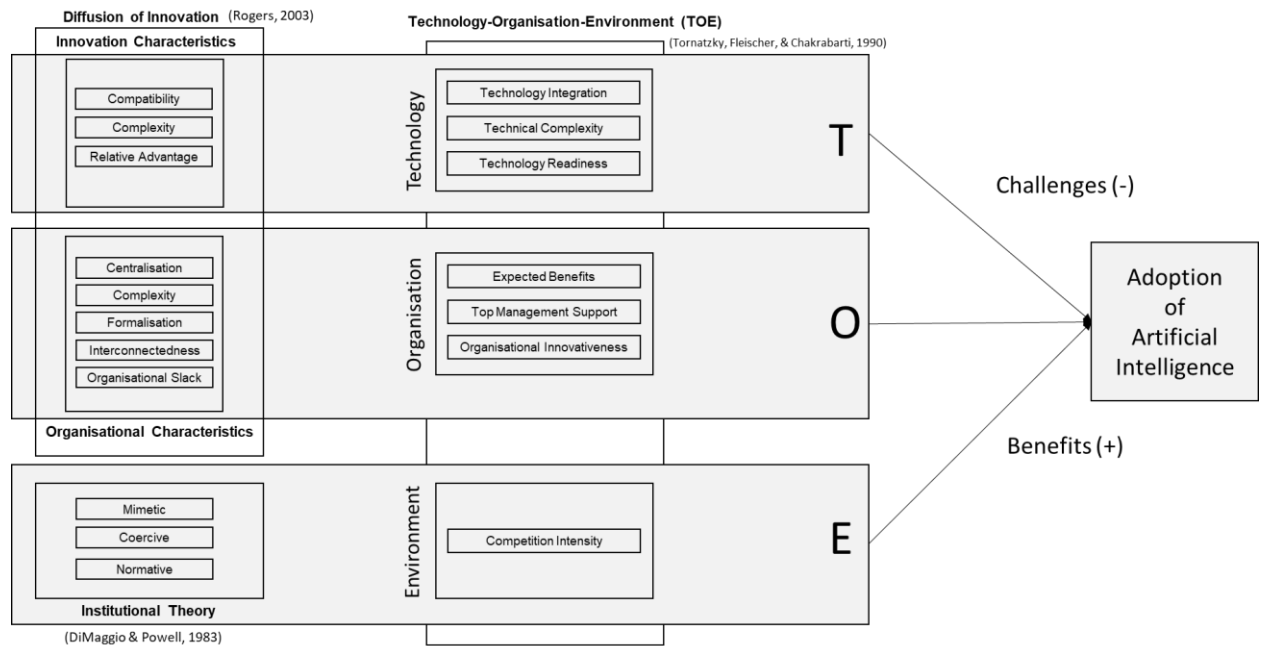
2.3 Towards Proposing a Conceptual Framework

The discussion of the literature argued that the theory of DOI (Rogers, 2003) and Institutional Theory (DiMaggio & Powell, 1983) could independently be applied to study the organisational level adoption of various applications of Information technology. The discussion around each of the theories indicated above also argued that:

- i. Limitations with the theory of DOI (Rogers, 2003) positioned it well to be combined with a complementary framework like TOE (Tornatzky et al., 1990), a view validated by (P. Hsu et al., 2006).
- ii. Institutional Theory (DiMaggio & Powell, 1983) has the propensity to augment the Environmental factor of the TOE (Tornatzky et al., 1990) framework. A view validated through two studies. (Gibbs & Kraemer, 2004; Soares-Aguiar & Palmados-Reis, 2008)

Thus, the study proposes to combine the three frameworks indicated above and illustrated in Figure 4 below, whilst utilising TOE (Tornatzky et al., 1990) as an overarching framework. It is the intention of the current study to validate the combined framework in the context of organisational level adoption of AI based technology. The validation will be supported by the research propositions that will be defined in chapter 3. The propositions will be structured in a manner to align with the view of P. Hsu et al. (2006), that posits that the adoption decision will be affected by challenges as constraints of adoption and benefits as enablers of the adoption decision.

Figure 4 - Conceptual Framework (Uncombined)



Source: Authors Own

Central to the combination of the frameworks will be the linking of overlapping factors and the merging of unique factors across all three frameworks discussed. This has been conceptualised in the table below:

Table 2.1 - Conceptual Framework with combined TOE factors

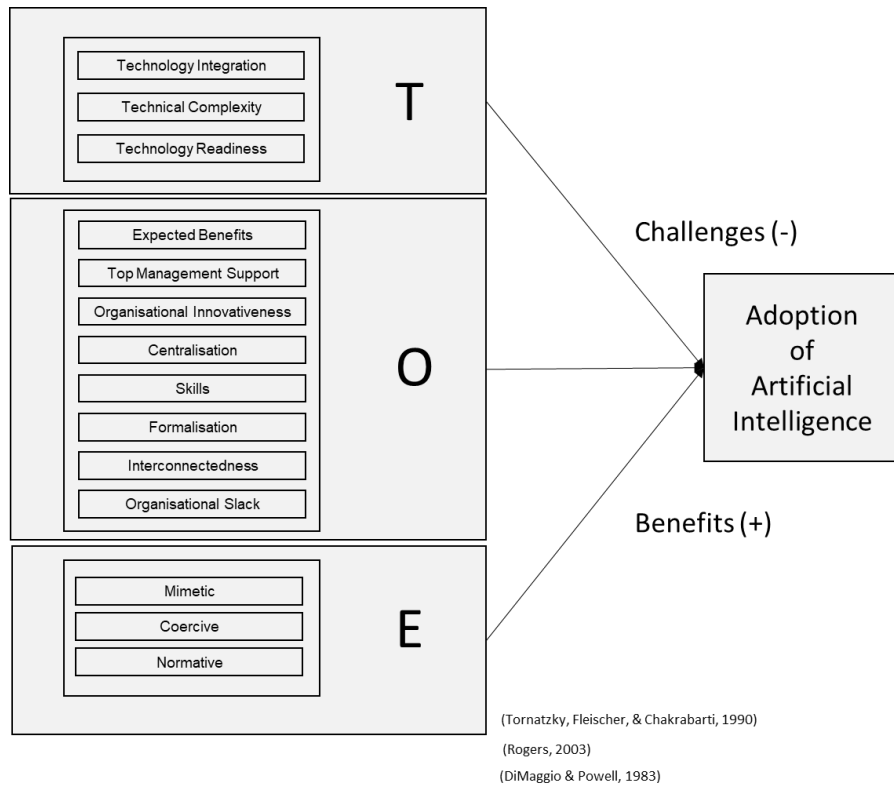
Number	DOI (Rogers, 2003)	Institutional Theory (DiMaggio & Powell, 1983)	TOE (Tornatzky et al., 1990)	Proposed Conceptual Framework	Categorisation
1	Compatibility		Technical Integration	Technical Integration	Technology
2	Complexity		Technical Complexity	Technical Complexity	
3			Technical Readiness	Technical Readiness	
4	Relative Advantage		Expected Benefits	Expected Benefits	Organisation
5	Centralisation			Centralisation	
6	Complexity			Skills	
7	Formalisation			Formalisation	
8	Interconnectedness			Interconnectedness	
9	Organisational Slack			Organisational Slack	
10			Organisational Innovativeness	Organisational Innovativeness	Environment
11			Top Management Support	Top Management Support	
12		Mimetic	Competition Intensity	Mimetic	
13		Coercive		Coercive	
14		Normative		Normative	

Table 2.1 depicts the Proposed Conceptual Framework Column. This column represents the combination of factors across the three frameworks posited. The justification for the combinations have been described below:

1. Compatibility and Technical Integration have been combined as Technical Integration
2. Complexity and Technical Complexity have combined as Technical Complexity
3. Technical Readiness is inherited directly from TOE (Tornatzky et al., 1990)
4. Relative Advantage and Expected Benefits have been combined as Expected Benefits.
5. Centralisation is inherited directly from DOI (Rogers, 2003)
6. Complexity is inherited directly from DOI (Rogers, 2003), but renamed to Skills as it aligns to the definition indicated in section 2.2.1 above.
7. Formalisation is inherited directly from DOI (Rogers, 2003)
8. Interconnectedness is inherited directly from DOI (Rogers, 2003)
9. Organisational Slack is inherited directly from DOI (Rogers, 2003)
10. Organisational Innovativeness is inherited directly from TOE (Tornatzky et al., 1990)
11. Top Management Support is inherited directly from TOE (Tornatzky et al., 1990)
12. Mimetic has been combined with Competition Intensity as Mimetic.
13. Coercive is inherited directly from Institutional Theory (DiMaggio & Powell, 1983)
14. Coercive is inherited directly from Institutional Theory (DiMaggio & Powell, 1983)

Figure 5 below, illustrates the culmination of the grouping indicated in table 2.1 above. Thus, the current study seeks to validate the combined conceptual framework illustrated in Figure 5 below. It is the intention of this study to validate this framework through the research propositions that will defined in Chapter three.

Figure 5 - Conceptual Framework: Combined View



Source: Authors Own

2.4 Artificial Intelligence (AI)

The field of AI has been largely been the purview of technical academic pursuit for some time with the history of the technology spanning at least the better part of six decades (Buchanan, 2005). As it is the intention of this study to understand the factors that might be complicit in the adoption of AI from an organisational perspective, it becomes an imperative to qualify the phrase Artificial Intelligence and the technologies it broadly represents today.

Simon, (1995) attempted to contextualise AI as a phenomenon that is some parts computer science, psychology and cognitive science, a phenomenon that manifests when computers execute actions that would require intelligence if executed by people. This quotation below elegantly sums up the authors definition of AI:

“Almost from its very birth, then, AI was a multicelled organism. Its foundation was the capability for building systems that exhibited intelligence, either as pure explorations into the nature of intelligence, explorations of the theory of human of the systems that could perform practical tasks intelligence, or explorations requiring intelligence.” (Simon, 1995, p. 96)

It is in the context of this definition that directed inquiry into broad business applications of AI is warranted. It is intended that insight into the business applications of AI based technology will position the AI based adoption decision that forms the subject of this research.

Thus, the following views on the applications of AI have been presented:

According to the consulting firm Price Waterhouse Coopers (PwC) AI based technologies can be broadly categorised as follows (PriceWaterhouseCoopers, 2017):

- I. **Assisted intelligence:** a classification of AI technology types that are widely available today. These specialised technologies are designed to solve very specific problems like GPS technology designed to find the best possible route to a destination given variables like traffic and inclement road conditions.
- II. **Augmented Intelligence:** is a classification of AI technology types that is emerging today. This type of technology allows people and by extension businesses to do what they wouldn't normally be able to do on their own. An example of this technology is predicative analytics where systems analyse vast amounts of data and are able to make intelligent and proactive decisions to solve complex problems.
- III. **Autonomous Intelligence:** is a classification of AI technology types that is being developed for the future. This type of AI technology utilises concepts of machine learning and natural language processing to automatically learn, make inferences and decisions. An example of this technology type gaining momentum today is self-driving cars.

An extension to the definitions above Schatsky, Muraskin, & Gurumurthy, (2014) introduce the following definition:

- I. **Cognitive Technologies:** the broad set of technologies that are able to execute tasks that only humans were able to do. Some applications of these technologies include: Rule Based Systems, Robotics, Speech Recognition, Computer Vision, Machine Learning and Natural language processing. Thus, Autonomous

Intelligence (PriceWaterhouseCoopers, 2017) based technologies would fall under the broad definition of Cognitive Technologies.

According to (Schatsky et al., 2014), it is this broad set of Cognitive Technologies that business and public sector leaders should focus on. Thus, providing context for AI based technologies that may form part of the adoption decision.

2.5 Summary of Literature Review

Literature scoped to address the research objective of identifying factors salient to the AI adoption decision was perused to build a conceptual position around extant literature. The crux of the research objective is built around the factors of technology and/or innovation adoption and thus literature purporting to understand adoption decision was broadly perused. Whilst the adoption decision could be studied at an individual and organisational level (Oliveira et al., 2011), the scope of inquiry pertinent to this research was limited to the organisation level adoption decision.

The application of the organisational lens directed inquiry towards technology adoption frameworks that would support the adoption decision in the context of AI based technology. Considering the emerging nature of AI based technologies a constraint identified at this point was that a gap exists in studies that seek to understand the adoption decision in the context of AI. Thus, in support of the robustness of academic inquiry, it was incumbent on the researcher to identify frameworks that enjoyed the maturity of empirical study and those that demonstrated applicability across technology and innovation types. Oliveira et al. (2011) reviewed IT adoption frameworks and through their study posited that the maturity of the DOI (Rogers, 2003), Institutional Theory (DiMaggio & Powell, 1983) and TOE (Tornatzky et al., 1990) frameworks positioned them well to understand the technology adoption decision at the organisational level. (Oliveira et al., 2011) went on to demonstrate through their study that, the frameworks when merged sought to address intrinsic individual limitations that each framework carried.

Thus, the next steps in the inquiry were directed to further validating the views that (Oliveira et al., 2011) posited. Perusal of studies that adopted the DOI (Rogers, 2003) framework as a mechanism to explain technology and/or innovation adoption uncovered that innovation characteristics of Trialability and Observability were found not to be significant to the adoption decision (Beatty et al., 2001). The same authors went on to

posit that, whilst the DOI (Rogers, 2003) was suitable as starting point in the study of innovation adoption and assimilation, it was recommended that the framework be combined with complimentary frameworks to enrich the understanding of the organisational adoption decision (Beatty et al., 2001). This view was substantiated by (P. Hsu et al., 2006), who posited that merging of the DOI (Rogers, 2003) and TOE (Tornatzky et al., 1990) frameworks had demonstrated salience in their studies.

In the context of Institutional Theory and its application to the technology adoption decision at the organisational level, the literature reviewed argued that, whilst the theory independently enjoyed maturity and the benefit of empirical study (Chatterjee et al., 2002; Gibbs & Kraemer, 2004; Teo et al., 2003) combining theory with the TOE (Tornatzky et al., 1990) framework had served to bolster the case for Environmental factors composited in the TOE framework, a view substantiated by (Gibbs & Kraemer, 2004; Soares-Aguiar & Palma-dos-Reis, 2008).

Merging the three frameworks towards building a conceptual framework posited for validation through the current research involved studying the applicability and empirical salience of factors proposed by individual frameworks and then combining them into a framework posited to test the factors key to the AI adoption decision through the research propositions defined in chapter 3.

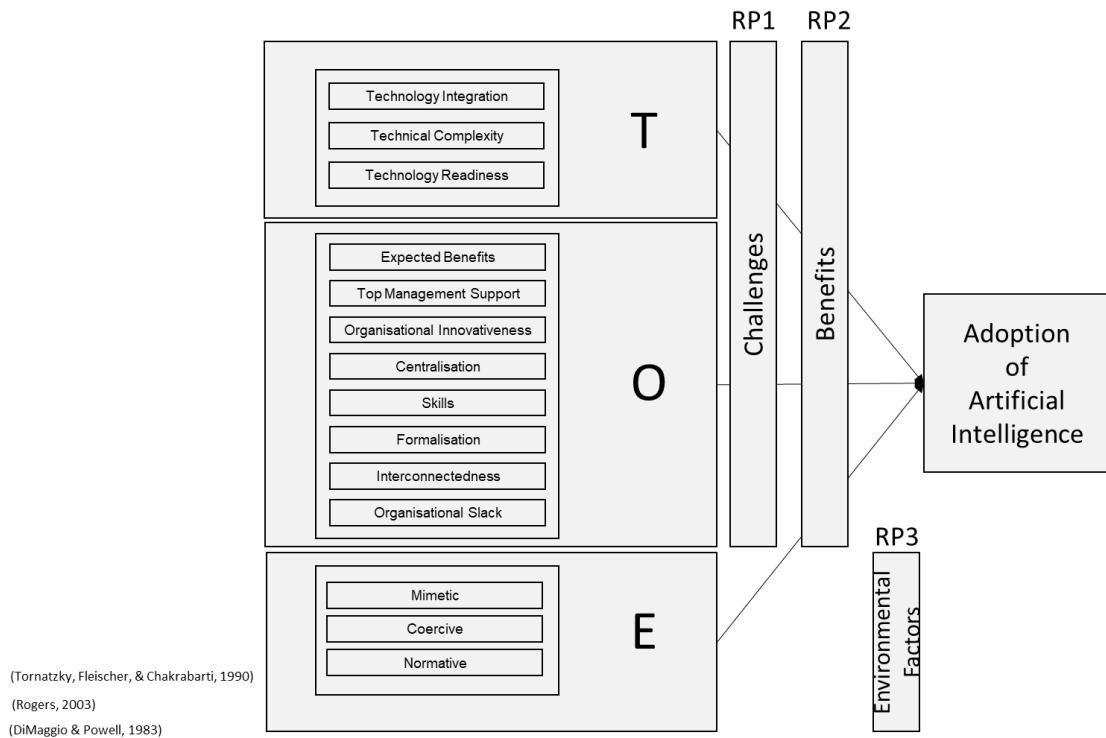
A brief discussion around the AI based technology and their applications to the business context was provided as most of the extant literature perused was found to be more technical in nature.

3 Chapter 3: Research Questions

3.1 Introduction

The research objectives discussed in chapter one along with the literature reviewed in chapter two provided the context within which the researcher has made the propositions that follow. Broadly, the scope of each Research Proposition (RP in the figure below) has been set based on the three contexts of Technology, Organisation and Environment in the combined conceptual framework illustrated below. The scope of the first two research propositions spans the Technology and Organisational contexts, whilst the scope of the third is limited to the Environmental context.

Figure 6 - Combined Conceptual Framework: Research Proposition Scope



Source: Authors Own

3.2 Research Proposition 1

Technological and Organisational challenges act as inhibitors to the AI based adoption decision based on the contextual factors proposed below:

Technology: Technology Integration, Complexity and Readiness

Organisation: Top Management Support, Organisational Innovativeness', Centralisation, Skills, Formalisation, Interconnectedness, Organisational Slack.

Each of the contextual factors proposed will have the propensity to introduce challenges and influence the AI based adoption decision.

3.3 Research Proposition 2

Technological and Organisational Benefits expected to be accrued from adopting AI based technology are key enablers of the adoption decision.

3.4 Research Proposition 3

Environmental factors have the propensity to affect the AI based adoption decision. The decision to adopt is influenced by:

- I. Mimetic factors: Pressure exerted by competitors and the need to gain or maintain the competitive advantage will influence the decision to adopt
- II. Coercive factors: Pressure exerted by strategic suppliers, regulatory bodies and/or parent organisations will influence the decision to adopt
- III. Normative factors: Pressure exerted by external organisations and/or industry norms that the focal organisation might have dyadic relationships with will influence the decision to adopt.

4 Chapter 4: Research Methodology

4.1 Research Design

This research is informed by a pragmatist philosophy. According to (Saunders & Lewis, 2012) it is often desirable to be guided in research by what is possible. Perusal of the literature and analysis of interview transcripts will guide the outcomes of this research. Each approach will require the researcher to view the context of the research differently and thus a Pragmatist philosophy has been deemed most appropriate.

A deductive approach will be used within the context of this research. This research purports to understand the factors that senior managers must consider when seeking to adopt AI based technologies within their respective organisations and as such will seek to test constructs grounded in existing and accepted theory. The research will be conducted with a view to either confirm the theory or identify the need for its modification (Saunders, Lewis, & Thornhill, 2009).

It is intended that the research will be exploratory in nature. This stance has been chosen because it is the intention of the research to seek insights into the factors considered when adopting AI related innovations or technologies (Saunders & Lewis, 2012).

The exploratory nature of the study justifies the qualitative methods will be used in the research process (Saunders & Lewis, 2012). It is the intention of this research to conduct semi-structured interviews with senior management within large South African enterprises to attempt to understand the factors they might consider when seeking to adopt an AI based innovation or technology. Semi-structured interviews will be used with the participants because the research will need themes related to the constructs identified through the literature review process examined. Some of the questions maybe pre-determined and the interviewer may exercise their prerogative in excluding or including themes and questions as needed (Saunders & Lewis, 2012). The interviews will enable a cross-sectional research approach where the study will take place at a particular time as opposed to spread over a time period (Saunders & Lewis, 2012).

4.2 Population

The population (universe) can be defined as any complete group of entities that share a common set of attributes (Zikmund, Babin, Carr, & Griffin, 2013) and as such the population relevant to this research will be South African senior managers in large

enterprises that are considering the adoption of AI based technologies and those that have already adopted AI based technologies.

4.3 Unit of Analysis

Typically the Unit of Analysis in research indicates what or who will provide the data and at what level of aggregation for the purpose of the research (Zikmund et al., 2013). The Unit of Analysis relevant to this research will be the individual senior manager in the large South African enterprise.

4.4 Sampling method and size

4.4.1 Sampling Method

- The sampling method utilised will be informed by access to the complete list of the population. Typically Probability sampling techniques can be utilised when one has access to the complete list of the population and non-probability when one does not (Saunders & Lewis, 2012). As the population for this research has been identified as South African senior managers in large enterprises that are in the process of considering AI adoption or have already adopted AI, getting access to the complete list may be a challenge. Thus, non-probability sampling techniques will be used for the sampling method.
- Using the researchers' judgement to select sample members is typically defined as Purposive sampling (Saunders & Lewis, 2012). Further, Snowball sampling is defined as a sampling technique where subsequent sample members are identified by members previously sampled (Saunders & Lewis, 2012). The samples for the semi-structured interviews will be selected via both Purposive and Snowball sampling techniques. The reasoning behind the utilisation of Snowball sampling as a method is that sampled senior managers may be able to identify other senior managers within the population. The researchers personal network will be leveraged to gain access to the initial candidates in the population

sample thereafter snowball sampling techniques will be utilised to identify further candidates.

4.4.2 Sample Size

- A suggested minimum sample size for the purposes of this research project will be 12 (Whittaker, 2016).

4.5 Measurement instrument

A semi-structured interview will be conducted with senior managers within the population of this research. A semi-structured interview will allow for flexibility in approach and execution of the process (Saunders & Lewis, 2012). As interview participants, will be senior managers it may be advantageous to not control or curtail the flow of discussion.

As the interviews will involve senior managers, the researcher must also take care to prepare for the interviews by (Saunders & Lewis, 2012):

- Finding out as much information about the interviewee as possible
- Develop an interview guide
- Chose a location that is convenient to both the interviewer and interviewee.
- Design a consent form and articulate this to the interviewee prior to the interview.

The types of questions asked will be as follows (Saunders & Lewis, 2012):

- Introductory questions to allow the interviewer to steer towards a new topic of discussion.
- Probing questions to ascertain detail without influencing the direction of the conversation.
- Specifying to ascertain detail about a specific aspect already discussed.
- Directing questions for more specific contextual responses from the interviewee.

It is also important to conduct a pilot for the interviews. This will allow the interviewer to identify possible problem questions, establish timelines around interviews and to generally make best use of the senior marketing stakeholder's time.

4.6 Data gathering process and Analysis approach

Data gathered via the interview process will typically require coding for subsequent analysis and inference of insights. It is the expectation of this research process that once the minimum number of interviews have been completed that the data collected will be coded according to the following types Attribute, Descriptive, Open and Thematic (Whittaker, 2016). The process will involve coding of specific data to codes which will be grouped into categories and in turn abstracted into themes through which the analysis can be conducted.

4.7 Limitations

The findings of this research can be constrained by the following limitations:

- The population of this research is limited to senior managers that are considering or have already adopted AI related innovations or technologies. Considering the status of AI as an emerging technology access to senior managers officers that satisfy the qualification criteria of the population may be a limiting factor.
- The research is also constrained by the theory and frameworks utilised as a foundation. As the frameworks employed have not been applied to test the adoption of AI based innovations or technologies and as such constructs applicable to this research had to be inferred from their significance to related studies in emerging technologies like Cloud Computing.
- Sampling bias could be introduced by the researcher in the case of selecting purposive and snowball sampling as methods.

5 Chapter 5: Results

5.1 Sample Analysis

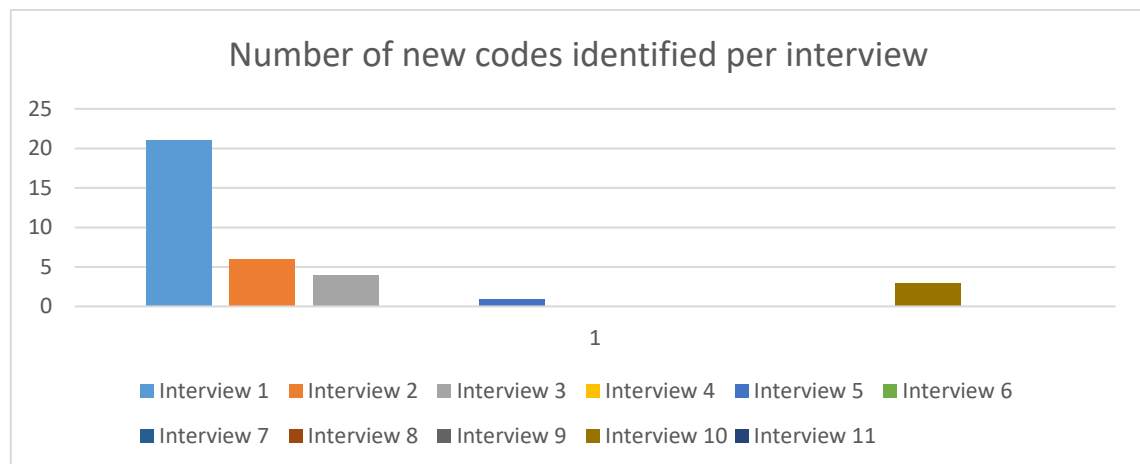
The table below depicts the 11 interviews conducted to support the data gathering and analysis process. As depicted, the majority of the interviewees were from the financial services sector with five candidates, followed by mining and professional services with three candidates each.

Table 5.1 - Table Interviewees (ordered by sequence of interview)

No.	Industry	Position	Interview Length (minutes)	Word Count
Interviewee 1	Mining	Group CIO	51	7573
Interviewee 2	Professional Services	Associate Director	59	9551
Interviewee 3	Financial Services	Product Manager	59	8850
Interviewee 4	Financial Services	COO: Premium and Business Core Banking	62	14663
Interviewee 5	Financial Services	Head of Operations	50	7911
Interviewee 6	Financial Services	COO: Stanlib Passive Franchise	34	4337
Interviewee 7	Financial Services	Executive Head: Business Banking Innovation, Process & Projects	44	7141
Interviewee 8	Professional Services	Director	44	6348
Interviewee 9	Professional Services	Infrastructure Consulting: Senior Manager	43	6156
Interviewee 10	Mining	Head of IM	45	6644
Interviewee 11	Mining	Head of Innovation	47	7554
		Average	49	7884
		Total	538	86728

5.2 Coding Process and Data Saturation

The researcher had planned to conduct a total of 12 interviews as part of the data gathering process, but as is evident from the figure below, data saturation was reached after Interview three. According to (Creswell, 2014), data saturation is generally reached when collecting new data does not generate new insight. Despite this happening early in the interview process, the researcher decided to continue till the 11th interview.



5.3 Results for Research Proposition 1

5.3.1 Theme 1: Organisational Innovativeness

5.3.1.1 Overview

The literature reviewed in Chapter 2 defined Organisational Innovativeness as the inclination of an organisation to adopt an open stance on innovation and is typically representative within its culture. The literature on adoption also went on to attribute Organisational Innovativeness as a key factor to be considered in the adoption of a technology/innovation. Thus, it is in the context of this theme that the researcher sought evidence in the interviews for innovation within an organisational context and the impact this might have had on adoption decisions within organisations.

Coding for Organisational Innovativeness the analysis of transcripts for quotations that called out Organisational Innovativeness explicitly as a key factor of AI adoption.

5.3.1.2 Findings

The subsequent analysis found the following breakdown of code occurrences and share of voice for Organisational Innovativeness coded as Org: Chall: Organisational Innovativeness over the eleven interviews conducted.

Table 5.1 depicted below demonstrates that all the interviewees deemed the Organisational Innovativeness as a key factor to be considered in the adoption of AI within an organisational context in South Africa. Interviews one, eight, nine and ten evidenced multiple quotations attributable to Organisational Innovativeness.

Table 5.5.2 – Code Org: Chall: Organisational Innovativeness Quotations Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Total
Org: Chall: Organisational Innovativeness	5	1	1	1	1	1	1	3	3	2	1	20

Table 5.2 depicted below demonstrates the share of voice for the theme of Organisational Innovativeness per interview. Whilst interview five had the most quotes according to Table 5.1, it is evident from the table below that interview nine had the largest share of voice amongst the interviews conducted.

Table 5.3 - Org: Code Chall: Organisational Innovativeness Share of Voice Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Total
Org: Chall: Organisational Innovativeness	533	175	166	113	165	43	153	342	600	240	66	2596
Total Transcript Word Count	7573	9551	8850	14663	7911	4347	7141	6348	6156	6644	7554	86738
Percentage	7%	2%	2%	1%	2%	1%	2%	5%	10%	4%	1%	3%

5.3.1.3 Interviewee Perspectives

Interviewee one's view on the status quo of innovativeness within their organisation was informed by their recent shift in strategy towards a more innovative stance. This change led the IT department within the organisation to actively look at leading edge technology to adopt to the benefit of the business and to gain a competitive advantage.

“... our brief, the brief that the IT department has is related to being leading edge not bleeding edge, bleeding edge is something typically brand new when you [sic] an early adopter, leading edge is when you have waited for two or three other players to go before you ... you are still an early adopter, but you are not a first mover... I would say for game changing technology we have definitely been

looking at it from a competitive edge perspective, it has to be game changing.”
(Interviewee One)

Further inquiry however indicated that this stance was limited to the identification and recommendation for adoption innovations solely in the corporate/business solution space. IT's mandate for innovation was not extended to the production/operational aspects of mining, thus limiting the potential scope of application and subsequently adoption of AI based technology.

Interviewee two's view also affirmed the importance of organisational innovativeness as a factor in adoption of AI, a view tempered for the interviewee by the South African macroeconomic environment. The interviewee built the context or the quotation below around their view that organisations in first world countries are able to focus their innovation efforts around long term strategic initiatives. Whereas, organisations in a developing nation like South Africa, are often forced to focus on the microeconomic impact of the macroeconomic environment they would find themselves in.

“So, I think to a large extent, [Innovation and therefore AI adoption in] South Africa will be impacted by the negative environmental factors around infrastructure, investments and positive outlook in terms of growth...” (Interviewee Two)

Interviewee two's recourse to the aforementioned impediment, *“I think South African context has always been to build it ourselves.”* (Interviewee Two), opening the proverbial reverse innovation door where low cost and alternative applications of AI developed locally can be diffused into developed markets. This view also found traction with Interviewee four where microeconomic cost pressures had their organisation embrace an innovative stance towards the adoption of AI based solutions - *“...the guys can't cut [costs] any more. So, they [sic] looking at this is the great white hope [AI based Innovation] that's gonna solve all their problems”* (Interviewee Four).

The evidence cited above indicated for the researcher the propensity of an organisation to innovate for the South African environment where microeconomic cost pressures lead to the innovation of low cost applications of AI based technology, which in turn improved the likelihood of the adoption decision in an organisational context.

Interviewees three, seven, eight and nine also positively attributed Organisational Innovativeness as a key factor of technology/innovation adoption and further, each found alignment on the key organisational characteristics that would support an innovative organisational stance. Fundamentally these were the ability of an organisation to adopt

a culture of iterative learning, experimenting and failing fast. This collective point of view is summed up by a quotation attributable to Interviewee seven:

“We obviously deploy as a practice design thinking in our innovation process because it clearly takes you through a series of steps that is iterative that says what is the real problem. Because we find that if you don’t do that you end up over engineering and you give a customer more than they actually need, so you know get to the real problem, understand the real business issue and you then actually design and you build for that. You test and learn and through the testing and learning phase and the prototyping and putting something rudimentary and the customer can at least get a sense of you collect information that further enriches your minimal viable product and then you go and develop, and you build. So, you go slowly to go fast.” (Interviewee Seven)

The substance of the evidence provided by Interviewees three, seven, eight and nine brought emphasis to the relationship between organisational innovativeness and the AI adoption decision, in that the ability of an organisation to innovate supported by practices such as iterative learning, experimentation and failing fast allowed solutions to be adapted and thus adopted with greater success within an organisational context.

5.3.1.4 Conclusion

Whilst all 11 interviewees attributed significance to Organisational Innovativeness as a salient factor in the adoption process, it was apparent through inquiry that simply adopting an innovative stance within an organisation would be insufficient to facilitate an AI based adoption decision. Thus, the key findings supporting improved adoption around the Organisational Innovativeness theme in the South African context included:

- The scope and mandate of the IT department to innovate, limited to just the corporate/business functions of an organisation and not extended to production/operations, impeded the ability of the IT organisation to adapt and thus adopt applications of AI technology in a wider field of applicability.
- Organisations under microeconomic cost pressure found that innovating low cost applications of AI based technology for the South African context acted as an enabler for improved organisational adoption.
- Organisations that adopted an approach to innovation that entailed iterative learning, experimentation and failing fast found the adoption decision easier as AI based solutions would be tailored to suit contextual value propositions.

5.3.2 Theme 2: Top Management Support

5.3.2.1 Overview

Extant literature in Chapter two cited Top Management Support as key to the adoption of technologies/innovations within an organisational context. Buy in from top management has been demonstrated as critical to enabling not just the organisational adoption context, but also the diffusion and acceptance of the technology/innovation at an individual level within an organisation. Considering the gravity of the theme it was incumbent upon the researcher to peruse the data from the interviews to identify evidence for top management support and the impact this buy-in might have had on adoption decisions within an organisation.

Coding for the Top Management Support theme sought evidence in the data that attributed evidence of:

- The explicit validation of Top Management Support as a key factor in the organisational adoption process
- Activities conducted to engage senior stakeholders in the organisational adoption decision.
- Challenges that senior stakeholders faced despite having adopted a positive stance towards a technological adoption decision.

5.3.2.2 Findings

Findings for the Top Management Support theme are supported by the tables of quotations (table 5.3) and share of voice (table 5.4) per interview below. Table 5.3 illustrates the number of quotations per interview attributing Top Management Support as a key factor in the AI adoption process. Whilst, Interview eight was coded with five occurrences of the Top Management Support theme, Interview seven did not cite this theme as significant in their adoption process. It can be noted however that 90% of the respondents attributed Top Management Support as significant.

Table 5.4 - Code Org: Chall: Top Management Support Quotations Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Org: Chall: Top Management Support	3	2	3	1	2	1	0	5	2	2	1	22

Table 5.4 depicts the share of voice for the Top Management Support theme per interview. Reflecting the number of quotations per interview, Interview eight does indeed share the highest proportion of the share of voice per interview. Interview nine and ten had relatively lower quotes attributable to Top Management Support, but shared proportionally higher shares of voice in their respective interviews which was above the average of the overall sample.

Table 5.5 - Org: Code Chall: Top Management Support Share of Voice Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Org: Chall: Top Management Support	326	305	348	262	251	95	0	531	352	358	158	2986
Total Transcript Word Count	7573	9551	8850	14663	7911	4347	7141	6348	6156	6644	7554	86738
Percentage	4%	3%	4%	2%	3%	2%	0%	8%	6%	5%	2%	3%

5.3.2.3 Interviewee Perspectives

As the findings discussed above demonstrate, Top Management Support was deemed as key by 90% of the Interviewees for the organisational adoption of technology/innovations. Further nuanced inquiry found that Top Management Support was either a bottom-up or top-down process. With the bottom-up process, middle management sought sponsorship from senior stakeholders and the converse applied for the top-down process where senior management sought buy-in from middle management to facilitate diffusion and individual adoption through the organisation. A discussion on each approach follows:

Bottom-up Approach

Interviewee two's view on the theme of Top Management Support was clear from the onset - *"It's not important, it's critical."* (Interviewee Two). According to the Interviewee two types of adoption decisions needed to be made, small scale and large scale. Interviewee two opined that, whilst organisational adoption decisions around small scale technological solutions likely did not need top management support, diffusion and adoption of the solution by individuals in the organisation presented challenges without top management support. Large scale technological adoption decisions however

required top management support, and this interviewee saw the most success when these stakeholders were kept engaged. This is a view supported by Interviewee nine:

“It’s [the adoption decision] not easy, but from a decision-making term [sic] it’s the belief in it and we had the CTO who believes in it 100% that made it so much easier because you had that investment from the CTO who was prepared to do this.” (Interviewee Nine)

Top Management Support was not always a given. Interviewee one and three both opined that the profile of senior management within organisations would be typified by mature executive leadership, perhaps not literate about the potential of emerging and disruptive technology. A view also shared by Interviewee one and eight:

“I think the other thing is the maturity or age concept of the people that have been in the organisation for a very long time. So we have got a group of people that are sort of fifty plus, our executive leadership, a few of them are in that fifty plus category and some of these individuals have been with the organisation for many years and for them this is their baby and also they have grown up in an era where they have done their MBA’s in the eighties and what they learnt in the MBA and what we have learnt is very different and they potentially not as literate about disruptive technologies and emerging technologies like AI.” (Interviewee One)

“But as I mentioned previously when you deal with people who are possibly not digital or computer natives it’s much harder to try and convince someone that a system is better than their gut feeling.” (Interviewee Eight)

Garnering management buy in for these interviewees involved identifying the right senior stakeholders and keeping them engaged. Interviewees one and nine spoke of forming committees or boards of relevant senior stakeholders to facilitate engagement and buy-in for adoption.

“So I think that is the reason that we actually formed the steering committee the one I mentioned, so it is made up of three directors and not all the senior management but some of the senior management including our chief operations officer and our plant operations or the mines themselves they report into the Chief Operating Officer, so the steering committee has a good mix of people and if they buy into it, it [adoption] is a collective decision even though there is sometimes dissent ... we use a democratic process, the point being that once the decision has been made then everybody is supporting it from a senior management

perspective which then makes it easier for people lower down the food chain to adopt.” (Interviewee One)

The formation of the structures discussed above supplemented by ongoing socialisation of benefits through presentations, executive summaries of white papers facilitated senior stakeholder buy-in for the participants. A view also substantiated by Interviewee four, *“...I've done thirty-six presentations sort of, to business units about robotics already. You know, and that, and as soon as they see it you know, everybody. Is on board.”* (Interviewee Four).

Top-Down Approach

The converse approach to that discussed above, the analysis found that should a senior management stakeholder be convinced off a technology/innovation, a dictatorial approach to adoption would not always work. It would be incumbent upon the senior stakeholder to identify and convince stakeholders at a peer level and middle management to facilitate a successful adoption decision.

“A lot of the battle was won through the CEO. He's was a IT manager on site previously. When he came on board I think [he] bought [sic] last year his big drive from a passion perspective, he's looking towards IT to take the business into the future... EXCO buys into AI and future thinking because of the CEO. The problem lies in levels below that where we have a much older culture, established culture in terms of running the department.” (Interviewee Ten)

As evidenced by the quotation above Interviewee ten was in a position where their CEO came from a technical background, thus peer level (Exco) buy-in was facilitated when the CEO put his weight behind a technology or innovation, the challenge arose in convincing the downstream middle management structure of the adoption decision.

This view that directives from senior management would not suffice in the adoption decision found corroboration with Interviewee eight, as evidenced in the quotation below:

“However, from a general managerial point of view dictation does not work. While I could pretty much say this is how it's going to be done and no one would actually know because I would say we're replacing this team by [sic] the system, it does the work of five people. You can make five people redundant if I were to do that I'd quite quickly find myself out of favour because I'm not buy in from the people.” (Interviewee Eight).

5.3.2.4 Conclusion

Whilst it was clear that 90% of the interviewees cited Top Management Support as a key factor the AI adoption decision the analysis of the interviews found that two approaches

- With a bottom-up approach garnering senior stakeholder support was facilitated via the formation of steering committees and boards along with ongoing socialisation of the expected benefits of the technology or innovation.
- A Top-down perspective showed that senior stakeholder buy-in on its own would on its account perhaps facilitate organisational adoption, but diffusion and adoption at an individual level within an organisation had to be facilitated through the buy-in from middle management

5.3.3 Theme 3 Complexity

5.3.3.1 Overview

According to (Low et al., 2011) the implementation of new systems is dependent on the time it takes an individual to understand the underlying innovation or technology and thus it follows that complexity can be an impediment in the adoption of innovations or technologies. Given the salience of Complexity as a key factor in the adoption decision, the discussion in this section seeks to examine the evidence from the interviews to make a case for Complexity as a key factor in the AI specific adoption decision.

Coding for Complexity as a theme involved analysing the data for elements that would impede the understanding of AI and its applications and as such the following code was attributed to this theme:

- Tech: Chall: Complexity: attributed with quotes that directly call out the complexity of AI based technology and the learning curve involved in understanding the technology.

5.3.3.2 Findings

As table 5.5 below indicates Complexity was identified to be salient theme amongst 90% of the interviews conducted. With Interview nine being attributed with the most number of quotes. Interviewee 2 was the only respondent that did not consider the factor significant the adoption of AI.

Table 5.6 - Code Tech:Chall:Complexity Quotations Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Tech: Chall: Complexity	1	0	3	2	3	1	1	3	4	1	2	21

Table 5.6 below represents the share of voice the theme of complexity enjoyed per interview. As the numbers imply, the average across ten interviews happened to 5%, but Interview five, eight and nine had significantly higher percentages of share of voice in comparison to the other interviews.

Table 5.7 Tech:Chall:Complexity Share of Voice Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Tech: Chall: Complexity	242	0	397	358	1007	80	432	544	926	206	156	4192
Totals	7573	9551	8850	14663	7911	4347	7141	6348	6156	6644	7554	86738
Percentage	3%	0%	4%	2%	13%	2%	6%	9%	15%	3%	2%	5%

5.3.3.3 Interviewee Perspectives

The fundamental view presented by the interviewees was that complexity would negatively impact the organisational adoption decision. The emerging nature of AI based technology had presented for the participants complexity in understanding the technology and how it could be implemented and applied to beneficiate the business of their respective organisations. The complexity factor can be directly attributed to the aforementioned uncertainty. This view was demonstrably validated by the following quotation:

“I definitely think so, I think when things are too complex or they seem to be too complex than most people sort of pull away from it because they don’t understand it well enough which is why I used the example of IT being still seen as the area that is driving innovation and being out there looking at new technologies, what do those technologies mean and how they are applicable to this business specifically, so complexity would be something that one would need to understand as the driver of innovation” (Interviewee One)

Interviewee three ascribes the intangible nature of technology as cause for the introduction of complexity. Senior executives in this interviewees context find it difficult to trust the output of AI based technologies and this lack of trust leads to scepticism as evidenced by the quotation below:

“...a lot of managers and execs struggle to, struggle to, um, understand what's really happening because they can't really see, feel, touch or smell it. Um they, they akin a lot of AI to a black box and they don't really understand what happens in that black box. And as a result, they're quite sceptical about the answers that come out of that black box.” (Interviewee Three)

Both Interviewee six and nine's view's also found synergy where the former referred to the AI as a foreign concept that would take time to convince people of its benefits and the latter referring to the relatively unknown nature of the technology, *“because it's unknown, a lot of people were saying because we don't know what it's going to mean and what's the impact to it, we don't want the adoption”* (Interviewee Nine).

Whilst the quotations attributed above evidenced the generic nature of technical complexity, the analysis also yielded nuances around complexity that can be attributed to AI specifically. Interviewee four cites a steep learning curve and the fear of the unknown. This view found corroboration and extension with Interviewees seven and ten. Interviewee seven spoke to implications on management processes and the impact introducing AI based technology had on them.

“So, when we originally started with this it was very clear that there is [sic] criteria before you can go and put robotics on something. We first needed to understand what that was, we tested quite few processes, we found that because of the nature of our decentralised model each of the regions were doing their own thing and each one had a tail on, no but in this region, we are unique and therefore we want to do this extra step for this type of request etcetera. So, our initial first expanse [sic] was just getting everybody to do the same things and getting some standardisation, process discipline in play.” (Interviewee Seven)

Interviewee ten's point of view carried the extension to fundamental complexity introduced earlier, by the need to ensure the not only were the architecture of the AI based technical solution and infrastructure understood and well designed, but also agile governance and management structures were considered as part of the adoption decision. This is point of view is evidenced by the quotation below:

Yes, a technical perspective I think is the architecture diagrams and infrastructure layers have to be in there... Look at use cases that add value, look at the agility [governance and management] structures that can deliver value to the organisation via AI and other innovative technology out of there... You have to understand exactly where you want to be and what is required, it's like prerequisites. (Interviewee Ten).

Another extension to fundamental complexity in the context of AI was identified in discussions with Interviewees five and nine. Both interviewees were of the point of view that AI is both a consumer and producer of voluminous data. Thus, the implication made by both interviewees was that gaining a thorough understanding of the data that AI based technology would need as input and the utilisation of the data output by the technology had introduced complexity and thereby was considered as a factor in the AI adoption decision. This view is summed up by the quotation below:

"The other challenge within this is how to deal with unstructured data and that's always a challenge. So, in other words where you are dealing with structured data a lot of these models work very effectively. As soon as you start getting to unstructured data, now you start to have an issue okay, and again like I have said you have robotics specialists and you have AI specialists, you also have specialists out in the market who deal with unstructured data, so in other words, how do we strip it, how do we compare it, how do we download it into a process, how do we try and determine what is relevant and what is not, that then becomes the next challenge. (Interviewee Five)

A further nuance to AI based complexity that was discussed as a factor of the adoption decision was time taken to train an Artificial Intelligence. A view informed for both interviewees five and ten, based on the premise that Machine Learning technology (an application of AI) had required training data for the technology to be able to make inferences from real world scenarios and thus make automated decisions. Identifying the right input training data had introduced complexity and thus was considered a factor in the adoption of AI based technology. This is evidenced in the quotation below:

"The issue in terms of adoption is the time taken to develop the model and train the model so you know once you start looking at the results coming out of the model you start to say ja that looks good, that element looks good but this element is a bit dicey and a bit shaky, what do we need to now add to the model to try and

tighten up or improve the result coming out with respect to that one element, that takes a bit of time” (Interviewee Five).

5.3.3.4 Conclusion

Complexity was posited as a factor that required due consideration when electing to adopt AI based technology. The case for complexity was made in the discussion and evidence presented above. It should be noted that whilst, the technical complexity in general was considered a salient factor by 90% of the interviewees in the adoption decision, the following nuances were identified as elements that introduced complexity specifically in the context of AI based technology:

- Understanding the implications of AI based technology on IT governance and management processes had the propensity to introduce complexity.
- Training and development of machine learning based technology had introduced complexity and thus impacted the AI adoption decision
- Understanding and preparation of the data required as inputs and the handling of data output by AI based technology also introduced complexity into the adoption decision.

5.3.4 Theme 4 Technical Readiness

5.3.4.1 Overview

The literature reviewed in chapter two defined this theme as the readiness and ability of an organisation, with respect to its infrastructure, key systems and access to skills, to adopt the innovation or technology (Viswanath Venkatesh & Bala, 2012; Zhu, Kraemer, et al., 2006). The discussion and analysis below found that the technical readiness of an organisation to assimilate AI based technology was considered a key factor in the adoption decision. Further inquiry found that the emerging nature of AI based technology and its propensity to impact the broader organisational context extended the need for readiness from technical readiness to organisational readiness.

The theme of readiness composited three codes, two of which were identified deductively through the literature review and third emerged inductively through the data analysis process. These codes have been listed and described below:

- Tech:Chall:Readiness – deductively identified through the literature review and defined as the technical readiness of an organisation, with respect to its technical

infrastructure, key systems and human resources, to adopt an innovation or technology (Viswanath Venkatesh & Bala, 2012; Zhu, Kraemer, et al., 2006)

- Tech:Chall:Skills – deductively identified through the literature review as the complexity construct composite within the DOI (Rogers, 2003) framework, as the intrinsic skills an organisation has access to the ability of an organisation to.
- Tech:Chall:Unstructured Data: inductively identified through the interview coding process as the readiness and maturity of the data architecture to facilitate data input and output for AI based technology to function optimally.

It should be noted that all three codes described above had been attributed to the readiness of an organisation to adopt AI based technologies as per the evidence identified through the interviews.

5.3.4.2 Findings

Table 5.7 provides an indication of the number of quotations relevant to the theme of readiness and its three composite codes. The overall theme of readiness saw ten out of 11 interviewees attributing this as a key factor in the AI adoption decision. Further, based on the number of quotations per interview it is evident that access to technical skills was the most significant factor of readiness according to eight of 11 interviewees. This was followed by technical readiness with six of 11 interviewees citing the factor as significant. Finally, unstructured data had only four of the 11 interviewees citing the factor as a significant component of technical readiness.

Table 5.8 – Technical Readiness theme and composite codes, Quotations Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Tech: Chall: Readiness	0	1	0	3	1	0	2	0	1	3	0	11
Tech: Chall: Skills	2	6	3	3	2	2	1	1	0	0	0	20
Tech: Chall: Unstructured Data	0	0	1	0	1	0	0	1	1	0	0	4
Theme of Readiness	2	7	4	6	4	2	3	2	2	3	0	35

Table 5.8 below depicts the share of voice per code that composited (expressed in word counts) the theme of readiness and also the share of voice for the theme of readiness (expressed as a percentage) as a whole. Whilst the average across eleven interviews was six percent, interview five had the largest share of voice at 12%, with interviews three, six, seven and nine following at eight percent.

Table 5.9 Technical Readiness theme and composite codes, Share of Voice Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Tech: Chall: Readiness	0	18	0	527	290	0	138	0	375	442	0	1790
Tech: Chall: Skills	254	538	503	375	332	350	423	118	0	0	0	2893
Tech: Chall: Unstructured Data	0	0	165	0	290	0	0	231	126	0	0	812
Theme of Readiness	254	556	668	902	912	350	561	349	501	442	0	5495
Total Transcript Word Count	7573	9551	8850	14663	7911	4347	7141	6348	6156	6644	7554	86738
Percentages	3%	6%	8%	6%	12%	8%	8%	5%	8%	7%	0%	6%

5.3.4.3 Interviewee Perspectives

Evidence perused to support the technical readiness theme presented insights around the readiness of an organisation to adopt AI based technology. Interviewee two was of the view that IT and business Operating Model constructs like processes and business rules should be digitised (automated) as a precursor to implementing AI based technology. The reasoning being that AI based technology sought to automate decision making and would benefit from the processes being standardised and automated to enable optimal efficiency. This view was also corroborated by Interviewee ten who extended interviewee two's view by bringing into consideration the readiness of the technical architecture and infrastructure to implement AI based technology. Interviewee ten's perspective is evidenced by the quotation below:

"A big caveat to that there is, most of your processes have to be digital. That there I got from listening to other CIOs that tried implementing AI in their organisations. As soon as that process flips to manual your entire value-add from delivering AI to the process stops." (Interviewee Ten)

Interviewee nine's point of view was strongly informed by the need to be technically prepared by ensuring adequate capacity of IT infrastructure in the production environment was in place and ready to take on the implementation and run of AI based technology. Interviewee four's stance on readiness extended Interviewee ten's view by including their pre-production environments within the scope of technical readiness. Interviewee four went on to mention that parity of infrastructure deployed between all the

pre-production and production environments was also a critical contributor to the readiness factor. This view is evidenced by the quotation below:

“I think if I could, if I could go back in time and do it all over again, I'd firstly make sure that everything in IT is set up before I started selling this [robotics and AI] So, I've sold like hell for leather and I'm still stuck in a, in a IT problem.”
(Interviewee Four).

The reference to selling in the quotation above must be taken in the context of the interview where the interviewee speaks off having to make presentations to their organisations senior stakeholders to facilitate adoption buy-in.

The second code compositing the readiness theme included skills, which in the context of the adoption of AI translated to access to skills that would facilitate the AI adoption decision. Interviewee one's quotation below set context for further inquiry:

“So with technical aspect, that is always do we have the in house skills to be able to roll out what we want to roll out, obviously scope, rollout and then support a system, so typically we would need to enhance or augment our skills and as an organisation we would say we are not experts, do we want to build that competency in house, we would probably say not and then work with a partner who we would have a long term agreement with, from an implementation agreement right through to the service level agreement to support and to provide the expertise around it” (Interviewee One).

As evidenced above the fundamental concern for interviewee one was whether to build skills internally or as an alternative, leverage external vendors for support. The specific skills that Interviewee One sought were those that would support the building, deployment and ongoing support of AI based technology. The skills required by Interviewee one needed to support the technology through its build and run lifecycles and thus lent further credence to skills as a factor of readiness to be considered for the AI adoption decision.

The challenge as specified by Interviewee two however lay in the scarcity of skills. This scarcity for Interviewee two meant that costs to procure skills externally, be they experienced hires or consultants, had been a salient factor in the adoption decision. The aforementioned scarcity of skills along with the costs led interviewee four to the following stance:

“Okay so, if you were looking for a, a certified RPA developer at the moment, in South Africa., good luck finding one okay. There's very, very few of them that are accredited, especially in the Blue Prism. Which is the software that we use... If you do find them, you gonna pay an arm and a leg for it. Okay. We, we've taken a different approach and said we'll build our own AI skills.... So, what we also trying to do is limit with the people impact, we saying do we have those resources sitting in our layer that could be affected by robotics? You know, we put them through assessments to see, have they got the right possible technical know how to get there? And then we teach them the rest.” (Interviewee Four)

Thus, building of skills internally for interviewee four had meant the identification and assessments of potential candidates internally. Investments were made in upskilling candidates where synergies in candidates and skillsets were identified. This was a view also substantiated by Interviewee seven to also manage the uncertainty and insecurity the implementation of AI based technology had introduced in their environment. Interviewee seven's approach was to bring their workforce on the journey with them, as evidenced by the quotation below:

“Obviously, the big thing now is that we are starting to get momentum on it and start getting more processes on it is to start managing that uncertainty and job security, staff start saying well you know is a robot going to replace everything, and those are things we are thinking about, is how do we bring people on this digital journey of which robotics is one shape and form as well, and bringing them along on the journey and starting to see how you reskill people.” (Interviewee Seven)

The impact on the workforce of AI based technology, a unique consideration for the South African organisational context finds discussion in the discussion below.

The position of developing skills internally as indicated above had meant then that organisations had to consider the types of skills required to build and support AI based technology over its lifecycle. Interviewee three's view succinctly positioned this requirement:

“So, those would be, those would be some of the big um, sort of hurdles, but more practically speaking, I also think that there's just not enough talent. Um, on, not just people who understand it, but people who can practically, actually build the algos,

train them, apply them, ah, 'cause it's, it is a combination of science and art in a way.
(Interviewee Three)

This view that the skills required to build and support AI based technology were a combination of art and science was also corroborated by Interviewee Two. According to this interviewee the skills required had to have a combination of business and technical orientations, a departure from just purely technical skills that some other technologies might have required.

“That's where the key lies, and if you haven't got enough capable skills and analysts. Then you just gonna get back to your traditional development. So, the analysis of it and the understanding of it, becomes [critical], so the skill set there is gonna be a little bit different to a, just a normal analyst. Or a business analyst, let's put it that way. It's going to almost a combination of technology and business.” (Interviewee Two).

The implication of the view on the types of skills required as analysed above found salience in the context of the AI adoption decision because further discussion will show that, AI based technology had been considered for deployment were the expected benefits were Business oriented as opposed to purely technical in nature.

Interviewees three, five eight and nine brought in a further factor for consideration and that was the nature of data that the AI based technology would consume and produce and the handling thereof.

“The only challenges was [sic] when we had multiple data platforms, so we were pulling data from mainframes, we were pulling data from other database platforms like Oracle, SQL lite and there was also non persistent...unstructured data. That is a challenge all on its own” (Interviewee Nine)

The unstructured nature of data consumed by AI based technology and the handling of any data produced by the technology were also factors considered to introduce complexity and thus impact the adoption decision. That the architecture and handling of data in the form it is consumed and produced found salience in the readiness theme too served to validate it further as a key factor in the AI adoption decision.

5.3.4.4 Conclusion

The theme of readiness through the analysis found that technical readiness, availability of skills and the maturity of data architectures supporting AI based technology to be granular factors that warranted due consideration in the adoption decision. The inquiry yielded a nuanced view around the consideration of the theme summarised as follows:

- Technical readiness warranted consideration of the following factors to support the AI adoption decision:
 - o IT and Business Operating Model constructs like processes and business rules that needed readiness assessment for digitisation (automation).
 - o Readiness of technical architecture and infrastructure to support the building, deployment and support of AI based technology
- Access to skills that would support AI based technology through the build, deployment and ongoing support was also key factor in the adoption decision. The following criteria had warranted consideration for the interviewees to support the adoption decision:
 - o Skill scarcity and thus the decision to either build skills internally or procure externally. The consideration of external procurement was inclusive experienced hires and consultancy for AI based skills.
 - o Inclusive in the decision to build or procure skills was due consideration of the costs involved.
 - o The types of skill requisite to support AI based technology through the build, deployment and support phases had not been purely technical. The analysis found that access to both technical and business analyst skills were cited as key to the adoption decision.
- Readiness of the data architecture that would define the input data consumed by AI based technology and the handling of the data output by AI were also considered salient factors to be considered in the adoption decision.

5.3.5 Theme 5: Technical Integration

5.3.5.1 Overview

Technical Integration was defined in the literature reviewed in chapter two as the extent to which information systems and databases, both internal and/or external to an organisation are interconnected (Zhu, Kraemer, et al., 2006). The authors contextualise external interfaces indicated by the definition as those with third party vendors an organisation may interact with.

This definition formed the basis for the coding of quotations that spoke to the key integration based considerations for the AI adoption decision in the interview transcripts.

5.3.5.2 Findings

It was evident from table 5.9 below that eight of the 11 interviewees (73%) found the theme of Technical Integration to be a key factor the AI adoption decision. Interviewee nine was attributed with the highest number of quotes. Further, Interviewees one, three and seven did not consider this theme key to their adoption decision.

Table 5.10 Code Tech:Chall:Integration Quotations Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Tech: Chall: Integration	0	2	0	2	2	2	0	1	3	1	1	14

Table 5.10 below indicates that share of voice attributed by each interviewee to the theme of Technical Integration. The average share of voice across 11 interviews was four percent. Considering the average, it should be noted that Interviewee nine had a 14% share of voice and Interviewee five subsequently 5%.

Table 5.11 - Tech:Chall:Integration Share of Voice Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Tech: Chall: Integration	0	372	0	412	422	296	0	275	859	206	155	3262
Total Transcript Word Count	7573	9551	8850	14663	7911	4347	7141	6348	6156	6644	7554	86738
Percentages	0%	4%	0%	3%	5%	7%	0%	4%	14%	3%	2%	4%

5.3.5.3 Insight & Interviewee Perspectives

Evidence analysed in favour of the Technical Integration theme built upon the definition of Technical Integration discussed above. Interviewee five's point of view affirmed the stance presented in the literature that integration was not just a concern of interconnectivity with internal information systems, but external interconnectivity with third party information systems and databases was also a key factor to be considered. Central to this interviewee's view was also the concern that internal systems that AI based technology needed integration with were typically owned, administered and managed according to the business systems they supported. These systems, based on the business need, would have often had other initiatives and projects planned for them. Thus, any work required to integrate AI based technology had to pass internal muster to ensure that resources were allocated to projects according to business priority. This is substantiated by the quotation below:

"...it depends you know again on what your core piece of technology is, so if it is internal systems, those come with different challenges, so you have got all your internal systems and its not to say that you cannot do it, the questions is where do you sit on the priority list, that is an issue and then what is that timeline and the cost to implementation look like and that is in your control. Then you have the second piece of it or element, where these are third party systems and now you have to integrate to third party systems. Obviously the cost related to third party systems is substantially different so potentially you could shrink your timeline if you could convince your vendor to add resource but that comes at a particular cost, so it is about trying to balance these things and saying well you don't want to impact your core pieces of technology, you do understand that there is value in the process but you also understand that there is a long list of other projects that need to be implemented within the business...." (Interviewee Five).

The considered view of Interviewee five that integration with incumbent systems was a skirmish for scarce business resources often decided in favour of projects that supported core value propositions found extension in the views of Interviewee six. According to Interviewee six, if the chartering of integration or implementation projects was the initial hurdle, subsequent consideration had to be given to the integration of AI based technology with the layers of pre-existing integrations between information systems and databases. Each layer of integration had the propensity to introduce its own degree of

complexity when it came to the technical integration consideration. This view is evidenced by the quotation below:

"I would say the integration is not the biggest impediment. It is the constraint on what you can do on top. If you think about anything that we do runs on information, either client information or portfolio investment information and the complexity of the automation you can do at the top depends on how easily you can access the information at the bottom. You can implement at the top a solution but it's limited to how you can access and process the underlying information. If you think about and this is without me being a techy person is if you've been selling insurance policies for 60 years to South African clients you've been building tech and tech and tech on top of each other. That it's such a layered system and such an interdependent system that pulling a process in that system is quite dangerous from the risk perspective. You are stuck with the output at the top in terms of what you can do. I think the integration part refers to the functionality that you can overlay on the databases basically." (Interviewee Six)

A further AI specific nuance to the integration consideration for the adoption decision was the validation of the integration. It has been posited in the discourse of this chapter that AI is a consumer as well as producer of voluminous information and that AI based technology relies upon the veracity of the information it consumes as input. Thus, the accuracy of its output was discussed as a function of the information the technology would consume. This view was substantiated by Interviewee five:

"Integration is always a challenge from a technology perspective because you are now adding another layer of complexity, another piece of technology, so what you have got to do is take the output from your core system, you have got to push it into the model, you have to take the output from the model and push it back into your core system to then allow your people to validate the answer that they have got and then you have got to be able to push the result of the validation back into the model in order for the model to now learn and say what was the result and if it was different why was it different." (Interviewee Five)

Interviewee nine had some strong views as around the technical perspective and integration concerns to be considered for the AI based adoption decision. This was reflected in the significantly higher than average share of voice for Interviewee nine around the theme of integration. Whilst the depth of the views around the technicalities of integration presented by this interviewee were substantial, the quote selected for

discussion below presented a view on the need for open access and integration into databases owned by federated business units.

“.... and due to [being a] bureaucratic organisation, because they're not a federated in terms of the structures, but the perception is still federated views, it's still their individual data ...Then you had investment bank that had a certain set of data. Then you had a branch manager, which is your home loans, personal loans, they had their own set of data, so to bring all that together becomes a little bit of a challenge because what the vision for the bots was, is to learn everything about the profile of the client. So we can have a full understanding of all the assets they have, the liabilities they have, and have something with structure. And then we want to link the data to other server providers like [sanitised], the [sanitised] and all of these other third parties to pull this data to give a full view of where we could do a little bit more targeted marketing as well.” (Interviewee Nine)

As evidenced above, it was Interviewee nine's view that integrating the data points and allowing AI based technology to analyse the data would present an opportunity for the business to benefit from targeted marketing opportunities towards its client base.

5.3.5.4 Conclusion

The views the interviews had around integration substantiated the theme of technical integration as a key factor in the AI adoption decision. The following summarises the findings identified through the data analysis process:

- Eight of the 11 interviewees found technical integration to be salient factor in the AI based adoption decision.
- Both internal and external integration points to information systems and databases warranted consideration
- The depth of incumbent integration points between legacy technologies had the propensity to impact the planned AI integration and thus the AI adoption decision.
- The validation of input data and the veracity of the data output by AI based technology was considered to be a key integration factor to considered in the AI adoption decision.
- Integration points between distributed or siloed databases so that AI based technology could leverage off a federated view of data was also considered to be a salient factor of integration to be considered for the AI adoption decision.

5.3.6 Theme 6: Inductively Identified Factors Unique to the Context of AI Adoption in South Africa

5.3.6.1 Overview

The literature reviewed in chapter two demonstrated that the organisational adoption of technology could be distilled to key factors that through numerous empirical studies had found salience in the AI adoption decision. Indeed, some of the factors posited and tested had been agnostic of the underlying technology being considered and thus broadly applicable to the organisational technology adoption decision.

The emerging nature of AI based technology and the localised South African context of the current study meant that the propensity to identify contextual adoption factors existed. Thus, codes found salient to the context described above were inductively identified through the analysis of transcripts from the interviews conducted. These codes have been listed and described below:

- Org:Chall:Workforce Impact – Analysis of the interviews showed that AI based technology had the propensity to impact the deployment of the workforce within an organisation. This was a direct impact of the automation of processes and decision making that effectively negated the need for manual or human intervention. Workforce impact was also considered a key factor in the South African context, given the country's burgeoning unemployment rate of 27.7% (Statistics South Africa, 2016) and that that the global competitiveness report attributes restrictive labour regulations as the second most problematic factor to doing business in South Africa (Schwab & Sala-i-Martin, 2016).
- Org:Chall:Governance – Evidence analysed in the interviews highlighted the need to evaluate the manner in which IT departments within organisations had implemented governance around the AI based adoption decision and for those that had AI based technology implemented, consideration had to be given to the impact on operational controls. Thus, evidence perused in the interviews around governance structures, policy recommendations, compliance and audit were coded as a governance factor of AI adoption.
 - o Org:Chall:AI Accountability – It was interesting to note that the emergence of AI based accountability as a sub-factor of governance. The issue for consideration that emerged here was the allocation of Accountability for decisions that an artificial intelligence would make.

- Org:Chall:Impact On Operating Model – The interviews also presented the impact on the IT and/or Business operating model as another emergent factor in the AI adoption decision. The attributes that made AI based technology unique in their impact on the operating model was the propensity of the technology to influence IT and/or business processes, the agility at which IT would need to operate and the effect on roles and responsibilities attributed to the workforce of an organisation.

Quotes attributed to the emergent themes identified above were inductively identified and coded through analysis of the evidence presented by the interview transcripts.

5.3.6.2 Findings

Descriptive discussion of the findings around each factors of the AI adoption decision inductively identified has been separated by each factor below.

The impact of AI on the workforce was identified as a salient factor to considered for the adoption decision by ten of the 11 interviewees. Table 5.11 below indicates that interviewees one, four and eight could be attributed with the four quotations each around the impact of the AI adoption decision on the workforce of an organisation

Table 5.12 Code Org:Chall:Workforce Impact Quotations Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Org: Chall: Workforce Impact	4	1	1	4	2	1	3	4	0	2	3	25

The number of quotations attributed to each interviewee above juxtaposed against the share of voice showed that whilst interviewees one, four and eight had the most quoted attributed to them, interviewee seven had the highest share of voice at 13% which was significantly higher than the five percent average over the 11 interviews.

Table 5.13 - Org:Chall:Workforce Impact Share of Voice Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Org: Chall: Workforce Impact	233	276	191	458	697	52	954	350	0	452	450	4113
Total Transcript Word Count	7573	9551	8850	14663	7911	4347	7141	6348	6156	6644	7554	86738
Percentages	3%	3%	2%	3%	9%	1%	13%	6%	0%	7%	6%	5%

Governance was found to be a salient enough a factor to considered for the AI adoption decision by nine of the 11 interviewees. It should be noted that AI accountability is being viewed as a sub-factor of governance and has been singled out for discussion because of the uniqueness of the factor. Four of the 11 interviewees considered accountability of AI to be an emergent factor in the AI adoption decision. Table 5.13 below demonstrates the number of quotations that can be attributed to each interviewee around the broader factor of governance and the sub-factor of AI accountability.

Table 5.14 Code Org:Chall:Governance & Org:Chall:AI Accountability Quotations Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Org: Chall: Governance	0	1	1	5	6	3	0	4	2	1	1	24
Org: Chall: AI Accountability	0	1	2	0	0	0	0	3	0	0	1	7

The share of voice for the broader factor of governance inclusive of the sub-factor of AI accountability has been summarised in table 5.14 below. Interviewee five had the highest share of voice with 20%, followed by Interviewee eight and six with 11% and 10% respectively. It should be noted that these percentages were significantly higher than the average of six percent over the 11 interviews, indicating the proportion of discussion each interviewee attributed to the topic.

Table 5.15 - Org:Chall:Governance & Org:Chall:AI Accountability Share of Voice Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Org: Chall: Governance	0	365	156	763	1618	424	0	486	419	135	56	4422
Org: Chall: AI Accountability	0	365	241	0	0	0	0	224	0	0	120	950
Total Transcript Word Count	7573	9551	8850	14663	7911	4347	7141	6348	6156	6644	7554	86738
Percentages	0%	8%	4%	5%	20%	10%	0%	11%	7%	2%	2%	6%

Table 5.15 below depicts the number of quotations attributed to each interviewee around the impact on the operating model as a factor to be considered for the AI based adoption decision. As is evidenced, seven of the 11 interviewees thought this factor to be salient towards the AI adoption decision, with interviewee four being attributed with eight quotes.

Table 5.16 Code Org:Chall:Impact on Operating Model Quotations Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Org: Chall: Impact on Operating Model	0	0	1	8	0	1	1	0	2	1	2	16

Table 5.16 below depicts the share of voice per interviewee as attributed to the factor of the impact of the adoption decision on the IT and/or business operating model. As depicted interviewee seven had the highest share of voice of seven percent. This was followed by interviewee seven with six percent, both had made significantly higher contributions over the 3% average across 11 interviewees.

Table 5.17 Org:Chall:Impact on Operating Model Share of Voice Per Interview

Interview	1	2	3	4	5	6	7	8	9	10	11	Totals
Org: Chall: Impact on Operating Model	0	0	191	956	0	66	432	0	332	140	295	2412
Total Transcript Word Count	7573	9551	8850	14663	7911	4347	7141	6348	6156	6644	7554	86738
Percentages	0%	0%	2%	7%	0%	2%	6%	0%	5%	2%	4%	3%

5.3.6.3 Insight & Interviewee Perspectives

Insight and interviewee perspectives for each unique factor have been discussed separately below.

5.3.6.3.1 Org:Chall:Workforce Impact

AI based technologies, for all of the interviewees, had the potential to have an impact on the workforce that could not be trivialised. Artificial Intelligence when implemented would automate tasks and decision making that had traditionally warranted human intervention. The adoption decision around AI would often be justified for the interviewees based upon the operational efficiencies the technology would potentially present. However, this decision would have an inevitable effect on the workforce of an organisation that interviewees could not ignore. Whilst the potential negative impact on the workforce was not explicitly called out in the following quotation, it was implicit in the subtext.

“If you think about it the operating model within AI is very different because a lot of people's jobs are automated. There's no, sometimes, if you look at the bots there's no human interaction where you'd have a call centre. So, what does that mean? It means you don't need a ten thousand seat call centre or a fifteen thousand seat call centre like we have in [sanitised]. We could reduce that to five, literally five architects with a bot, and this bot would have enough intelligence to make it seem personal, and you can even customise the bot to be whatever you want it to be.” (Interviewee Nine)

Thus, reduction in headcounts in the had left organisations with two choices, namely; the redeployment of the workforce to other areas of the organisation or alternatively, retrenchments, a view validated by the quotation below:

If I have four functional areas and I apply AI to the first functional area I have got two options there, one is either keep the headcount the same and have it increase in volume of work. The second is to keep the volume of work the same and redeploy resources across the other three functional spaces. (Interviewee Five)

Redeployment of the workforce impacted by the AI adoption decision was a recourse that Interviewees four, five, seven and 11 considered. This potential redeployment had for the each of the interviewees presented an opportunity to assess their existing workforce to ascertain their eligibility in terms of skills and aptitude for redeployment to other areas of their respective organisations. This view is evidenced by the quotation below:

“... on my side it is around redeployment of resources which therefore changes how you pay and reward people, how you determine skill and how you train people to be able to walk across functional spaces, not necessarily a reduction in head count...” (Interviewee Six)

A reduction in headcount was found to be an option considered for interviewee one, ten and 11. A reduction in headcount would however had the potential to introduce complexities in the handling the fallout of the retrenchment with unions, a view validated by Interviewee ten:

“In our industry it's easy to restructure the IM [Information Management] department and get it off temporary [sic], but when talking about introducing the same kind of tech in the pit [Mining Operation] where we've got 15,000 people and you can impair 5,000 of them then it's not an easy gig. Unions will shut that mine down completely because if AI.” (Interviewee Ten)

Managing Unions was found to be a factor that played out uniquely for the South African context of the AI adoption decision, a view shared by Interviewees two, four and ten. However, it was found that the complexities in managing Union expectations had varied across industries. Unions in the financial sector as Interviewee four found were more accepting of the potential impact of the implementation in AI within their sector. However, in the mining sector Interviewees found that they had to tread carefully. The quotations below illustrate the contrast in these views:

“Okay, so we’ve already gone to the unions up front, when, you know, before we even had our first robot in production. We went to the unions and said, guys this is what’s happening. This is what’s coming down the line. And surprisingly enough, I think we were most probably the last bank to come to them. ‘Cause it wasn’t a surprise to them. they actually took it very much in their stride. “

(Interviewee Four)

“So, because it is a unionized environment you have got specific agreements in place with the unions around you know employment, shift work, the number of shifts you have to run etc. etc., to keep the unions happy because it is always a balancing act.” (Interviewee One)

The quotation by Interviewee one along with the quotation by Interviewee ten above illustrated the complexities of managing Union expectations in the mining industry. Thus, the impact on the workforce is a salient factor to be considered for the AI adoption decision in a South African context.

5.3.6.3.2 [Org:Chall:Governance](#)

Governance was seen as a key factor of the AI adoption decision by 91% of the interviewees. Prevalent amongst these interviewees was the view that governance supporting the adoption decision was critical. Further, changes to the incumbent governance structure were required to manage and control the operations of AI based technology. The view of Interviewee six below sets the context for further discussion:

“I think governance sits alongside the economic rationale for the proposal [of AI adoption], so you need to tick both boxes. Within that governance box you’ve got the legal risk and compliance box. From a compliance point of view are you complying to the regulation? From a legal point of view are you in-line with the

client's rights. From a risk point of view are you exposing the company to any type of risk? You see that as one bucket, if you see it as three then you probably need to trek down through all three of them." (Interviewee Six)

The quotation above brought into focus the need to consider governance controls that would account for risk mitigation, regulatory and legal compliance. This need for compliance however, in the opinion of Interviewees four, five, eight, nine and ten, had to be juxtaposed against bureaucracy that these controls had the potential to introduce. This representative view is evidenced by the following quotation:

"The challenge within the bank is a lot of bureaucracy, red tape, linked to processes, which are very antiquated and not agile enough to drive this sort of adoption. So, you would have to check a hundred check boxes before you could do something. That's where within the organisation it would be a challenge. Because we had these very in depth, crazy type of risk assessment profiles we would go through and run all this across, and it used to exclude 90% of the applications or solutions we were trying to roll out because the risk assessment was so rigid. So, within the bank it was again related to policy that were either developed over years which haven't evolved, or not working in line with what is coming down the line in terms of technology like AI." (Interviewee Nine)

As evidenced in the quotation above, it was the view of Interviewee nine that this bureaucracy would be in direct conflict with the agility in governance and the IT operating model that AI based technology would require.

Interviewee three's view (quoted below), whilst at initial glance facetious, was upon deeper reflection insightful.

"...we can start quite simply just by getting a proper data stewardship policy in place and just better understanding [sic] that data we have, as opposed to now putting sensors in the shoes of our customers so we understand like, how many times they go to the toilet at... it's more about, you know, the elegance and simplicity and there's a lot of value in simplicity." (Interviewee Three)

In the opinion of this interviewee simplification of governance structures that supported the value proposition of AI based technology was a good place to start. It was also this interviewee's considered view that organisations tended to over complicate their controls in the name of compliance and risk mitigation.

Thus, policies, forums and controls that facilitated management control at the same time as maintaining the agility in the operating model that AI based technology mandated was

that balance that the interviewees sought. This balance between control and agility had, for the interviewees, the potential to support the AI adoption decision.

5.3.6.3.2.1 Org:Chall: AI Accountability

AI Accountability was considered a key factor to be considered for the AI adoption decision by 37% of the interviewees. AI accountability has been singled out, even though the factor had found favour with only the minority. The justification for this is summed up by the following quote by Interviewee 11:

"I think there is still an ethical factor about the data, what you are doing with it and what you are using it for and what you are trying to do with it. So there is still this ethical factor of the data and also what decisions you want it to take and who will be held accountable for this. So if we are running an AI system and it needs to take a decision on production and that results in some impact, who is held accountable, do I hold the AI accountable, do I hold the [organisation], so if I am implementing a system where does the accountability lie for the decision that was taken or how it was used." (Interviewee 11)

As the adoption of AI at the time of this study found itself in relative infancy across most organisations, it was the considered view of Interviewees two, eight and 11 that the factor of Accountability would gain in salience as the technologies themselves matured.

5.3.6.3.3 Org:Chall:Impact on Operating Model

It was evident from the analysis conducted around this factor that 72% of the interviewees perceived the potential impact on the operating model a key factor in the AI adoption decision. AI based technology, brought with it the potential to automate tasks and decisions that would hitherto have been the mandate of human intervention. Whilst, the impact on the workforce of the AI adoption decision has been discussed above, further nuanced inquiry also demonstrated the potential impact on the IT and/or business operating model. As interviewee six confirmed, the propensity of AI based technology to impact the IT and/or business operating model was inadvertent and a given, and that start-ups found the adoption decision easier because they would start with a clean slate as far as their operating models were concerned. Not being encumbered with a legacy

for these start-ups had facilitated a favourable adoption decision in the view of interviewee six. This view is evidenced by the quotation below:

“The second part was legacy; I think if you look at globally where AI has worked the most has been within Fin-tech start-up because you’ve got no legacy you can start from scratch and you can design it as you want rather than having to plug it into an existing system. I think those two are the biggest hindrances to adoption of AI within our organisation. “(Interviewee Six)

This interviewee went on to attribute the potential impact on the operating model as the second hinderance to the adoption decision after the lack of top management support which was discussed earlier in this chapter. The fundamental view was that the way organisations would needed to operate had the potential to change, this was evidenced by the following quotation:

“... and I think the key thing is, the robot is a virtual employee. Only difference is that it works twenty-four hours a day. So other people aspect we gotta consider is the people that monitor the bots now have to work twenty-four hours a day. So currently now we’re a standard business, eight to five kind of operating hours. So now the, what the, we call them process controllers or RPA process controllers, they’ll have to work three eight hour shifts.” (Interviewee Four)

Implicit in the opinion of Interviewee four above was the potential impact AI based technology would have on their organisational working hours, processes and the responsibilities of those individuals tasked with managing and monitoring AI based technology. Further validation of this view was found with the quotation below:

“So, you’ve almost got to go through your whole role change and you know, get new roles changed for a RPA developer, or a RPA ops manager and everything else like that. ‘Cause they aren’t traditional operations managers.” (Interviewee Four)

The impact on the operating model was also extended to the processes that were deployed within organisations. Interviewees four, seven and ten were of view that processes would need to be assessed for efficiency and standardised to enable automation. This view is substantiated by the quotation below:

“A big caveat to that there is most of your processes have to be digital. That there I got from listening to other CIO that tried implementing AI in their organisations

as soon as that process flips to manual your entire value-add from delivering AI to the process stops.” (Interviewee Ten)

Further, as processes and decision making had been considered for automation through AI, another driver of change to the IT and/or business operating model, had been the increase in agility or speed with which IT would need to operate at in areas impacted by AI. By extension, areas of the operating model not impacted by the AI adoption decision had continued to function at a more traditional pace of work. This duality in operating modes, agile vs traditional, had the propensity to impact the AI adoption decision in the context of its impact on the operating model. This was evidenced by the quotation below:

“So, from us actually investigating it you know, it’s kind of like, the, one of the biggest challenges or concerns that I’ve actually experienced in putting in robotics. Is that it moves a hellaver lot quicker than a traditional business actually will.” (Interviewee Four)

Thus, based on the discussion above, the view on operating model impact as a factor of AI adoption, was informed for the interviewees, by the potential impact of the AI adoption decision on processes, roles and responsibilities and the agility with which IT had to operate at in comparison to areas not impacted by AI.

5.3.6.4 Conclusion

Three broad themes were inductively identified as unique and relevant to the adoption of AI based technologies in a South African context. These were, namely workforce impact, governance and the impact on the operating model. Accountability for decisions that AI based technologies would make was defined as a sub-theme of governance. The findings for each theme have been summarised below:

Workforce Impact:

- 90% of the interviewees found the team to be a significant factor to be considered in the AI adoption decisions.
- The adoption of AI based technology had the potential to directly and adversely impact the workforce within an organisation.

- The positions that adopted by the interviewees' organisations was to redeploy or retrench. The option to retrenchment brought with it the nuance of managing expectations of Unions
- Redeployment introduced the nuance of having to reskill the workforce for changes to expected roles and responsibilities

Governance

- 81% of the interviewees found the factor of governance to be significant in the context of their AI adoption decision. AI accountability has been coded as a sub-factor of governance.
- The adoption of AI brought into focus the following findings considering that interviewees considered significant to their AI adoption decision.
 - Due consideration needed to be given to procedural and governance controls whilst considering the AI for adoption.
 - Controls put into place to govern adoption decisions often introduced the unintended circumstance of bureaucracy, adversely impacting the AI based adoption decision.
 - Accountability for decisions that AI would make was also considered to be a nuance specific to the AI adoption decision.

Impact on the Operating Model

- 63% of the interviewees considered the impact on the Operating Model to be significant to the AI based adoption decision
- The findings pertinent to the impact on the operating model of the AI based adoption decision have been summarised as follows:
 - The potential impact on the organisational working hours, processes and the responsibilities of those individuals tasked with managing and monitoring AI based technology had been identified as a factor to be considered for the AI based adoption decision.
 - AI was positioned as a virtual employee and the implications of managing and governing the implications of virtual employees was also positioned as factors salient to the adoption decision.
 - AI had the potential to impact the rate which processes are executed, and decisions are made by leveraging of automation. Thus, the agility at which AI enabled IT would operate at would be at contrast to that of the non-automated areas of IT, a consideration key to the adoption decision.

5.4 Results for Research Proposition 2

5.4.1 Overview

Research proposition two sought to understand the benefits an organisation would expect to accrue from the adoption of AI based technology. Evidenced across the eleven interviews was perused via the transcripts and quotations attributable to benefits expected were deductively coded. However, it became evident that specific themes around the expected benefits had started to emerge. The codes around the specific themes identified inductively have been listed in table 5.17 below.

The following themes found salience with the majority of the interviewees:

Org:EB:Value Proposition - This theme was deductively Identified and broadly relates to the benefits expected from the AI adoption decision.

Org:EB:Business Growth – Inductively identified theme that spoke to the ability of AI based technology to enable business growth in terms of market share and revenue streams

Org:EB:Economic & Financial – Inductively identified theme that enabled economic and financial benefits in the context of cost optimisation and increase in revenue.

Org:EB:Operational Efficiency – Inductively Identified theme that spoke to the enablement of operational efficiency through the automation of task and decision making that AI based technology could offer.

Org:EB: Proactivity – Inductively Identified theme that spoke to the propensity of AI based technology to support proactivity through the identification of trends and deep insight to enable proactive and strategic decision making.

5.4.2 Findings

As table 5.17 below indicates 11 codes around the broad theme of expected benefits were identified. Codes one to five form the focus of further discussion as it was found that over 50% of the interviewees found these to be salient. Codes six to 11 did not find major consensus with the interviewees and thus have been excluded from further analysis and thus, discussion.

As indicated by the table below, all the interviewees believed AI must present a value proposition. 64% of the interviewees believed that Business Growth, Economic & Financial Benefit, Operational Efficiency were key benefits for them. Further, 55% of the interviewees believed that the ability of AI based technology to enable proactivity was a key benefit.

Table 5.18 – Org: Expected Benefits Theme and Composite Codes: Salience Factor per Interviewee

NO.	Interview	1	2	3	4	5	6	7	8	9	10	11	Totals	Relative %
1	Org: EB: Value Proposition	1	1	1	1	1	1	1	1	1	1	1	11	100%
2	Org: EB: Business Growth	1	0	1	1	1	1	1	0	1	0	0	7	64%
3	Org: EB: Economic & Financial	1	1	0	1	1	1	0	1	0	0	1	7	64%
4	Org: EB: Operational Efficiency	1	0	1	1	1	0	1	1	0	0	1	7	64%
5	Org: EB: Proactivity	1	0	1	1	1	1	0	0	0	0	1	6	55%
6	Org: EB: Competitive Advantage	1	0	0	0	1	1	1	0	0	1	0	5	45%
7	Org: EB: Scalable Solutions	1	0	0	1	1	0	0	0	0	0	0	3	27%
8	Org: EB: Risk Mitigation	0	0	0	0	1	1	0	0	0	0	0	2	18%
9	Org: EB: Enable Innovation	0	0	1	0	0	0	0	0	0	0	0	1	9%
10	Org: EB: Reduction in human risk	1	0	0	0	0	0	0	0	0	0	0	1	9%
11	Org: EB: Quick Win	0	0	0	0	0	0	0	0	0	1	0	1	9%

5.4.3 Interviewee Perspectives

It was broadly found that for 100% of the interviewees AI had to present a value proposition with the promise of accrued benefits. Whilst, expected benefits was a theme deductively identified through the literature review, further nuanced inquiry facilitated the identification of specific inductive themes around what kind of benefits would enable the AI based adoption decision. The broad consensus was that whilst AI is an emerging technology and that large number of its applications remain conceptual, the ability to identify a salient value proposition would enable the AI based adoption decision. This representative view is evidenced by the quotation below:

“... what is important to define as, you know, what is the value proposition that you're trying to bring to the market and assessing how AI can impact that value proposition and almost, you know, the thing is that AI is so, it's application is so vast, um, that you'd have to be focused in [sic]... why, where and how you apply it. And I think that's where the organizational context comes in and the strategic context about what you're trying to achieve...” (Interviewee Three)

If the generic presentation of a value proposition was salient to a 100% of the interviewees. The expectation of business growth found consensus with 64% of the interviewees. It was the considered view of the interviewees that the potential adoption of AI would introduce efficiencies that would enable focus on business growth. Further, 64% of the interviewees agreed that Economic and Financial benefit had for them been an enabler of the adoption decision. A representative view in support of Business Growth, Economic and Financial benefits as enablers of the adoption decision is evidenced by the quotation by Interviewees five and six below:

“You don't want AI to be seen as the solution only in terms of reduction of costs and that element of efficiency, you also want it to be seen as an element where you can grow and add to your income stream so that you are getting the best of both worlds and at the moment there is a lot of focus on cost saving efficiency type process and there isn't enough discussion around how you drive income out of the process, so it is just that differentiation, so I am actually trying to do that at the moment” (Interviewee Five)

“For me there is two reasons why you adopt AI either to save costs or to generate revenue which sounds quite simplistic. If you can prove either of those then I think the financial decision is always the easier one to take if you can see the benefit.” (Interviewee Six)

Operational Efficiency was also a salient theme for 64% of the interviewees. It was the view of the interviewees that the potential introduction of AI based technologies would

enable organisations to optimise productivity gains and enable the employees of the organisation to focus on proactivity and thus support strategic initiatives of the organisation. 55% of the interviewees found proactivity a key benefit to be expected as a consequence of adopting AI based technology. This representative view built around operational efficiency and proactivity is evidenced by the quotations made by Interviewees One and 11 below:

“I think in our world we define AI as the technology that will assist us to make employees’ life easier; because you will be able to fast track their work and they don’t have to spend time doing the day-to-day actual. So, if AI can take away those tedious tasks and employees are spending time doing things that they are passionate about, and they don’t have to make those decisions, it is done through the AI – then there is a benefit. So, I think that is how we see AI in terms of our mining context.” (Interviewee 11)

“So that is where artificial intelligence can really help, in the sensing of things that can go wrong when all of that is automated you becoming much more proactive, you can learn from it, it can give you alerts it can give you reports, that is not the main reason, but it is one of the reasons” (Interviewee One)

5.4.4 Conclusion

The factor of Expected benefits was identified as a salient theme to be tested as an enabler of the AI based adoption decision. The discussion above around the insight gained from the interviews conducted had demonstrated that, whilst the broader value proposition was considered a key factor that would enable the AI based adoption decision, specific benefits like business growth, economic & financial benefits, operational efficiency and proactivity are nuanced factors further enabled the adoption decision for the interviewees.

5.5 Results for Research Proposition 3

5.5.1 Overview

Research proposition three effectively stated that environmental factors have the propensity to affect the AI based adoption decision. The decision to adopt is influenced by:

- I. Mimetic factors: Pressure exerted by competitors and the need to gain or maintain the competitive advantage will influence the decision to adopt
- II. Coercive factors: Pressure exerted by strategic suppliers, regulatory bodies and/or parent organisations will influence the decision to adopt
- III. Normative factors: Pressure exerted by external organisations and/or industry norms that the focal organisation might have dyadic relationships with will influence the decision to adopt.

Thus the factors quotations attributed to the factors listed above were coded for in the interview transcripts as Env:Mimetic, Env:Coercive, Env:Normative. The interviews also identified Env:Support Capability inductively. This code was defined as the extent to which the focal organisation could rely upon external vendors for support with regards to AI based technologies.

5.5.2 Findings

As table below 5.18 indicates whilst six codes attributing environmental factors were either deductively or inductively attributed to the quotations evidenced in the 11 interviews conducted, only three were found to be salient with the interviewees. Env:Normative, Env:Support Capability and Env:Mimetic received were identified as salient by 73%, 64% and 55% of the interviewees respectively. Thus, the codes numbered one to three will form the bases of further discussion and the codes four to six will be excluded.

Table 5.19 - Environmental Theme and Composite Codes of AI Adoption: Salience Factor

No.	Interview	1	2	3	4	5	6	7	8	9	10	11	Totals	Relative %
1	Env: Normative	1	0	1	1	1	1	1	1	0	1	0	8	73%
2	Env: Support Capability	1	1	1	1	1	0	1	0	0	0	1	7	64%
3	Env: Mimetic	1	0	0	1	1	1	1	0	0	1	0	6	55%
4	Env: Legislative & Regulatory Constraints	1	0	0	0	1	1	0	0	1	0	0	4	36%
5	Env: Coercive	1	1	0	0	1	1	0	0	0	0	0	4	36%
6	Env: Macro-Economic Factors	1	1	0	0	0	0	0	1	0	0	0	3	27%

5.5.3 Interviewee Perspectives

Pressure from the Normative environment was identified as the factor that was found to be the most salient amongst the interviewees, with 73% citing the factor as significant to their AI based adoption decision. The Normative environment consists of external organisations that the interviewee's organisation would share a dyadic relationship with inclusive of rules and norms that both might subscribe to. The broadly representative view of those that found salience with the Normative factor was that within a South African context organisations are often followers of trends that off-shore contemporaries would have adopted. This representative view is summarised by Interviewee four's quotation below:

"I think definitely looking from off-shore from our side but they're less our competition than they are an indication of what's been done in the market. I think globally, or I think the developed world is ahead of SA as you say and the maturity phase and we're mostly going to be followers unless you've got a unique emerging market problem that we can solve ourselves. If it comes to the basics we're going to be cloning mostly than innovating...you need to be the faster follower with the best implementation." (Interviewee Four)

The access to external support found the next highest degree of salience amongst the interviewee sample with 64% citing this factor as key to their AI based adoption decision. Broadly, two views were posited by interviewees. The first, the access to external skills

when building the capability to build, support and run AI based technology would not be feasible. This view is supported by the quotation below:

“So with technical aspect, that is always do we have the in house skills to be able to roll out what we want to roll out, obviously scope, rollout and then support a system, so typically we would need to enhance or augment our skills and as an organisation we would say we are not experts, do we want to build that competency in house, we would probably say not and then work with a partner who we would have a long term agreement with, from an implementation agreement right through to the service level agreement to support and to provide the expertise around it.” (Interviewee One)

The second factor posited was with regards to the emerging nature of AI based technology compounded by the low adoption rate of AI based technology in South Africa had meant that very few vendors had feasible value propositions with referenceable credentials and case studies of implementation in the local context. This was a cause for concern for the adoption decision as the lack of support was seen as an inhibitor. This representative view is evidenced by the quotation below:

“Because everybody [vendors] says they can do AI but then the question is can you really do it or are you just trying to figure out what you need to do. Everyone says no we have done this, we can do this but you can’t really verify in a lot of circumstances, is what they’ve done true, does it really add value, will it function the way they say it will. So, it is these promises that are made from the supplier’s point of view, the sellers point of view but then you cannot verify because it is not always published, there are very few case studies, they have done something for one company as a proof of concept and then they say now we can do this. So, I think that lack of maturity or understanding from the suppliers side because everyone says we can do this we can do it but...” (Interviewee 11)

The third and final factor that found salience with the interviewees was the effect of the pressure exerted by external organisations considered to be competitors of the interviewee’s organisation, coded as Env:Mimetic. 55% found salience with this factor as key to the adoption decision. The broadly representative view of the interviewees was that pressure from competitors had influenced their adoption decision. As ignoring signals from their competitors would have had them potentially comprise competitive advantage. This representative view is evidenced by the quotation below:

“Yes, and the pressure would come from if I can sketch back to my original [example]. Within the investment world you’ve got a consumer or investor, you’ve

got an intermediary, you've got a platform and then you've got a product provider. As a product provider you want to access the investor in the most seamless manner that you can. If somebody else within the financial institution can bridge that gap through AI technology, ease of access the pressure would be on us to do it as well. You can do it in the conventional manner, but I doubt if you'll be able to do it in the same efficient way as they do it." (Interviewee Six)

5.5.4 Conclusion

Three Environmental factors were found to be salient across the 11 interviews conducted, namely; Env:Normative; Env:Support Capability and Env:Mimetic

6 Chapter Six: Discussion of Results

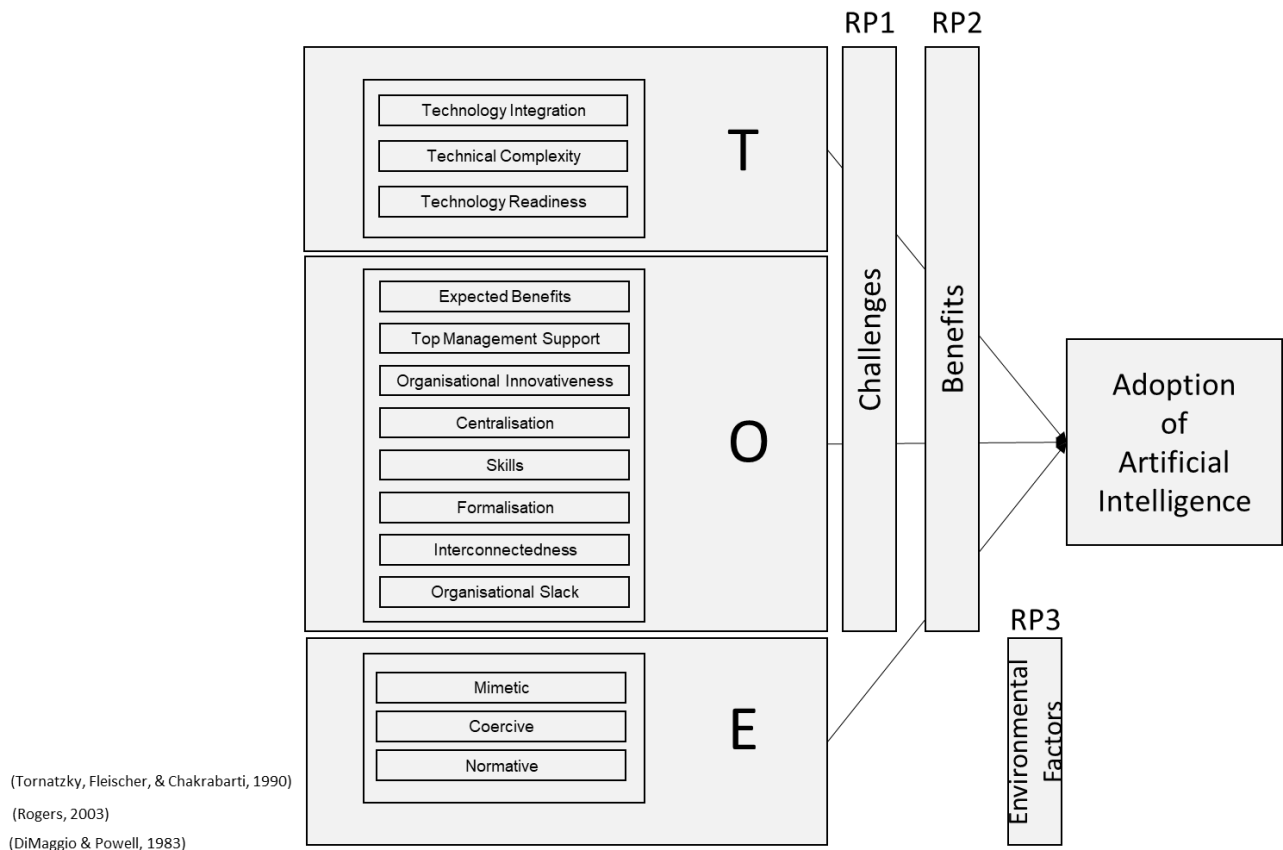
6.1 Introduction

The preceding discussion in Chapter 5 presented the results from the analysis conducted to prove or refute the propositions posited in Chapter 3. Thus, it bodes well for the direction of inquiry, in the current chapter, to turn towards validating the results discussed in Chapter 5 in relation to the literature reviewed in Chapter 2. Broadly, it is the intention of the chapter to demonstrate support for the research objectives posited in Chapter 1.

6.2 Discussion of results in relation to conceptual framework

The conceptual model presented in Chapter 2 is presented in this section (Figure 7) as reference and for the ease of comparison with Figure 8 which illustrates the results as applied to the conceptual framework.

Figure 7 - Conceptual Framework presented in Chapter 2



The conceptual framework presented above combined the theories of DOI (Rogers, 2003), Institutional Theory (DiMaggio & Powell, 1983) and TOE (Tornatzky et al., 1990) towards the end of studying the factors that can impact the organisation level AI adoption decision. The frameworks indicated above can on their own attempt to explain the organisation level adoption decision. However, as argued in Chapter 2 and summarised below, the merging of the frameworks can present synergistic effects for the endeavour presented in the current research to understand the factors salient in the AI adoption decision. Whilst the TOE (Tornatzky et al., 1990) was used as the overarching framework, the justification for merging DOI (Rogers, 2003) and Institutional Theory (DiMaggio & Powell, 1983) into the overarching construct has been summarised below:

- I. Precedent for merging DOI (Rogers, 2003) into TOE (Tornatzky et al., 1990) was justified due to the limitation of the former in terms of the number of constructs posited and by extension to enrich the constructs that can explain the innovation adoption decision (Beatty et al., 2001). Further empirical precedent was found for the combination of the two frame works through the study of P. Hsu et al. (2006).
- II. Precedent for merging Institutional Theory (DiMaggio & Powell, 1983) with TOE (Tornatzky et al., 1990) was found through the perusal of extant studies by

(Chatterjee et al., 2002; Gibbs & Kraemer, 2004; Teo et al., 2003), the justification was to augment the Environment factor in the TOE (Tornatzky et al., 1990) with those posited by Institutional Theory ((DiMaggio & Powell, 1983).

III. Individual constructs were merged as depicted in Table 2.1 (Section 2.3)

Chapter 5 discussed the findings in the context of the analysis conducted of the 11 interview transcripts and these have been summarised for brevity below. The summary that follows will make reference to Figure 8 below that seeks illustrate the impact of the results on the conceptual framework proposed.

Research Proposition 1

- Relevant constructs found to be salient through the analysis conducted in chapter 5 have been highlighted in green and have a black star linked to them. Those that did not find salience were struck out and shaded in grey.
- Technology Integration and Technical Complexity were both found to be salient based on the findings discussed in (Section 5.4.6) and (Section 5.4.4) respectively.
- Technology Readiness was also found to be salient through the analysis conducted in (Section 5.4.5) and further, two sub-themes were posited in support of this factor, namely; the effect of unstructured data and the impact of the availability on skills on the adoption decision.
- Organisational Innovativeness and Top Management Support were both also found to be salient factors in the AI based adoption decision, the findings for which have been summarised in (Section 5.4.2) and (Section 5.4.3) respectively.
- Formalisation was also found to be salient, but the discussion supporting this was attributed to the Governance theme discussed in (Section 5.4.7.3.2). The justification for this will be discussed in section 6.3 below.
- Themes were also inductively identified through the analysis process and these were indicated with blue circles in Figure 8. Work-force impact is discussed in (Section 5.4.7.3.1), Impact on the Operating Model is discussed in (Section 5.4.7.3.3), AI Accountability is discussed as a sub-theme of Governance in (Section 5.4.7.3.2.1).

Research Proposition 2

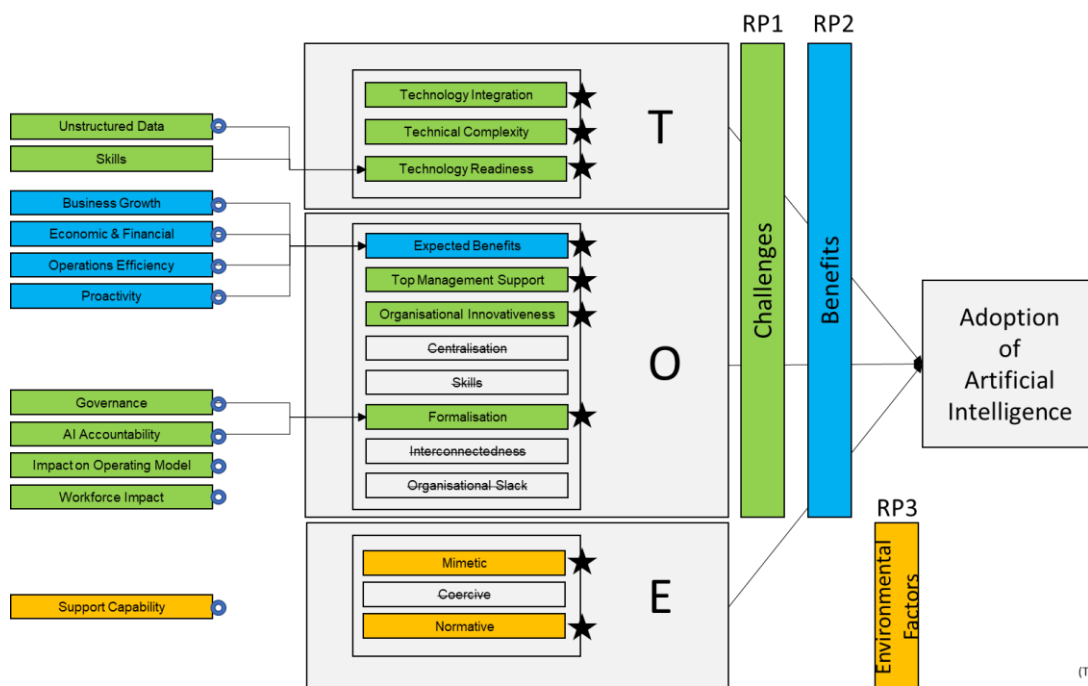
- Relevant constructs found to be salient through the analysis conducted in chapter 5 have been highlighted in blue and have a black star linked to them.

- Whilst the overall theme was deductively identified and coded for, sub-themes were inductively identified through analysis of interview transcripts. The discussion supporting this finding can be referenced in (Section 5.5).
- Themes inductively identified through the analysis process were indicated with blue circles in Figure 8.

Research Proposition 3

- Relevant constructs found to be salient through the analysis conducted in chapter 5 have been highlighted in yellow and have a black star linked to them. Themes not found to be salient through the analysis process have been struck and greyed out.
- Whilst the overall theme was deductively identified and coded for, a single sub-theme (Support Capability) was inductively identified through analysis of interview transcripts. The discussion supporting this finding can be referenced in (Section 5.6).
- Themes inductively identified through the analysis process were indicated with blue circles in Figure 8.

Figure 8- Results as applied to the Conceptual Framework



(Tornatzky, Fleischer, & Chakrabarti, 1990)
 (Rogers, 2003)
 (DiMaggio & Powell, 1983)

Source: Authors Own

6.3 Discussion of research proposition 1

Research Proposition 1 was defined as follows:

Technological and Organisational challenges act as inhibitors to the AI based adoption decision based on the contextual factors proposed below:

Technology: Technology Integration, Complexity and Readiness

Organisation: Top Management Support, Organisational Innovativeness', Centralisation, Skills, Formalisation, Interconnectedness, Organisational Slack.

Each of the contextual factors proposed will have the proposed will have the propensity to introduce challenges and influence the AI based adoption decision.

6.3.1 Theme 1: Organisational Innovativeness

Section 5.4.2 analysed Organisational Innovativeness as a salient theme that supported the AI based adoption decision. 100% of the interviewees attributed significance to the factor in the AI adoption process. Whilst all 11 interviewees purported for their organisations a stance of innovation, it was apparent through the interview process that simply adopting a stance of innovation would be insufficient to support an AI based adoption decision. Thus, the key findings supporting improved adoption around the Organisational Innovativeness theme in the South African context included:

- I. The scope and mandate of the IT department to innovate, limited to just the corporate/business functions of an organisation and not extended to production/operations, impeded the ability of the IT organisation to adapt and thus adopt applications of AI technology in a wider field of applicability.
- II. Organisations under microeconomic cost pressure found that innovating low cost applications of AI based technology for the South African context acted as an enabler for improved organisational adoption.
- III. Organisations that adopted an approach to innovation that entailed iterative learning, experimentation and failing fast found the adoption decision easier as AI based solutions would be tailored to suit contextual value propositions.

According to (Viswanath Venkatesh & Bala, 2012), who's study forms part of literature reviewed in Chapter 2, organisations with a culture predisposed to innovation will be

more inclined to make a favourable adoption decision. The authors through their study found Organisational Innovativeness to be a significant factor explaining the adoption of the technology within the context of their study. Another study by (Hurley & Hult, 1998), reviewed in Chapter 2, also substantiates and extends this view by positing that mature organisational cultures with an innovative stance enable the organisation to position itself towards continuous learning to adapt to customer changing customer and market demands. The views presented above find synergy with two findings from Chapter 5, first, the broader view that an innovative organisational stance will enable the AI based adoption decision and second, that organisations that adopt an approach to innovation that entails iterative learning, thus by extension supporting experimentation and failing fast will support a more positive inclination to adopt AI based technologies.

In support of finding (II) articulated above however, inquiry needed to be directed towards the study of (Govindarajan & Trimble, 2012), who posited that innovating low cost alternatives (Reverse Innovation) was an imperative of developing markets and that these innovations find stronger salience in these markets because of their development in a localised context.

The theoretical validation of finding (I) articulated above also directed inquiry towards the concept of Technology Scope Maturity as defined by (Luftman, 2003). The author defines Technology Scope Maturity as the ability of an IT department within an organisation to:

- i. Extend the scope of its influence to beyond the back and front offices of an organisation
- ii. Assess and adopt emerging technologies effectively
- iii. Support business processes and by extension, business strategies as a standard
- iv. Deliver solutions tailored to customer's requirements

This indication of technology scope maturity finds substantiation in the study conducted by (L. Chen, 2010), who posits that Business-IT alignment can support improved strategic planning. Thus, looking through the lenses proffered by both authors, finding (I) above finds salience.

6.3.2 Theme 2: Top Management Support

Section 5.4.2 analysed the theme of Top Management Support as a key factor the AI adoption decision. 90% of the interviewees attributed the significance to the factor in the context of their AI based adoption decision, supporting the factor as a key component of

research proposition one. Broadly, the findings articulated two approaches around garnering Top Management Support, a bottom-up and top-down approach:

- i. With a bottom-up approach garnering senior stakeholder support was facilitated via the formation of steering committees and boards along with ongoing socialisation of the expected benefits of the technology or innovation.
- ii. A Top-down perspective showed that senior stakeholder buy-in on its own would on its account perhaps facilitate organisational adoption, but diffusion and adoption at an individual level within an organisation had to be facilitated through the buy-in from middle management

The literature reviewed in chapter two found synergy in the view of the broad finding that Top Management Support is key to the AI adoption decision (Cao et al., 2014; Oliveira et al., 2014; Thong et al., 1996). Despite the two approaches to garnering support, the common denominator was Top Management Support. With the bottom-up approach it was evident that garnering support would facilitate the adoption decision. Whereas, with the top-down approach, top management support was a demonstrated pre-condition and gaining middle management support would enable and propagate individual assimilation and diffusion of AI based technology, post the organisational adoption decision. Thus, with the support of the academic literature reviewed in chapter 2, Top Management Support finds salience towards research proposition one and the AI based adoption decision.

6.3.3 Theme 3: Complexity

Complexity was posited as a key factor that required due consideration when electing to adopt AI based technology by 90% of the interviewees interacted with during the data gathering process. AI specific nuances to complexity were identified through the process of analysis and these have been summarised below:

- i. Understanding the implications of AI based technology on IT governance and management processes had the propensity to introduce complexity.
- ii. Training and development of machine learning based technology had introduced complexity and thus impacted the AI adoption decision
- iii. Understanding and preparation of the data required as inputs and the handling of data output by AI based technology also introduced complexity into the adoption decision

The three findings articulated above can trace their root cause to the difficulty in understanding AI based technologies, findings (i), (ii) and (iii) articulated above are supported directly with the literature reviewed in Chapter 2. Complexity is defined as the time taken to understand a technology or innovation (Low et al., 2011). Oliveira et al., (2014) extend this view by defining technical complexity in the context of the ease with which a technology can be incorporated into business operations. Thus, the findings articulated above find salience in the literature reviewed in Chapter 2.

6.3.4 Theme 4: Technical Readiness

The findings highlighted in section 5.4.5 found technical readiness to be a key factor in the AI based adoption decision. The key findings around Technical Readiness in the context of AI based technologies have been summarised from section 5.4.5.4 below:

- i. The maturity of existing processes and business rules to facilitate automation for AI based technology.
 - ii. Readiness of incumbent technical architectures to support the building, deployment and support of AI based technology.
 - iii. Access to skills that would support AI based technology through the build, deployment and ongoing support was also key factor in the adoption decision.
- The nuances around readiness in terms of skills have been summarised below:

- a. Organisations having to decide between investments to build skills internally or to procure them externally through experienced hires and/or consultancy for AI based skills
 - b. The types of skill requisite to support AI based technology through the build, deployment and support phases had not been purely technical. The analysis found that access to both technical and business analyst skills were cited as key to the adoption decision.
- iv. Readiness of the data architecture that would define the input data consumed by AI based technology and the handling of the data output by AI were also considered salient factors to be considered in the adoption decision.

Based on the literature reviewed in chapter 2, Zhu, Kraemer, et al., (2006) define the factor as the readiness of an organisation, with respect to its infrastructure, key systems and access to skills, to adopt AI based technology. This is definition also finds salience with (Viswanath Venkatesh & Bala, 2012), who define readiness as the degree to which an organisation has access to technical infrastructure and human resources to build and

support technology. Findings (ii), (iii) and (iv) find salience through the literature reviewed in chapter 2 and their alignment with the, access to infrastructure, technical skills and systems based view presented by (Viswanath Venkatesh & Bala, 2012; Zhu, Kraemer, et al., 2006).

In support of finding (i) Willner, Gosling, & Schönsleben, (2016) posit that full automation requires that processes be fully and formally defined and coordinated at an organisational level to support automation. This requirement, according to the authors represents a level of maturity that would be a precursor for the automation of processes. Thus, supporting the view of finding (i) that organisations must seek process maturity in the context of their readiness to adopt AI based technology.

6.3.5 Theme 5: Technical Integration

Section 5.4.6 sought to analyse the theme of Technical Integration towards its salience in the AI adoption decision. 73% of the interviewees found the factor to be significant in the context of their AI adoption decision and their views analysed in chapter 5 have been summarised below:

- i. Both internal and external integration points to information systems and databases warranted consideration
- ii. The depth of incumbent integration points between legacy technologies had the propensity to impact the planned AI integration and thus the AI adoption decision.
- iii. The validation of input data and the veracity of the data output by AI based technology was considered to be a key integration factor to considered in the AI adoption decision.
- iv. Integration points between distributed or siloed databases so that AI based technology could leverage off a federated view of data was also considered to be a salient factor of integration to be considered for the AI adoption decision.

The literature reviewed in chapter 2 defined technical integration as the extent to which information systems and databases, both internal and/or external to an organisation are interconnected (Zhu, Kraemer, et al., 2006). According to the authors, organisations with stronger integrated links as defined benefit from better facilitated adoption decisions. This view supports all four of the findings articulated above, and thus positions Technical Integration as a key factor in the AI adoption decision.

6.3.6 Theme 6: Inductively Identified Factors Unique to the Context of AI Adoption in South Africa

Section 5.4.7 discussed the themes inductively identified as contextual and significant to the AI based adoption decision in a South African context. As the themes were inductively identified, theory to support the findings will be discussed below. Three specific themes were identified and the findings around each have been summarised as follows:

Workforce Impact:

- 90% of the interviewees found the team to be a significant factor to be considered in the AI adoption decisions.
- The adoption of AI based technology had the potential to directly and adversely impact the workforce within an organisation.
 - i. The positions that adopted by the interviewees' organisations was to redeploy or retrench. The option to retrenchment brought with it the nuance of managing expectations of Unions
 - ii. Redeployment introduced the nuance of having to reskill the workforce for changes to expected roles and responsibilities

In broad support of the findings on Workforce impact (Wisskirchen et al., 2010) conceded that adoption of AI had the propensity to impact jobs adversely, specifically those jobs perceived to be routine, repetitive and manual. The authors posit that the adoption of AI, would in addition to impacting jobs also impact the organisation of work, working time and remuneration of employees (Wisskirchen et al., 2010). This view also finds salience with the recalibration of the IT operating model as proposed by (Bayley & Shacklady, 2015) below.

To the knowledge of the researcher

Governance

- 81% of the interviewees found the factor of governance to be significant in the context of their AI adoption decision. AI accountability has been coded as a sub-factor of governance.
- The adoption of AI brought into focus the following findings considering that interviewees considered significant to their AI adoption decision.

- i. Due consideration needed to be given to procedural and governance controls whilst considering AI for adoption.
- ii. Controls put into place to govern adoption decisions often introduced the unintended circumstance of bureaucracy, adversely impacting the AI based adoption decision.
- iii. Accountability for decisions that AI would make was also considered to be a nuance specific to the AI adoption decision.

In support of the broad finding of the need for governance and accountability for decisions made by an AI Bostrom & Yudkowsky, (2014 p. 318) posit that “Responsibility, transparency, auditability, incorruptibility, predictability...” as criteria that must be considered to govern in AI that has the potential to replace human judgement and decision making.

Impact on the Operating Model

- 63% of the interviewees considered the impact on the Operating Model to be significant to the AI based adoption decision
- The findings pertinent to the impact on the operating model of the AI based adoption decision have been summarised as follows:
 - i. The potential impact on the organisational working hours, processes and the responsibilities of those individuals tasked with managing and monitoring AI based technology had been identified as a factor to be considered for the AI based adoption decision.
 - ii. AI was positioned as a virtual employee and the implications of managing and governing the implications of virtual employees was also positioned as factors salient to the adoption decision.
 - iii. AI had the potential to impact the rate which processes are executed, and decisions are made by leveraging of automation. Thus, the agility at which AI enabled IT would operate at would be at contrast to that of the non-automated areas of IT, a consideration key to the adoption decision.

In broad support of findings (i), (ii) and (iii) listed above resonance was found in the concept of Bimodal-IT as proposed by (Gartner, 2017). The analyst firm define Bimodal-IT as the ability of the IT organisation to function in two modes, one that supports the traditional way of work that is predictable, well understood and perceived as traditional IT. The second mode is defined by the firm as optimised and exploratory and concerned with managing the uncertainty implicit in digital transformation initiatives (Gartner, 2017). Horlach, Drews, & Schirmer, (2016) build on this definition of the second mode by

attributing characteristics of agility, innovation, speed and iterative development to the mode, this supporting the views echoed by the interviewees above.

Reflecting the agility described in the second mode defined by (Gartner, 2017), (Bayley & Shacklady, 2015) posit that the traditional IT operating models will require recalibration to support the speed at which AI based technologies would enable IT, and by extension the business to operate at. Thus, supporting the views of the interviewees and findings summarised above.

In conclusion, it should be noted that the emerging nature of AI based technology and as a consequence its penetration in the marketplace implied, to the best of the researcher's knowledge, a limitation in the context of academic literature supporting the views posited above. This limitation has implications on the current research that will be explored in Chapter 7.

6.4 Discussion of research proposition 2

Research Proposition 2 was defined as:

Technological and Organisational Benefits expected to be accrued from adopting AI based technology are key enablers of the adoption decision.

The findings around this proposition have been discussed in the context of salient theory from chapter 2 below.

6.4.1 Theme 1: Expected Benefits

Section 5.5 broadly presented the results of the analysis conducted around research proposition two and expected benefits as a key enabler of the AI based adoption decision. The broader finding identified was that tangible and material benefits expected to be accrued do indeed enable the AI based adoption decision. Nuanced inquiry, facilitated the identification of benefits specific to the context of AI. These were identified through the analysis process as, business growth, economic and financial benefit, operational efficiency and productivity.

This stance identified through the analysis of interview transcripts finds salience in the literature reviewed in chapter 2. Zhu, L, et al., (2006) defined the factor of expected benefits as those tangible benefits organisations expect to realise as consequence of

the technology adoption decision. Studies conducted by both (Viswanath Venkatesh & Bala, 2012; Zhu, L, et al., 2006) identify this factor as significant to the technology adoption decision, thus finding salience for the research proposition posited above.

6.5 Discussion of research proposition 3

Research proposition three was defined as:

Environmental factors have the propensity to affect the AI based adoption decision. The decision to adopt is influenced by:

- I. Mimetic factors: Pressure exerted by competitors and the need to gain or maintain the competitive advantage will influence the decision to adopt
- II. Coercive factors: Pressure exerted by strategic suppliers, regulatory bodies and/or parent organisations will influence the decision to adopt
- III. Normative factors: Pressure exerted by external organisations and/or industry norms that the focal organisation might have dyadic relationships with will influence the decision to adopt.

6.5.1 Theme 1: Environmental Factors

Section 5.6 analysed the results pertaining to the environmental factors salient to the AI based adoption decision. Literature reviewed in chapter 2 posited that Normative, Mimetic and Coercive factors as salient to the technology adoption decision (Chatterjee et al., 2002; Gibbs & Kraemer, 2004; Teo et al., 2003). The extant literature reviewed and the findings discussed found synergy in the identification of Normative pressures as the most significant factor and Mimetic pressures as the next most significant factor in the context of Institutional theory (DiMaggio & Powell, 1983). Interestingly, Coercive pressures was not identified as salient to the AI based adoption decision in the South African context.

The theme of Support Capability was inductively identified through the data analysis process. Chircu & Kauffman, (2000) views on the access to partner based support capability to facilitate technology implementation and ongoing support around emerging and innovative technology as key to realising the benefits proposed by adopting a given technology resonates with the findings above. This view is also substantiated by Oliveira et al., (2011) who attribute technical support infrastructure as a significant environmental factor in their review of the TOE framework (Tornatzky et al., 1990).

7 Chapter Seven: Conclusion & Recommendations

7.1 Principle Findings

The objectives for the research set in chapter one provided context and direction for the inquiry that comprised this study. Perusal of extant literature identified that most of the research in the context of AI was the purview of the technical domain and that considering the emerging nature of AI based technology, the niche at the intersection of business and AI had largely been left unexplored. Thus, this study set the objective of understating the factors that influence the organisational adoption of AI based technology.

Extant literature perused pointed the research in the direction of organisation level technology adoption frameworks like DOI (Rogers, 2003), Institutional Theory (DiMaggio & Powell, 1983) and TOE (Tornatzky et al., 1990). Justification for the synergies behind combining the frameworks came through the analysis of mature extant studies, in the context of DOI (Rogers, 2003) and TOE (Tornatzky et al., 1990), this came from the study of (P. Hsu et al., 2006) and in the context of combining Institutional Theory (DiMaggio & Powell, 1983) and TOE (Tornatzky et al., 1990), the justification came from the studies of (Gibbs & Kraemer, 2004; Soares-Aguiar & Palma-dos-Reis, 2008). The combination of the frameworks allowed the construction of a framework to test the salience of the research propositions against and the key findings have been illustrated in Figure 9 below.

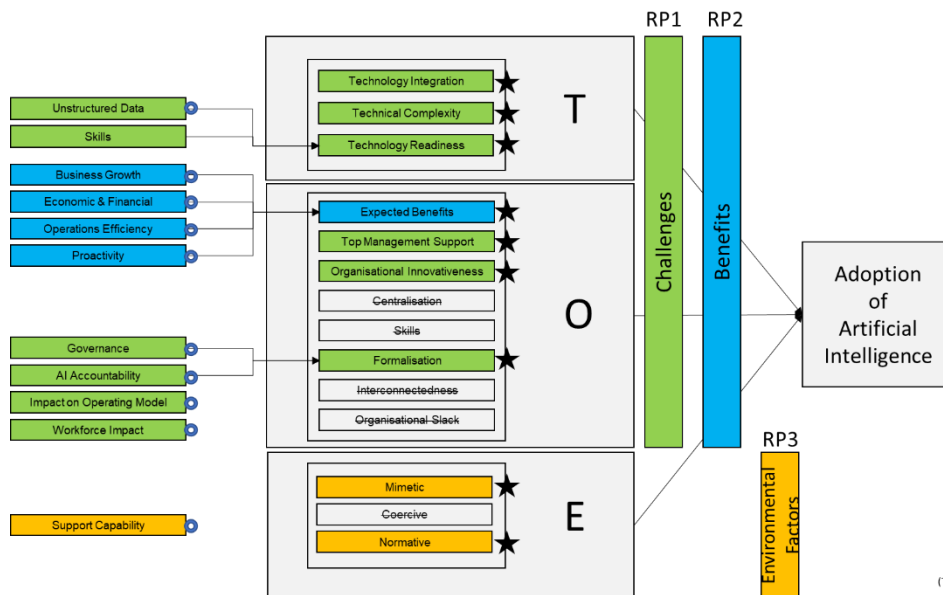
The Key findings of this research can be qualified in the overarching TOE (Tornatzky et al., 1990) context as follows;

1. Technological Factors found to be salient to the AI based Adoption decision.
 - a. Technology Integration
 - b. Technical Complexity
 - c. Technology Readiness
 - i. Access to AI based skills
 - ii. Data architecture supporting AI based technology
2. Organisational Factors found to be salient to the AI based adoption decision
 - a. Expected Benefits
 - i. Business Growth
 - ii. Economic & Financial

- iii. Operational Efficiency
- iv. Proactivity
- b. Top Management Support
- c. Operational Innovativeness
- d. Formalisation
 - i. Governance & AI Accountability
 - ii. Impact on the Operating Model
 - iii. Workforce Impact
- 3. Environmental Factors found to be salient to the AI based adoption decision
 - a. Mimetic Pressure
 - b. Normative Pressure
 - c. Support Capability

It was also interesting to note that four factors posited as salient to extant studies were found not to be significant in the context of organisational level AI adoption in the South African Context. These have been struck and greyed out in figure 9 below.

Figure 9 - Findings as applied to the proposed conceptual framework



(Tornatzky, Fleischer, & Chakrabarti, 1990)
(Rogers, 2003)
(DiMaggio & Powell, 1983)

Source: Authors Own

7.2 Implications for Management

The implication based on the findings of this research for senior management in the South African context include the facilitation of AI adoption decisions within their organisational contexts. Senior management will be in a position to focus on salient factors identified as significant contributors to the organisational adoption decision as identified through this study.

Of key significance to South African senior management will be the AI specific factors identified inductively through the data analysis process (discussed in section 6.3.6) summarised below:

- Workforce Impact: considering the very South African constraints of burgeoning unemployment (Statistics South Africa, 2016) and the generally restrictive nature of labour regulations attributed as a key challenge in the context of doing business in South Africa (Schwab & Sala-i-Martin, 2016), managers would do well to heed the impact on the workforce of the AI based adoption decision as detailed by (Wisskirchen et al., 2010)
- Consideration to the impact on the operating model as posited by (Bayley & Shacklady, 2015) would help identify the considerations to be made on how IT will operate should the AI adoption decision be taken.
- Implications for governance of AI based technology were posited by (Bostrom & Yudkowsky, 2014) and will serve as a starting point for the recalibration of governance to support AI based technology.

7.3 Limitations of the Research

The nature of the research and thus the findings were constrained by the following factors:

- Lack of AI specific academic literature in the context of the business specific application, adoption and use. Inferences had to be made through the maturity and empirical evidence supporting extant studies in support of the application of existing frameworks to AI.
- The general emerging nature of AI based technologies meant that access to qualifying senior managers composite of the population was a challenge and thus the researchers professional network had to be leveraged to identify potential candidates for the study. Snowball sampling was then utilised and the risk of introducing sampling bias and homogeneity in the sample (Saunders et al., 2009)

7.4 Suggestions of future research

It is suggested that future research direction take steps towards:

1. Testing the validity of the conceptual framework proposed through this study through quantitative studies.
2. As the current study seeks to understand the adoption decision at the organisational level, further study can be directed towards individual assimilation of AI based technology, post the organisational adoption decision.
3. Understanding the pre and post adoption parity in the factors considered to be part of the adoption decision, i.e. expected benefits vs actual benefits accrued post adoption.

8 References

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9 Appendix 1: Ethical Clearance Letter

Gordon Institute of Business Science

University
of Pretoria

10 August 2017

Tarun Rao

Dear Tarun,

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data conditional to the below:

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

Appendix 2: Informed Consent Letter

Dear Participant,

I am currently studying towards a MBA at the Gordon Institute of Business Science and am conducting research on the factors affecting the adoption Artificial Intelligence (AI) in South African organizations.

Our interview is expected to last no longer than an hour and this process will help us gain insight into the factors that impact the adoption of AI within an organization. It is the intention of the research project to help identify key factors that warrant consideration when looking to adopt AI based technologies and potentially help managers facilitate better adoption of the technologies within the context of their organizations.

Your participation is voluntary and you can withdraw at any stage during the interview.

With this letter, you consent to participating in the interview which will be recorded for more accurate data capturing. **All data will be kept confidential.**

If you have any concerns or queries please do not hesitate to contact my supervisor, all details provided below:

Supervisor Name	Jeff Y-J Chen
Supervisor Email	chenj@gibs.co.za

Signature of Participant _____

Date: _____

Signature of Researcher _____

Date: _____

10 Appendix 3: Final Coding Scheme

0. AI Adoption		
1. Research Proposition 1 (Challenges in Adoption)	2. Research Proposition 2 (Benefits of Adoption)	3. Research Proposition 3 (Environment)
1.12 Org: Chall: Top Management Support	2.1 Org: EB: Business Growth	3.1 Env: Coercive
1.13 Org: Chall: AI Accountability	2.10 Org: EB: Value Proposition	3.2 Env: Legislative & Regulatory Constraints
1.14 Org: Chall: Workforce Impact	2.2 Org: EB: Competitive Advantage	3.3 Env: Macro-Economic Factors
1.15 Tech: Chall: AI Maturity	2.3 Org: EB: Enable Innovation	3.4 Env: Mimetic
1.17 Tech: Chall: Complexity	2.4 Org: EB: Economic & Financial	3.5 Env: Normative
1.19 Tech: Chall: Integration	2.5 Org: EB: Operational Efficiency	3.6 Env: Support Capability
1.20 Tech: Chall: Readiness	2.6 Org: EB: Proactivity	
1.21 Tech: Chall: Skills	2.7 Org: EB: Reduction in human risk	
1.23 Tech: Chall: Unstructured Data	2.8 Org: EB: Risk Mitigation	
1.4 Org: Chall: Organisational Innovativeness	2.9 Org: EB: Scalable Solutions	
1.6 Org: Chall: Governance		
1.7 Org: Chall: Impact on Operating Model		
1.8 Org: Chall: IT-OT Convergence		
1.9 Org: Chall: Resistance to Change		
Org: Chall: aaService		
Org: Chall: Management of AI		
Org: EB: Quick Win		

11 Appendix 4: Interview Question Guide

Grand Tour Questions

What does AI mean to you?

What Applications of AI technology are you familiar with?

Walk me through a typical technology adoption process within your organisation?

Interview Questions

1. What are some of the potential challenges that may manifest in terms of the adoption of AI
 - i. Prompts: Technological, Organisational
2. What is your perception of the usefulness of AI?
 - i. Prompts: Technological, Organisational
3. What are some of the internal and external business environment factors that may influence the adoption of AI within your organisation?
 - a. Prompts:
 - i. Mimetic (Competitor)
 - ii. Coercive (Supplier)
 - iii. Normative (Similar Orgs)