The adoption of B2B marketplace platforms by South African organisations:

A technological-organisational-environmental perspective.

A research report submitted in partial fulfilment of the requirements for the degree of Master of Commerce in the field of Information Systems

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DECLARATION

I declare that this research report is my own, unaided work. It is being submitted for the degree of Master of Commerce in Information Systems (by research and coursework) to the University of the Witwatersrand, Johannesburg.

It has not been submitted before for any other degree or examination at this or any other University.

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Date

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This report is dedicated to my family for their support in completing this report.

ABSTRACT

Advances in digital technology have driven the development of online marketplaces and other platform-based businesses. There are examples of platforms that are highly successful with some becoming the most valuable businesses in the global economy. However, successful platforms are the exception and many have failed to scale and benefit from the network effects that facilitate their growth. The success of platform businesses depends largely on whether they are accepted and used. Attracting users to the platform is therefore essential.

The purpose of this research was to explain the factors that influence the adoption of platforms by South African organisations. More specifically, the study focused on the adoption of business-to-business (B2B) marketplace platforms, which is a key type of platform that connects buyers within an organisation to organisations selling goods and services. The growth in B2B marketplaces is expected to increase substantially to account for 30% of online B2B sales by 2024.

A model, underpinned by the Technology-Organisation-Environment (TOE) framework and extended by Institutional Theory (INT) was used to underpin the study. The TOE framework strives to explain the effects of technology-related and intra-organisational factors on the Information Systems (IS) innovation adoption process, whereas INT seeks to explain the effects of the inter-organisational factors on the adoption process. Taken together, nine factors were examined for their influence on the adoption of B2B marketplaces: (1) technological factors (security concerns, complexity, compatibility and cost); (2) organisational factors (top management support and perceived benefit); and (3) environmental factors (competitive pressure, trust and trading partner readiness).

To examine their effects, this research utilised a relational, quantitative research approach. Data were collected from 87 South African organisations using a structured online questionnaire. The reliability and validity of the data were examined using Principal Component Analysis and assessing the computed Cronbach's Alphas. The hypotheses were tested using logistical regression techniques. Results showed six of the study's nine hypotheses were supported.

The most important factors are competitive pressure, top management support and perceived organisational benefits. The least important are technology security, compatibility and cost. Thus, B2B marketplace adoption appears more strongly influenced by organisational and environmental considerations than by technical considerations, although some technology factors are potentially significant.

This study deals with a gap in IS adoption literature by studying the B2B marketplace artefact specifically in the South African context. In addition, using the strengths of both the TOE framework and INT further deepens the understanding of the adoption phenomenon in the IS discipline.

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LIST OF ABBREVIATIONS

B2B	Business-to-Business
B2C	Business-to-Customer
CP	Competitor Pressure
CT	Cost
DOI	Diffusion of Innovation
e-Commerce	Electronic Commerce
e-Procurement	Electronic Procurement
INT	Institutional Theory
IS	Information Systems
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
MSP	Multisided Platform
PB	Perceived Benefits
PCA	Principal Component Analysis
PR	Partner Readiness
RFID	Radio frequency identification
SC	Security Concern
SIC	Standard Industrial Classification
SaaS	Software as a Service
TM	Top Management

TOE	Technology-Organisation-Environment
TR	Trust

1 INTRODUCTION

1.1 Background

This chapter provides a perspective on the importance of platform businesses and marketplaces, defines platform businesses, describes the various participants within a platform business, and provides examples of platform businesses with a focus on marketplace platforms. Thereafter, the research problem and objectives are stated.

1.1.1 *Importance of platform businesses and marketplaces*

Five of the ten most valuable organisations in the global economy are platform businesses (Evans and Schmalensee, 2016; Hagiu and Altman, 2017). Platform businesses have surfaced as one of the most influential business models in the increasingly connected and data-rich world. The platform business model provides the foundation for several of the most disruptive and rapidly growing organisations, from the digital natives of Uber, Airbnb and eBay to Google, Amazon and Microsoft (Parker et al., 2016). Marketplaces are one example of a platform business. Marketplaces connect buyers and sellers in a specific market space or via a specific model of matching buyers and sellers generally via a digital platform. Amazon.com and eBay are classic examples. Amazon.com started as merely another online retailer, and its marketplace grew out of that as the organisation realised the power and agility of its platform's capabilities and the value of the buyer community it had built. Other examples of marketplace platforms include Lyft, Alibaba, Airbnb and Uber (Heffner, 2018). These examples are all well-known in the business-to-consumer (B2C) space, and Amazon Business and Alibaba are examples in the business-to-business (B2B) space. Forrester (Schadler and Fenwick, 2018) estimates that almost half of the global B2C commerce comes from four marketplaces (Tmall, Amazon, JD.com and Pinduoduo).

Platform businesses, including marketplaces, have grown substantially in number and value, helping transform industries and economies. There is an urgent need to explore the

adoption and diffusion of this phenomenon further (de Reuver et al., 2018). Platform businesses provide superior returns to shareholders (Staeritz and Torrance, 2020, p. 878):

> "Platform-powered business models consistently perform better than linear businesses on every measure – growth, margins, return on assets and market capitalization. Platform models enable you to leverage new technologies, economic and social trends and the hidden value of the abundant and detailed data they generate."

The growth in the importance of platforms and ecosystems is driven by the convergence of three large structural changes in the economy (Jacobides, 2019). The first is the removal of regulations protecting organisations that had exclusivity on serving specific customer needs. The second change is driven by digitisation and regulatory changes that blur the boundaries between products and services. The third change involves the technology that is revolutionising how organisations operate and serve their customers (Jacobides, 2019).

There are many benefits associated with a platform business, including reduced cost of delivery (Drewel et al., 2018; Edelman and Geradin, 2016; Schadler and Fenwick, 2018; Zhu and Iansiti, 2019), accelerated growth (Drewel et al., 2018; Hagiu and Altman, 2017; Schadler and Fenwick, 2018; Zhu and Iansiti, 2019), enabling scale (Drewel et al., 2018; Schadler and Fenwick, 2018; Zhu and Iansiti, 2019), provides access to innovation (Edelman and Geradin, 2016; Hagiu and Altman, 2017; Jacobides, 2019; Schadler and Fenwick, 2018; Zhu and Iansiti, 2019), access to funding (Schadler and Fenwick, 2018), creates economies of learning from data (Schadler and Fenwick, 2018; 2019; Zhu and Furr, 2016; Zhu and Iansiti, 2019) and creates barriers to entry (Schadler and Fenwick, 2018; Zhu and Furr, 2016; Zhu and Iansiti, 2019).

Parker et al. (2016) explain that the disruptive potential of digital platforms is based on two major economic advantages: marginal costs that arise from economies of scale and the ability to reach a critical mass of users through virtuous network effects. These advantages enable companies to expand their platform businesses with relatively low investments compared to traditional businesses.

1.1.2 *Definition of platform businesses*

Hagiu and Wright (2015a) define a platform business as one that generates value by matching and facilitating the direct transfer of value between two or more different groups of users. While Parker et al. (2016, p. 298) define it as:

> A platform is a business based on enabling value-creating interactions between external producers and consumers. The platform provides an open, participative infrastructure for these interactions and sets governance conditions for them. The platform's overarching purpose: to consummate matches among users and facilitate the exchange of goods, services, or social currency, thereby enabling value creation for all participants.

Platform businesses are increasingly enabled by technology. The modern technologies that enable frictionless entry, efficient and scalable growth, on-demand access (24/7/365) and speed, combined with increased connectivity to end-users, has enabled rapid, exponential growth on a global level (Cusumano et al., 2019). It is the interdependence between this technology and organisational governance that provides competitive differentiation to these platforms.

1.1.3 *Platform participants*

Digital platforms are made up of multiple components (de Reuver et al., 2018; Tiwana et al., 2010) that interact in a dynamic and complex way. From the technology components (software and hardware) to the underlying business model, to the communities of users that operate on the multiple sides of the platform, to the broader environmental factors acting upon the platform, and the governance practices that dictate the operations of the platform.

To be successful, organisations must consider the interests of all the participants in the design of the digital platform (van Alstyne et al., 2016). Platform economics will force firms to reconsider which capabilities to shed, which to partner for, and which to develop into a platform business (Schadler and Fenwick, 2018). Not every organisation will be able to build a platform business (Bonde, 2019) that reshapes an industry, but every organisation must participate in the platform economy (Schadler and Fenwick, 2019).

There are several roles that you can adopt within a platform business model, as depicted in Figure 1. The platform owner, leader or orchestrator controls the intellectual property and manages the overall architecture of the platform (Drewel et al., 2018). The platform provider takes accountability for the provision of the technical platform (Drewel et al., 2018). Platform participants include producers (provide platform offerings), partners (complement the platform and provide additional components), and consumers (use platform offerings) of services or capability to and from the platform (Drewel et al., 2018). The platform environment influences the operations of the platform. This includes the competitive, legal, technological and regulatory forces (Drewel et al., 2018).

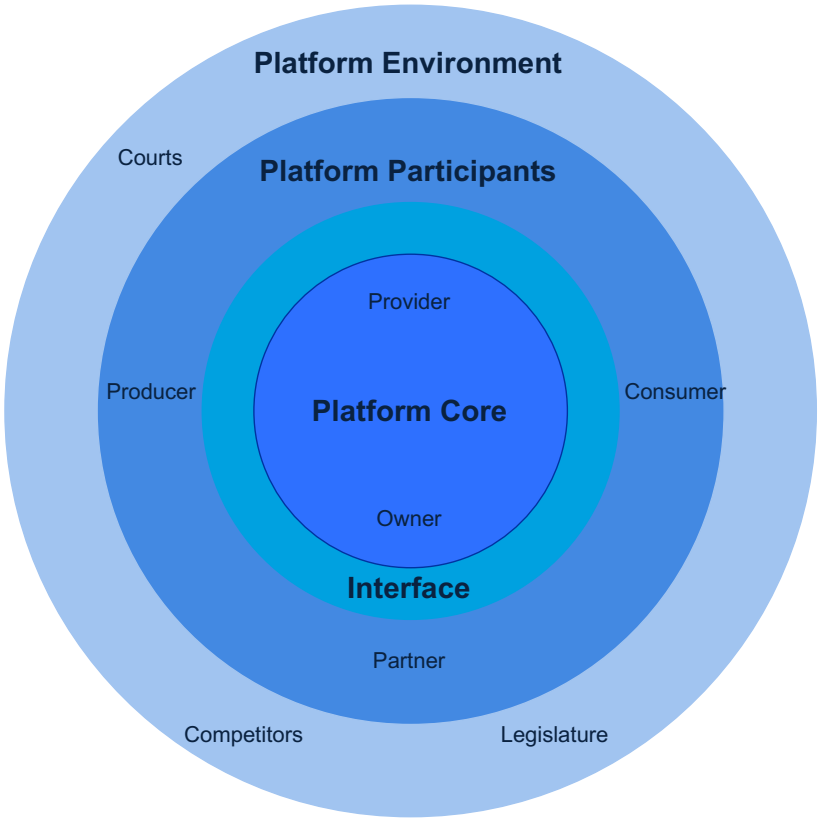

Figure 1: Platform actors (Drewel et al., 2018)

In the context of B2B marketplaces, producers are referred to as suppliers and consumers as buyers.

1.1.4 *B2B marketplaces*

This research focused on the marketplace platform in the context of B2B interactions.

B2B e-Commerce refers to the exchange of goods, services and information between organisations through an Internet-enabled digital platform (Sila, 2013). B2B e-Commerce providers use either the direct model (reseller) or the marketplace model. In the direct model, organisations establish their own platforms and sell products or services directly to consumers. A marketplace is a platform where many organisations sell their products and services alongside one another. Marketplaces are a subclass of multisided platforms (MSPs), where buyers and suppliers interact in commercial trade (Hagiu and Wright, 2015b). Marketplaces allow suppliers to sell directly to buyers via a platform (Hagiu and Wright, 2015b; Reillier and Reillier, 2017), while resellers act as an intermediary by reselling products they purchase from suppliers to buyers (Hagiu and Wright, 2015b). Organisations choose whether to operate as a reseller, marketplace, or a hybrid (Hagiu and Wright, 2015b).

Benefits to sellers for participating on marketplace platforms include reduced transaction and fulfilment costs, lower costs to enter new markets and scale. Benefits to buyers include price transparency, simplicity and vetted products (Bonde and Ewald, 2020).

Despite the benefits of participating in B2B marketplaces, many organisations have been slow to recognise, adopt and participate in these new digital business models. It has been argued that organisations that do not adopt and participate in platform businesses will be uncompetitive in the long term (van Alstyne et al., 2016). However, traditional businesses are often constrained by forces of habit, convention and inertia and may fail to adopt and capture value from platform models (Staeritz and Torrance, 2020). Understanding the factors that promote and constrain platform adoption is thus a research problem in need of attention.

1.2 Problem statement

This research explored the extent to which incumbent South African organisations are adopting digital B2B marketplaces, the roles (buyer, seller, owner, partner) they assume

within these B2B marketplaces and the degree of participation. These incumbent organisations (Hein et al., 2019) are under increased threat from nimbler and more agile digital natives that leverage marketplaces to reduce costs and serve customers more efficiently (Mohtaramzadeh et al., 2018). Yet, the incumbents may lack the understanding of the dynamics of these business models and the technology, organisational or environmental factors that are needed to compete with these new competitors and business models. Many platforms have failed to scale and benefit from the network effects that facilitate their growth. Attracting users to adopt platforms is therefore essential but adoption may be influenced by a number of factors. Therefore, this research focuses on what factors are influencing the adoption of digital B2B marketplaces within incumbent South African organisations.

1.3 Purpose of the study

The purpose of this research was to explain the factors that influence the adoption of digital B2B marketplaces in South African organisations. This research draws on the TOE framework and INT as a theoretical basis.

This leads to the following research question:

- What are the technological, organisational and environmental factors influencing the adoption of B2B marketplaces by South African organisations, and what are their relative effects on adoption?

To address the question, this study:

- Reviews the literature on platform businesses and specifically B2B marketplaces including a review of frameworks of Technology-Organisation-Environment (TOE) framework and extended by Institutional Theory (INT).
- Develops a research model hypothesizing the effect of selected technological, organisational, and environmental factors on adoption of B2B marketplace in South African organisations.
- Develops a structured questionnaire instrument to measure the selected factors and distributes it to a sample of South African organisations.

- Analyses the data using logistic regression to conclude on the factors most important to the adoption of B2B marketplaces.

1.4 Intended contribution of the study

A limited number of studies were found that investigated the adoption of digital platform businesses at the organisational level (Hein et al., 2019; Hinz et al., 2020; Loux et al., 2020; Ondrus et al., 2015; Song et al., 2018; Staykova and Damsgaard, 2016; Wallbach et al., 2019). The majority of these studies focused on MSPs using a qualitative case study research approach (Hein et al., 2019; Loux et al., 2020; Ondrus et al., 2015; Staykova and Damsgaard, 2016; Wallbach et al., 2019). None of these studies applied the TOE framework or INT, nor did they focus specifically on B2B marketplaces within South African organisations.

This study draws on the TOE framework and INT to explain the factors that influence the adoption of B2B marketplaces within South African organisations using a relational, quantitative research approach.

This study is also of practical importance to organisations wanting to adopt B2B marketplaces as they can use the results of this study to inform which factors influence the adoption of B2B marketplaces by organisations in the South African context. Specifically, it will enable them to understand the relative importance of different technology, organisation and environment factors. Understanding the factors will allow them to focus on the appropriate areas and emphasise investment in the right interventions. Organisations traditional focus on the technology components and this study will show that organisation and environment factors are potentially more important.

1.5 Delimitations of the study

The delimitations of this study are:

- The scope of the study is limited to South African organisations.
- The focus of the study is on B2B marketplaces.

- This research study follows the positivistic perspective, adopting both relational quantitative research questions and methods.
- The survey research method is used for data collection from a random sample of participants using a questionnaire instrument. This study employed a cross-sectional survey to collect the data on all variables at the same point in time.
- Data was collected via self-reports from key informants within each sampled organisation.
- Statistical analysis was conducted on the collected data to test the hypotheses. This analysis was used to answer the research question.
- The study has drawn variables from extant literature utilising the TOE framework and INT.

1.6 Conclusion

This chapter has discussed the relevance of platform businesses and marketplaces in the global economy. A definition for platform businesses was provided and several key characteristics of platform businesses were discussed. This led to the definition of the research problem, objectives, and approach to the research being stated.

The next chapter will describe the systemic literature review conducted.

2 LITERATURE REVIEW

2.1 Introduction

The purpose of this research was to explain the factors that influence the adoption of digital B2B marketplaces by South African organisations. This research draws on the TOE framework and INT as a theoretical basis.

To identify gaps in the existing literature and to derive a set of TOE factors, it was necessary to systematically review the existing body of knowledge, firstly as it relates to the adoption of digital platform businesses, and secondly on the application of the proposed TOE and INT frameworks in studies of innovative IT adoption.

The objective of this SLR is to understand the existing literature related to TOE factors and INT factors and how they relate to the adoption of IT innovations and digital platform businesses.

2.2 Systematic literature review

The systematic literature review was conducted using an adapted approach from Okoli and Schabram (2010). The EBSCO host (Academic Search Ultimate, Business Source Ultimate) electronic databases were selected as the primary source for searching for relevant articles. These databases were selected as they provide a comprehensive set of full text academic databases including access to the following journals: Information Systems Research, MIS Quarterly, Journal of Management Information Systems, Journal of Association of Information Systems, and Journal of Information Technology. As the focus of this study is on B2B marketplaces, the closely related area of B2B electronic commerce (e-Commerce) was incorporated. The search terms included: “B2B e-business OR B2B e-Commerce” AND “TOE framework OR Technology-Organisation-Environment framework OR institutional theory” AND “adoption OR diffusion”.

Studies were included only if in peer-reviewed journals and if they were organisational level studies. Studies were excluded if they focused on individual user adoption and were

not empirical studies published in English. The search was conducted in late 2019 and there was no restriction on the date of publication.

The search identified 35 articles, of which 13 were excluded on title and abstract review as they did not relate to e-Commerce business adoption at an organisational level or TOE or INT. A further ten articles were excluded on a full review of the articles as they were not e-Commerce adoption at an organisational level or TOE or INT. Five additional articles were added from a review of the references of reviewed articles. Twelve articles were found to meet the inclusion criteria and are listed in Table 1.

Table 1: B2B e-Commerce adoption literature

REFERENCE	ANALYSED VARIABLE		FRAMEWORK/ THEORY	PHENOMENON AND CONTEXT
Lin and Lin, 2008	Technology	• "IS Infrastructure" • "IS expertise"	TOE framework	E-Business diffusion Large Taiwanese firms
	Organisation	• "Organisational compatibility" • "Expected benefits"		
	Environment	• "Competitive pressure" • "Trading partner readiness"		
Scupola, 2009	Technology	• "Relative advantage" • "Related technologies"	TOE framework	B2B e-Commerce adoption Danish and Australian small to medium-sized enterprises
	Organisation	• "CEO's characteristics and top management support" • "IS knowledge and attitude" • "Resource constraints"		
	Environment	• "Role of government" • "Technology support infrastructure"		
Soares-Aguiar and Palma-dos-Reis, 2008	Technology	• "Technology competence (IT infrastructure, IT expertise, B2B know-how)"	TOE framework, Institutional theory (INT)	Electronic procurement system Portugal
	Organisation	• "Firm scope" • "Firm size"		
	Environment	• "Extent of adoption among competitors" • "Trading partner readiness" • "Perceived success of competitor adopters"		
Gibbs and Kraemer, 2004	Technology	• "Technology resources"	TOE framework, INT	E-commerce B2B Three industries and ten countries
	Organisation	• "Perceived benefit" • "Lack of organisational compatibility" • "Financial resources" • "Firm size"		
	Environment	• "External pressure" • "Government promotion" • "Legislation barriers"		
Sila and Dobni, 2012	Technology	• "Cost" • "Complexity" • "Network Reliability" • "Data Security" • "Scalability"	TOE framework	B2B e-Commerce usage patterns North American small- and medium-sized enterprises
	Organisation	• "Top Management Support" • "Trust"		

REFERENCE	ANALYSED VARIABLE		FRAMEWORK/ THEORY	PHENOMENON AND CONTEXT
		• "Pressure from Trading Partners" • "Pressure from Competitors"		
	Environment	• "Dynamism" • "Complexity" • "Hostility"		
Mohtaramzadeh et al., 2018	Technology	• "Perceived relative advantage" • "Cost of Adoption"	TOE framework	B2B e-Commerce Adoption Iranian manufacturing companies
	Organisation	• "Top management support" • "IT Infrastructure and capabilities"		
	Environment	• "Competitive pressure" • "Trading partner pressure" • "Legal infrastructure" • "Government support"		
Teo et al., 2006	Technology	• "Technological inhibitors"	TOE framework	Web-based B2B e-Commerce
	Organisation	• "Organisational inhibitors"		
	Environment	• "Environmental inhibitors"		
Sila, 2013	Technology	• "Cost" • "Complexity" • "Network reliability" • "Data security" • "Scalability"	TOE framework	B2B e-Commerce adoption North America
	Organisation	• "Top management support" • "Trust"		
	Environment	• "Pressure from trading partners" • "Pressure from competitors"		
	Control	• "Country of origin" • "Firm size" • "Firm type" • "Management level"		
Teo et al., 2009	Technology	• "Perceived direct benefits" • "Perceived indirect benefits" • "Perceived costs"	TOE framework	Electronic procurement adoption Singapore
	Organisation	• "Firm size" • "Top management support" • "Information-sharing culture"		
	Environment	• "Business partner influence"		
Zhu and Kraemer, 2005	Technology	• "Technology competence"	TOE framework Resource-based view	e-Business use, adoption and non-adoption United States and nine other countries (Brazil, China, Denmark, France, Germany, Japan, Mexico, Singapore and Taiwan).
	Organisation	• "Size" • "International scope" • "Financial commitment"		
	Environment	• "Competitive pressure" • "Regulatory support"		
Zhu et al., 2003	Technology	• "Technology competence"	TOE framework	e-Business adoption 3100 businesses and 7500 consumers in eight European countries
	Organisation	• "Firm scope" • "Firm size"		
	Environment	• "Consumer readiness" • "Competitive pressure" • "Lack of trading partner readiness"		
Zhu et al., 2006a	Technology	• "Technology competence"	Diffusion of Innovation TOE framework	Enterprise digital transformation Post-adoption 1415 companies from six European countries
	Organisation	• "Organisation size"		
	Environment	• "Competitive pressure" • "Partner readiness"		
	Innovation characteristics	• "Relative advantage" • "Compatibility" • "Costs" • "Security concern"		

2.2.1 *Summary of systematic literature review results and findings*

The reviewed studies motivate the importance of studying the adoption phenomenon by pointing to an increase in economic growth (Mohtaramzadeh et al., 2018), improved organisational competitiveness (Mohtaramzadeh et al., 2018; Soares-Aguiar and Palma-dos-Reis, 2008) and improved efficiencies (Scupola, 2009; Soares-Aguiar and Palma-dos-Reis, 2008; Teo et al., 2006) realised by organisations adopting B2B e-Commerce solutions. Even so, some organisations are adopting IT (e-business, electronic procurement (e-Procurement) while others are not. This may be as a result of the factors that influence the adoption of IT innovation not being consistent across studies (Mohtaramzadeh et al., 2018; Sila, 2013; Soares-Aguiar and Palma-dos-Reis, 2008). In addition, there is a need to validate existing theories in different contexts (Mohtaramzadeh et al., 2018; Soares-Aguiar and Palma-dos-Reis, 2008). E-business adoption is hindered by barriers from technical, managerial and cultural issues (Zhu et al., 2006a).

Limited research related to the adoption, diffusion or usage of digital platform businesses (and the other related terms to search for the artefact) at an organisation level could be found. While some studies did focus on the use, diffusion and growth of MSP using case studies (Hein et al., 2019; Hinz et al., 2020; Loux et al., 2020; Ondrus et al., 2015; Song et al., 2018; Staykova and Damsgaard, 2016; Wallbach et al., 2019), none of the studies utilised any of the widely used IS theories and frameworks of Diffusion of Innovation (DOI), INT, or TOE.

Studies that were more broadly related to e-business did, however, apply TOE, and all 12 studies identified in Table 1 had applied the TOE framework. Two studies (Gibbs and Kraemer, 2004; Soares-Aguiar and Palma-dos-Reis, 2008) combined INT with the TOE framework to create an integrated model. Those studies have demonstrated that the application of TOE and INT was useful. For example, Mohtaramzadeh et al. (2018) applied TOE and tested the effect of eight factors on the adoption of B2B e-Commerce in Iranian manufacturing companies. They found four factors (cost of adoption, top management support, competitive pressure and government support) from across the TOE framework significant, and their model collectively explained 50% of the variance in adoption (R^2= 0.50). Similarly, Soares-Aguiar and Palma-dos-Reis (2008) applied TOE but added INT.

They focused on e-Procurement system adoption in 2500 of the largest companies in Portugal. Applying extent of adoption among competitors, trading partner readiness, and perceived success of competitor adopters as INT related variables and included them in a model that incorporated technological factors such as technology competence and organisational factors such as firm scope and firm size. They found five factors (technology competence, firm size, trading partner readiness, perceived success of competitors adopters, and extent of adoption among competitors) from across the framework significant and their model collectively explained 59.4% of the variance in adoption (pseudo R^2= 0.99).

Yet, much of the extant literature identified in the review focuses on the developed markets of North America and Europe (Gibbs and Kraemer, 2004; Scupola, 2009; Sila, 2013; Sila and Dobni, 2012; Teo et al., 2009; Zhu et al., 2006a). Mohtaramzadeh et al. (2018) highlight that the main issues in developing countries differ: lower-quality connectivity and speed; high costs of data, immature or undeveloped regulatory environment; inferior organisational cultures and management skills; and inadequate IT infrastructure. To consider these issues, Mohtaramzadeh et al. (2018) included cost of adoption, top management support, IT infrastructure and capabilities and government support in their study of Iranian manufacturing companies. Future research in developing countries needs to consider these factors. None of the studies was conducted in South Africa.

Much of the B2B adoption research has focused on e-Procurement (Soares-Aguiar and Palma-dos-Reis, 2008; Teo et al., 2009) and e-business (Gibbs and Kraemer, 2004; Lin and Lin, 2008; Mohtaramzadeh et al., 2018; Scupola, 2009; Zhu et al., 2006a). However, these relate to B2B marketplaces in that they enable organisations to buy and sell goods and services with external parties via electronic transactions. Both impact multiple areas of the value chain, including sales, customer service, procurement, information management and coordination with trading partners (Lin and Lin, 2008; Zhu and Kraemer, 2005). They also differ in that B2B marketplaces are open ecosystems (Parker et al., 2016) relying on the participation and interaction (Cusumano et al., 2019) of multiple external parties, including partners, competitors and governments (Drewel et al., 2018). This requires a greater focus on the inter-organisational factors impacted by the external environment. However, they inform this study by surfacing factors likely to be relevant to

adoption, such as technology competence, organisation size and trading partner readiness.

Altogether, across the reviewed studies, 12 unique factors were identified under the technology perspective: technology competence (in five studies), relative advantage, related technologies, technology resources, cost (in four studies), complexity (in two studies), network reliability (in two studies), data security (in two studies), scalability (in two studies), technological inhibitors, perceived direct benefits and perceived indirect benefits.

Fourteen unique factors were identified under the organisation perspective: organisational compatibility (in two studies), expected benefits (in two studies), top management support (in five studies), IS knowledge and attitude, resource constraints, firm scope (in two studies), firm size (in six studies), financial resources, trust, pressure from trading partners, pressure from competitors, IT infrastructure and capabilities, organisational inhibitors and information-sharing culture.

Twelve unique factors were identified under the environmental perspective: competitive pressure (in six studies), trading partner readiness (in five studies), the role of government (in three studies), technology support infrastructure, perceived success of competitor adopters, external pressure, legislation barriers, dynamism, complexity, hostility, regulatory support and consumer readiness.

2.3 Shortcomings and contributions of past studies

Only a limited number of studies could be found in extant literature that explain the adoption of digital platform businesses at the organisational level or applied the TOE framework of INT. These studies did not specifically focus on B2B marketplaces within South African organisations.

de Reuver et al. (2018) believe that a clear view of the factors resulting in the adoption of a digital platform is still lacking. The relative lack of studies in this area supports the call from various authors (de Reuver et al., 2018; Ondrus et al., 2015; Tiwana et al., 2010) for more research into the digital platform artefact.

Many studies have explored MSPs using a qualitative case study research approach (Hein et al., 2019; Loux et al., 2020; Ondrus et al., 2015; Staykova and Damsgaard, 2016; Wallbach et al., 2019). This limits the generalisability of the findings of such research and presents an opportunity to conduct larger sample studies to confirm the relative effects of different factors driving the adoption process. This research can thus contribute by utilising empirical research to further enhance the understanding of this phenomenon.

The reviewed studies reiterate the potential value and benefit of technologies to adopters but describe adoption as often challenged by high costs (Mohtaramzadeh et al., 2018; Sila, 2013; Sila and Dobni, 2012; Teo et al., 2009; Zhu et al., 2006a), competitive pressure (Lin and Lin, 2008; Mohtaramzadeh et al., 2018; Sila and Dobni, 2012; Soares-Aguiar and Palma-dos-Reis, 2008; Zhu et al., 2006a; Zhu and Kraemer, 2005), and partner readiness (Lin and Lin, 2008; Soares-Aguiar and Palma-dos-Reis, 2008; Zhu et al., 2006a). Adoption seems to be more likely when there is strong support from top management (Mohtaramzadeh et al., 2018; Sila, 2013; Sila and Dobni, 2012; Teo et al., 2009), the perceived benefit is high (Gibbs and Kraemer, 2004; Lin and Lin, 2008; Teo et al., 2009), the organisation has the technology competence to implement the innovation (Gibbs and Kraemer, 2004; Lin and Lin, 2008; Soares-Aguiar and Palma-dos-Reis, 2008; Zhu et al., 2006b; 2003), and trading partners and governments provide a supportive external environment (Gibbs and Kraemer, 2004; Lin and Lin, 2008; Mohtaramzadeh et al., 2018; Scupola, 2009; Soares-Aguiar and Palma-dos-Reis, 2008; Zhu and Kraemer, 2005).

Taken together, it is evident from the review that the adoption of B2B marketplaces in developing country contexts is an understudied problem. The review also suggests the TOE and INT are useful frameworks to underpin such a study with various technological, organisational and environmental factors potentially being salient. However, specific factors need to be subjected to empirical testing in different contexts. Therefore, the following research question is posed:

- What are the technological, organisational and environmental factors influencing the adoption of B2B marketplaces by South African organisations, and what are their relative effects on adoption?

The next chapter explains the TOE and INT underpinnings in more detail and then develops the research model aimed at addressing this research question.

3 THEORETICAL BACKGROUND AND RESEARCH MODEL

3.1 Theoretical background

There are several commonly applied theories or frameworks in the IS field used to understand the adoption of innovation at an organisation level, including DOI theory, the Technology-Organisation-Environment (TOE) framework and institutional theory (INT) (Oliveira and Martins, 2010). None of these models in isolation is suited to determine the adoption of digital platform businesses as they do not consider all the variables required. INT does not take into consideration the ability of the organisation's managers to deal with digital platform business, while the TOE framework may not consider the relevant mimetic forces that result in an organisation adopting a digital platform business. This paper considers both TOE and INT to develop a model to predict digital platform business adoption, specifically B2B marketplaces.

In the next three sections, TOE and INT are discussed in more detail.

3.1.1 *Technology-organisation-environment framework*

The TOE framework provides a practical mechanism to understand the adoption and assimilation of technology at an organisational level. It defines three contexts that impact the adoption of technological innovations: technology, organisation, and environment (Awa et al., 2017; Mohtaramzadeh et al., 2018; Oliveira and Martins, 2011). Figure 2 depicts the TOE framework.

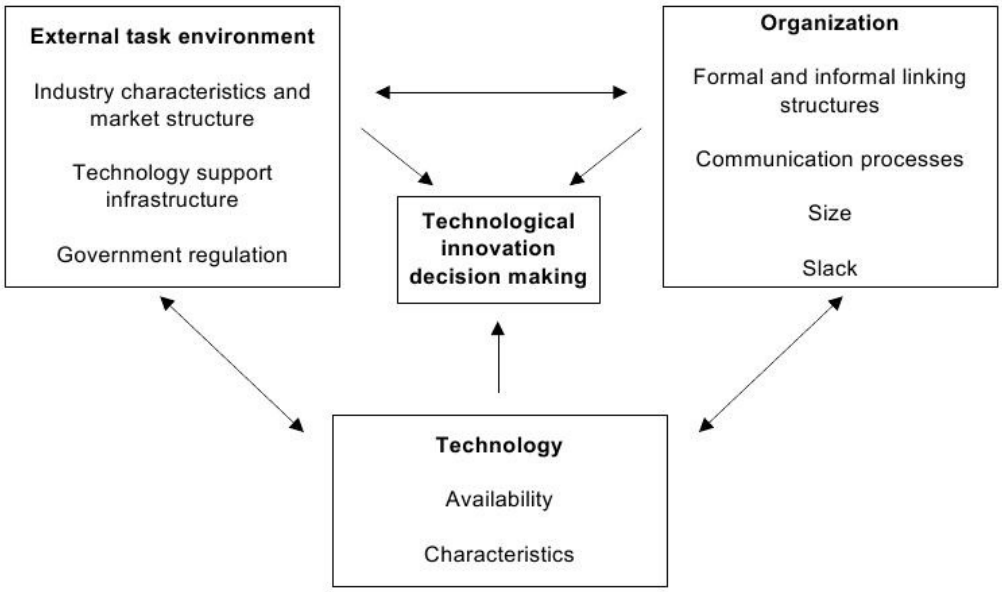

Figure 2: Technology, organisation and environment framework (Tornatzky and Fleischer, 1990)

The technology context defines the applicable technologies inside and outside the organisation (Gibbs and Kraemer, 2004; Oliveira and Martins, 2011). It includes the characteristics of how the technology is used and the skills required to use it (Sila, 2013). Studies often refer to the DOI theory in justifying technological factors. DOI defines five technological factors that may influence the adoption of an innovation: relative advantage, compatibility, complexity, trialability and observability (Martins et al., 2016; Sila, 2013). DOI provides a good explanation of how innovations are adopted and has been widely used in IS literature to explain the adoption of IT innovations such as the Internet, e-Procurement, radio frequency identification (RFID), e-business and cloud computing (Martins et al., 2016).

The next set of factors recommended for inclusion within the TOE framework is organisational factors. The organisation context relates to the resources available to support the adoption of innovation within the organisation (Tomás et al., 2018). This is evaluated by several characteristics of the organisation, including quality of staff, available capacity of staff, size of the organisation, the magnitude of decentralisation or centralisation, and the formalisation of management controls and structures (Gibbs and Kraemer, 2004; Oliveira and Martins, 2011). Finally, TOE surfaces the relevance of the external context. The environment context is the external environment the organisation

works within and encompasses the competitive, legal, social and regulatory environment (Gibbs and Kraemer, 2004; Oliveira and Martins, 2011; Tomás et al., 2018). As the TOE framework includes the environmental context, it explains intra-firm innovation adoption (Hsu et al., 2006) and the model is therefore considered more complete than DOI.

TOE does not provide a definitive model for expressing the factors that influence the adoption of innovation but provides a taxonomy for classifying these factors. TOE has been used in many contexts, including mobile supply chain, inter-organisational business process standards, software as a service (SaaS), cloud computing, electronic data interchange, and e-business (Bose and Luo, 2011; Martins et al., 2016). Researchers widely apply the TOE framework but do not use a consistent set of factors to measure each context (Teo et al., 2006, 2009). Researchers must consider the broader context in which the innovations take place to identify the specific factors that relate to that specific situation of the research (Bose and Luo, 2011).

A key contribution of the TOE framework is the broad context it embraces in viewing innovation adoption (Bose and Luo, 2011), but it does not take into account all factors (Martins et al., 2016). To address this limitation, the use of an integrative approach combining the TOE framework with DOI or INT can be beneficial (Martins et al., 2016). INT is discussed next.

3.1.2 *Institutional theory*

INT deals with why organisations operating in a field tend to be similar (Tomás et al., 2018). INT puts forward that an organisational decision to assume operating models, processes or innovations is not only premised on the need for increased efficiency but also in response to cultural, social and legitimacy forces (DiMaggio and Powell, 1983). Although internal dynamics are likely to influence organisations deciding to adopt a B2B marketplace, they are also impacted by isomorphic pressures from other organisations (Oliveira and Martins, 2011).

INT identifies three types of pressures exerted on an organisation: coercive, normative and mimetic (Teo et al., 2003). Figure 3 provides an example of how these forces were positioned in a previous adoption research model.

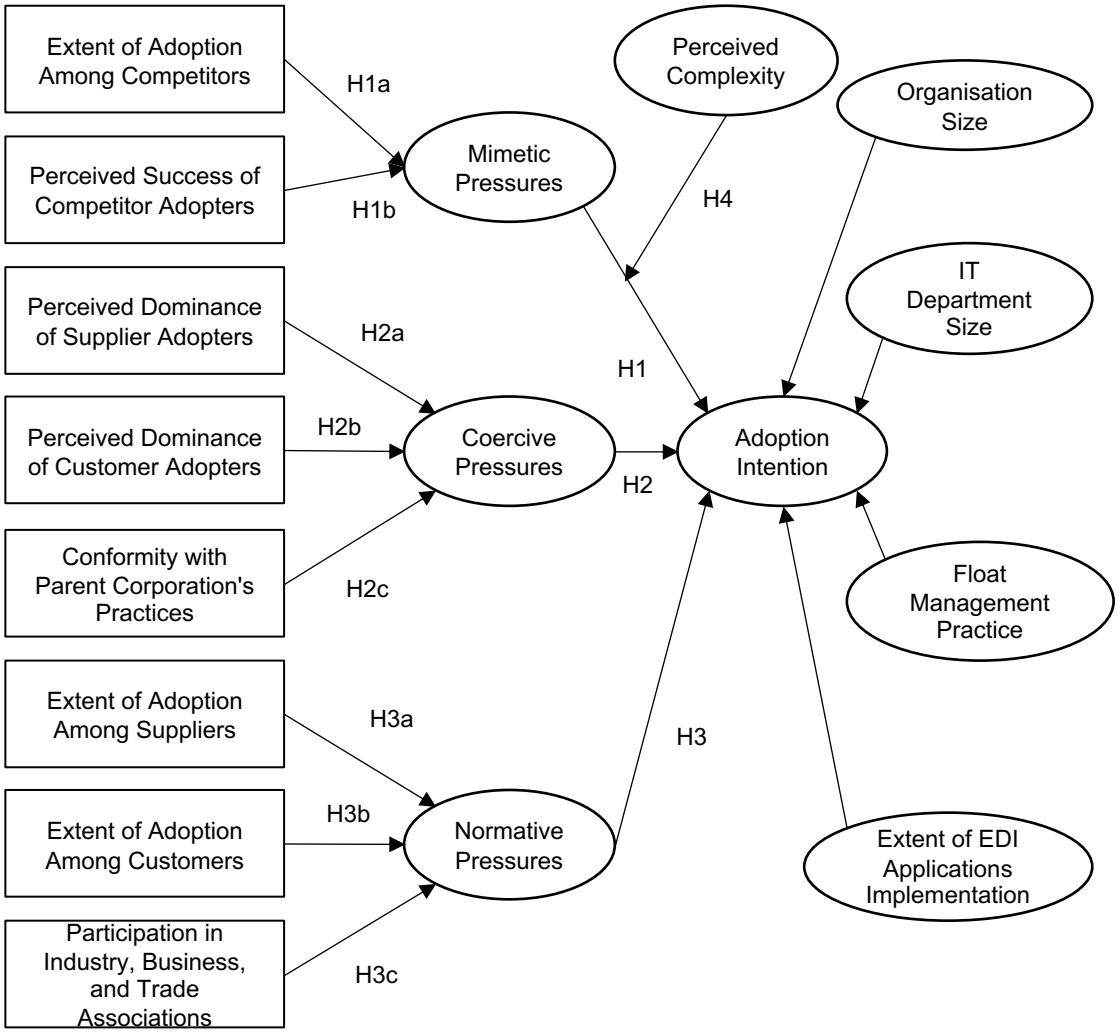

Figure 3: Teo et al Research Model (Teo et al., 2003)

Coercive pressures come from the external sources (other organisations, governments, regulators, society) that are formally exerted on an organisation (Gibbs and Kraemer, 2004). Normative pressures are the pressures that are exerted by members of a profession based on information, rules and norms (Oliveira and Martins, 2011; Teo et al., 2006). Normative pressures arise from professionalisation and as a result of the sharing of standards and knowledge among organisations and adopting standardised responses to comparable situations. This consensus influences organisations to assume these practices (Tomás et al., 2018). Mimetic pressure is the pressure that occurs when organisations are faced with uncertainty and ambiguity, mimic the activities of other organisations that they regard as effective. Mimetic pressures stem from uncertainty and

ultimately inspire the imitation of a successful practice or innovation of a competitor (Oliveira and Martins, 2011; Tomás et al., 2018).

3.1.3 *Integrated framework*

Through the combination of several theoretical models, the researcher can obtain an improved appreciation of the IS adoption phenomenon (Zollet and Back, 2015). Several studies (Gibbs and Kraemer, 2004; Soares-Aguiar and Palma-dos-Reis, 2008) have used INT to augment the environmental variable of the TOE framework, which include competitive pressure and trading partners readiness. Oliveira and Martins (2011) recommend that further research should be done on the use of more than one theory for more complex implementations. Platform businesses are a complex ecosystem, and a study of B2B marketplaces using an integrated framework responds to this call.

Gibbs and Kraemer (2004, p. 126) state that:

> "Applying Institutional theory in conjunction with the TOE framework is helpful in identifying and explaining important determinants of adoption. The external pressure factor tested in the TOE studies encompasses institutional variables such as extent of adoption by competitors, suppliers and customers, as well as their perceived success and dominance."

INT enriches the environmental context of the TOE framework and provides value when used in conjunction with the TOE framework (Martins et al., 2016). As B2B marketplaces are open ecosystems (Parker et al., 2016), they rely on the participation and interaction (Cusumano et al., 2019) of multiple external parties, including partners, competitors and governments (Drewel et al., 2018). As these factors influence the value created by a platform (Evans and Schmalensee, 2016), supplementing the TOE framework with INT variables will enhance the model within the context of this study.

This research adopts a framework inspired by the TOE framework and augmented by the INT factor of external pressure.

3.2 The research model and hypotheses

A conceptual model was developed to capture the salient factors from the technological, organisational and environmental perspectives that influence the adoption of a B2B marketplace by extending the TOE framework with INT. B2B marketplaces allow suppliers to sell directly to buyers via a platform (Hagiu and Wright, 2015b; Reillier and Reillier, 2017). B2B marketplaces provide the technology infrastructure and value-added services to facilitate the relationship and commercial trade between business buyers and sellers (Pavlou, 2002). Figure 4 depicts this conceptual model graphically.

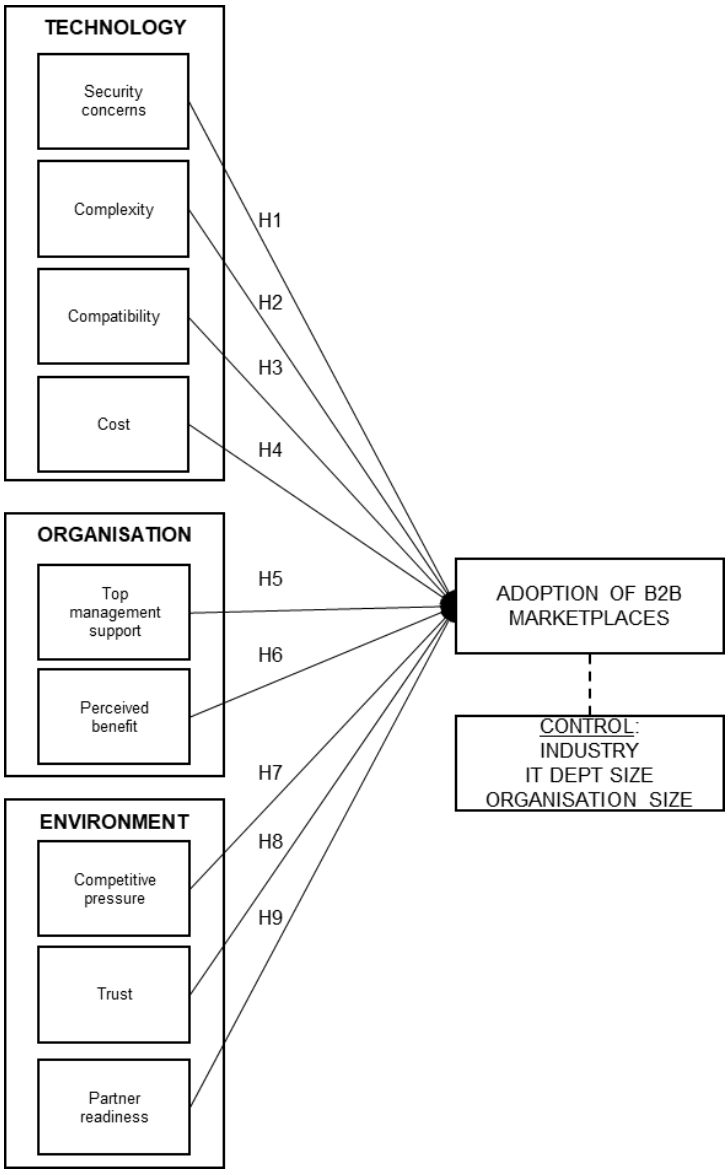

Figure 4: Conceptual model for adoption of B2B marketplace

This conceptual model includes three groups of variables (technology, organisational and environmental) that have been derived from the TOE framework and INT. All technology variables, all organisational variables, and the “trust” and “partner readiness” variables from the environmental context were derived from the TOE framework. The “competitive pressure” variable was derived from the INT. Adoption is the dependent variable and industry, organisation size and IT department size are the controlled variables in Figure 4.

Adoption can be defined as the decision stage of the innovation process where the organisation decides to accept and make the innovation available to the organisation. Prior work (Mohtaramzadeh et al., 2018; Soares-Aguiar and Palma-dos-Reis, 2008; Teo et al., 2009; Zhu et al., 2003) has examined adoption as a binary variable (e.g. adopters or non-adopters) where adoption is based on whether the organisation has or has not decided to adopt the IT innovation. Others (Sila, 2013) view adoption as the extent of usage of B2B technologies and measure it through taking the average organisation use of several technologies (e.g. procurement, inventory, order processing, customer service). Further, adoption can be considered in terms of a broader assimilation process, including initiation, adoption and routinisation (Zhu et al., 2006b). Hence, B2B marketplace adoption is defined as making the decision to own or participate in a B2B marketplace and allocating the necessary resources and acquiring the skills and capabilities to operationalise it. Furthermore, this study conceptualises adoption as the extent to which a B2B marketplace has been adopted by an organisation to supplement or replace its existing channel of procuring goods and services or as a channel to market and sell its products and services or as an owner to facilitate the sale and purchase of products and services between buyers and sellers.

The following sections provide details of each of the groups of variables (technological, organisational and environmental) specified in the conceptual model and found in Figure 4.

3.2.1 *Technological context*

This section describes the four variables associated with the technological context and the related hypotheses.

a. *Security concerns*

Security concern is defined as the extent to which an Internet-based platform is considered unsafe or unprotected for exchanging data and performing online operations (Zhu et al., 2006a). With B2B marketplaces, organisations are heavily dependent on the supplier for security measures and procedures. This presents the possibility for information leakages, fraud, and the opportunity for unauthorised access to data and privacy to be compromised (Martins et al., 2016; Zhu et al., 2006a). Also, the Internet-based connection between the provider and the organisation may be viewed as a security concern (Martins et al., 2016). Security concerns may result in organisations being less likely to adopt an e-business as a channel for doing business (Martins et al., 2016; Zhu et al., 2006a). Therefore, it is reasonable to hypothesise:

Hypothesis 1. Security concern is negatively related to B2B marketplace adoption.

b. *Complexity*

According to DOI theory, the complexity of an innovation refers to how difficult it is perceived to be to use and understand (Rogers, 1995). Organisations may be less likely to adopt an innovation if the associated complexity requires a high level of new skills from their employees (Martins et al., 2016). Past studies confirm that complexity can be an obstacle to adoption of technologies such as B2B e-Commerce (Sila, 2013; Sila and Dobni, 2012) and radio frequency identification (RFID) (Wang et al., 2010). Similarly, the greater the perceived complexity of a B2B marketplace, the less likely an organisation will adopt it (Kapoor et al., 2014; Low et al., 2011; Martins et al., 2016; Sila, 2013). Hence, it is reasonable to hypothesise:

Hypothesis 2. Complexity is negatively related to B2B marketplace adoption.

c. *Compatibility*

Rogers' (1995) DOI theory defines compatibility as the extent to which an innovation suits the prospective adopter's prevailing values, formal practices and existing needs. Organisations are more likely to adopt an innovation that is considered to be compatible with their existing processes, operations, IT infrastructure and systems (Kapoor et al., 2014; Low et al., 2011; Martins et al., 2016; Zhu et al., 2006a). Compatibility is important

to adoption because it eases implementation of the technology and its integration with other systems, allows for faster routinization into organisational work practices, simplifies change management processes and reduces organisational resistance. Past studies confirm that lack of compatibility can be an obstacle to adoption of technologies such as SaaS (Martins et al., 2016) and RFID (Wang et al., 2010). Therefore, it is reasonable to hypothesise:

Hypothesis 3: Compatibility is positively related to B2B marketplace adoption.

d. *Cost*

Extant literature (Mohtaramzadeh et al., 2018; Rahayu and Day, 2015; Shi and Yan, 2016; Sila, 2013) shows that costs inhibit the adoption of new technologies. Although the access to broader markets scale and greater scope could reduce procurement and coordination costs, there are high expenses associated with the initial deployment, integration, operation and ongoing support when participating in B2B marketplaces (Loukis et al., 2011; Zhang and Bhattacharyya, 2010), which can also deter their adoption. Therefore, it can be hypothesised that:

Hypothesis 4: Perceived costs are negatively related to B2B marketplace adoption.

3.2.2 *Organisational context*

This section describes the two variables associated with the organisational context and the related hypotheses.

a. *Top management support*

The support of top management relates to their devotion to driving the change and is generally considered as a key factor for determining the adoption of IS innovations (Mohtaramzadeh et al., 2018; Sila and Dobni, 2012; Teo et al., 2003; Tomás et al., 2018). Innovations potentially impact many aspects of an organisation (e.g. business processes and structures) and require financial support (Shi and Yan, 2016). The viability of these changes requires top management support (Martins et al., 2016) as they support the adoption by encouraging staff to accept the change by allocating the required financial and

non-financial resources and communicating the related benefits (Mohtaramzadeh et al., 2018; Sila, 2013; Tomás et al., 2018; Zollet and Back, 2015). This may indicate that if top management support is weak or does not acknowledge the benefit of B2B marketplace to the business, the organisation may actively resist its adoption. Therefore, it is reasonable to hypothesise:

Hypothesis 5: Top management support is positively related to B2B marketplace adoption.

b. *Perceived benefits*

Perceived benefits include reduced expenses, enhanced collaboration with partners and clients, improved productivity and greater return on investment that accrue at the organisational level (Gibbs and Kraemer, 2004). Perceived benefits associated with innovation have previously been demonstrated to have a positive impact on the adoption of technology. Empirical research has established that perceived benefits have a positive effect on IT adoption in the contexts such as B2B e-Commerce (Gibbs and Kraemer, 2004), e-Commerce (Oliveira and Martins, 2009; Rahayu and Day, 2015) and e-Procurement (Teo et al., 2009). Hence, it is reasonable to hypothesise:

Hypothesis 6: Perceived benefits (strategic and operational) are positively related to B2B marketplace adoption.

3.2.3 *Environmental context*

This section describes the three variables associated with the environmental context and the related hypotheses.

a. *Competitive pressure*

Institutional theory suggests that mimetic pressures occur in uncertain environments where organisations believe they will achieve positive results if they adopt systems used by other successful organisations (Tomás et al., 2018). Organisations may respond to mimetic pressures to keep up with competitors and adopt new technology innovations based on the perceived success of competitors (Gibbs and Kraemer, 2004). Organisations believe that by adopting this new technology, they will strengthen their competitive position and improve performance (Mohtaramzadeh et al., 2018).

Competitive pressure is the level of tension experienced by the organisation from competitors within an industry (Soares-Aguiar and Palma-dos-Reis, 2008). Organisations operating in competitive environments continuously need to evaluate technology trends to remain competitive and relevant. Innovation literature regards competitive pressure as a key motivator for technology adoption (Zhu and Kraemer, 2005) and is a central reason for B2B e-Commerce adoption (Mohtaramzadeh et al., 2018; Sila, 2013; Sila and Dobni, 2012; Zhu et al., 2006a). Therefore, it can be hypothesised that:

Hypothesis 7: Competitive pressure is positively related to B2B marketplace adoption.

b. *Trust*

Trust is defined as "the belief the trusting agent has in the trusted agent's willingness and capability to deliver a mutually agreed service in a given context" (Antoniou and Batten, 2011, p. 422). Trust can be viewed as social capital and is especially important when business is conducted through electronic communications (Liu et al., 2008). Trust in supply chain members is an important facilitator of inter-firm relationships (Chan and Chong, 2013). Trust is a critical factor between buyers and sellers, and mutual trust must be developed before B2B e-Commerce transactions are adopted (Antoniou and Batten, 2011). To be perceived effective, online infrastructures need to ensure that all parties are trustworthy, that there are adequate rules to moderate behaviour, and that there are sufficient laws and regulation to protect participants (Fang et al., 2014).The stronger the trust, the greater the perceived capabilities to adopt a B2B marketplace (Liu et al., 2008; Sila, 2013; Sila and Dobni, 2012).

Hence, it is reasonable to hypothesise:

Hypothesis 8: Trust is positively related to B2B marketplace adoption.

c. *Partner readiness*

Substantial empirical support exists for the value of trading partner readiness in effectively adopting IT innovations (Lin and Lin, 2008; Soares-Aguiar and Palma-dos-Reis, 2008). Partner relationships are an important determinant of inter-organisational system adoption (Lin and Lin, 2008). In a trading community where there is a greater degree of partner

readiness, individual adopters will benefit more from the adoption due to the network effect (Zhu et al., 2006a). As B2B marketplaces extend beyond the walls of a single organisation, it may be more appropriate for there to be tight integration with partners' systems (Soares-Aguiar and Palma-dos-Reis, 2008). Therefore, it can be hypothesised that:

Hypothesis 9: Partner readiness is positively related to B2B marketplace adoption.

3.2.4 *Control variable*

Finally, the organisation's industry, size and IT department size are the control variables (Soares-Aguiar and Palma-dos-Reis, 2008).

3.3 Conclusion

This chapter discussed TOE and INT as theoretical underpinnings and developed a research model hypothesising the effect of four technology factors, two organisational factors and three environmental factors on organisational adoption of B2B marketplace platforms.

The hypotheses are summarised in Table 2.

Table 2: Summary of the hypotheses

HYPOTHESIS	DESCRIPTION
H1	Security concern is negatively related to B2B marketplace adoption.
H2	Complexity is negatively related to B2B marketplace adoption.
H3	Compatibility is positively related to B2B marketplace adoption.
H4	Perceived costs are negatively related to B2B marketplace adoption.
H5	Top management support is positively related to B2B marketplace adoption.
H6	Perceived benefits (strategic and operational) are positively related to B2B marketplace adoption.
H7	Competitive pressure is positively related to B2B marketplace adoption.
H8	Trust is positively related to B2B marketplace adoption.
H9	Partner readiness is positively related to B2B marketplace adoption.

The next chapter describes the research methodology that was used to test the research model.

4 RESEARCH METHODOLOGY

This section describes the research methodology used to address the research question and test the hypotheses. It defines the research paradigm, research approach, research design, research strategy, time horizon and data collection methods followed in this study. Next, the data analysis methods are outlined. Finally, the ethical considerations associated with this study are discussed.

Research methodology is the method used in conducting a study (Antwi and Hamza, 2015). The research methodology employed in this study has been guided by an adapted version of Saunders et al. research onion (Saunders et al., 2009), as depicted in Figure 5.

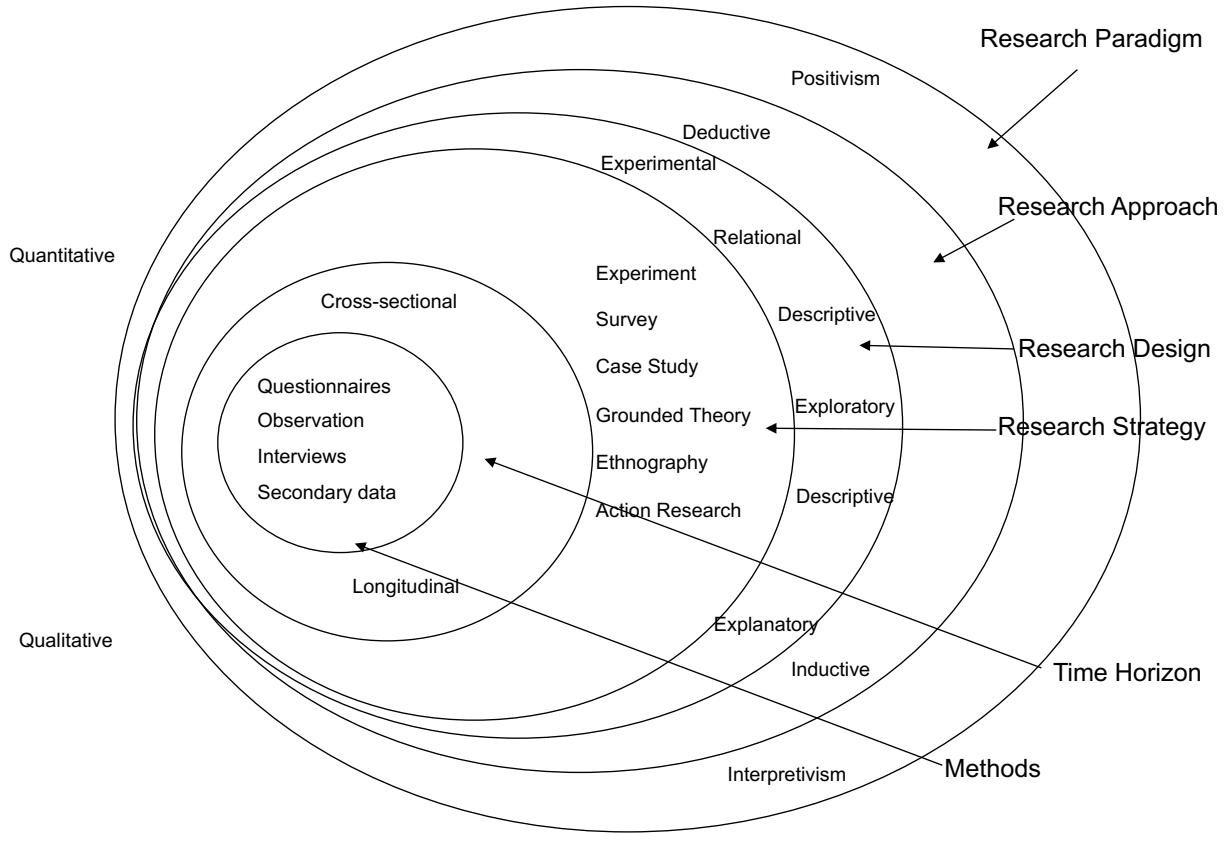

Figure 5: Research onion (adapted from Saunders et al., 2009)

4.1 Research paradigm and approach

This section describes the two outer rings of the Saunders' onion (Figure 5): the research paradigm and the research approach.

4.1.1 *Research paradigm*

A paradigm refers to "the mental models or frames of references that we use to organize our reasoning and observation" (Bhattacherjee, 2012, p. 17). Oates (2005, p. 282) defines a paradigm as "a set of shared assumptions or ways of thinking about some aspect of the world." Paradigms drive the underlying beliefs and processes of how various communities of researchers conduct research and create knowledge (Bhattacherjee, 2012). A paradigm is shaped by different ontologies and epistemologies. The term ontology refers to the assumptions the researcher takes to define reality and the truth (Antwi and Hamza, 2015; Bhattacherjee, 2012). Epistemology refers to the assumptions about the best way to study the world and the process the researcher deploys to come to know the truth and reality (Antwi and Hamza, 2015; Bhattacherjee, 2012).

Positivism and interpretivism are two popular philosophical paradigms used in IS research (Oates, 2005).

Positivism has its roots in the natural sciences and is considered to be the oldest, and by some, the right way to conduct research (Oates, 2005). This paradigm has two basic underlying assumptions:

- The world is not random but has order and regularity (Oates, 2005); and
- Research of this world can be conducted objectively, and the researcher must remain neutral and independent (Oates, 2005).

In contrast, interpretivism has a shared view that there is no one single version of the truth and that multiple subjective realities exist. Interpretivists believe that it is not possible to eliminate bias and embrace the role of the researcher in the process (Oates, 2005).

The researcher in this study is informed by the positivism paradigm. Positivists believe that reality is objective and can be measured using properties that are independent of the

researcher and the instrument used. These researchers believe that knowledge is quantifiable and objective (Antwi and Hamza, 2015). These studies predominantly test theories to increase the predictive understanding of a phenomenon (Orlikowski and Baroudi, 1991). Positivist researchers use quantitative techniques to explain how variables interact, shape events, and cause outcomes (Antwi and Hamza, 2015). This is consistent with this study's aim to measure and test the relationships between a set of variables derived from TOE and INT theory by operationalising variables, measuring the variables, analysing the variables and testing hypotheses.

4.1.2 *Research approach*

Researchers can adopt either a deductive approach or an inductive approach to research.

In the deductive approach, researchers test concepts or patterns utilising established theories (theory testing) with newly acquired empirical data (Bhattacherjee, 2012). Positivist researchers tend to follow a deductive approach to research: starting with the formulation of a theory, deriving a hypothesis, objectively testing the derived hypothesis, observing results, determining whether these results confirm or refute the derived hypothesis, and finally accepting, modifying or rejecting the formulated theory (Oates, 2005).

The inductive approach infers theoretical concepts (theory building) and patterns from observed data (Bhattacherjee, 2012). Interpretivist researchers follow an inductive approach to research: collect data, observe and analyse patterns, and then derive a theory or framework (Bhattacherjee, 2012; Saunders et al., 2009).

There are several established theories for the explanation of the adoption of innovative technologies. Applying these theories to the adoption of B2B marketplaces and gathering the relevant data will enable an understanding of the relationship between B2B marketplace adoption and the identified independent variables. This is consistent with the positivist paradigm and deductive approach to research. More specifically, the study has drawn on the TOE framework along with INT to develop a conceptual model hypothesising the impacts of selected technological, organisational, and environmental variables on B2B

marketplace adoption behaviour. It can thus be described as hypothetico-deductive in nature.

In the research onion (Saunders et al., 2009), the research choice refers to the combination of data collection techniques and data analysis procedures. Quantitative research relies on data collection and analysis procedures that generate and utilise numerical data in the form of categorical (e.g. industry type) or scales (e.g. Likert scale-based questions) data collected from surveys. The quantitative methodology thus endeavours to quantify social phenomena, collect and analyse numerical data, and create associations between a smaller volume of attributes across many instances (Antwi and Hamza, 2015).

Qualitative research relies on data collection and data analysis procedures that primarily generate and utilise non-numerical data, such as words collected from interviews or documents (Saunders et al., 2009). Interpretivist research typically uses qualitative research to understand real-world situations subjectively as they naturally occur (Antwi and Hamza, 2015). The qualitative methodology attempts to understand the meaning of social phenomena by studying a large number of attributes in a few instances (Antwi and Hamza, 2015).

A quantitative approach is consistent with this study's objective of testing the combined and relative effects of selected TOE factors on adoption and reaching conclusions based on statistical probability.

The study can thus be summarised as informed by positivism and following a deductive, quantitative approach. The specific strategy and methods for data collection and analysis are described next.

4.2 Research design and methodology

This section covers three of the inner rings of the Saunders' onion (Figure 5): the research design, research strategy and time horizon.

4.2.1 *Research design*

Research design is the process of creating a plan of the activities required to satisfy the research question (Bhattacherjee, 2012; Saunders et al., 2009). There are five types of research design: exploratory, descriptive, relational, experimental and explanatory.

Exploratory research is a process of investigating a problem that is not clearly defined or has not been comprehensively studied in the past. It is generally performed to obtain a richer understanding of the existing problem but will not generally provide conclusive results (Saunders et al., 2009). It may be applied to identify the research questions or hypotheses to be used in future research (Oates, 2005).

Descriptive research aims to describe a phenomenon and its characteristics in rich detail (Oates, 2005). This type of research is more concerned with what, where and when of a phenomenon (Bhattacherjee, 2012). It provides a detailed analysis of a phenomenon within a specific context. Descriptive research generally precedes a piece of explanatory research to provide a comprehensive view of the phenomena prior to research design and data collection (Saunders et al., 2009).

Relational research design studies the association between two or more variables. This type of research is also referred to as a correlational study where the researcher uses theories or hypotheses to test which variables cause a phenomenon to occur (Cooper et al., 2003). A relational hypothesis describes the relationship between two variables for a defined phenomenon and can be either correlational or explanatory. A correlational hypothesis proposes that variables occur together in a specific way but does not imply that one variable causes a change in the other variable. While, an explanatory (causal) hypothesis implies that the change in one variable causes or results in a change to another variable (Cooper et al., 2003).

In experimental research, the researcher adjusts one or more independent variables with a randomly selected group to observe the result on the dependent variable (Bhattacherjee, 2012). The researcher introduces a catalyst and monitors its effects on the variables in experimental research.

The objective of explanatory research is to obtain explanations of observed phenomena, problems, or behaviours (Bhattacherjee, 2012). It aims to explain or interpret why events happened, or specific outcomes occurred and the relationships between the variables (Oates, 2005). It goes beyond descriptive research and focuses on the why and how of a phenomenon (Bhattacherjee, 2012).

This research study poses the research question: What are the technological, organisational and environmental factors influencing the adoption of B2B marketplaces by South African organisations, and what are their relative effects on adoption? This research thus aimed to study the adoption of B2B marketplaces as a function of the factors hypothesised in Section 3.2, i.e., the research is interested in the correlational association between adoption and the various TOE and INT factors. Consequently, this study employed a relational research design.

4.2.2 *Research strategy*

There are several research strategies available to researchers (Oates, 2005; Saunders et al., 2009), such as survey, experiment, case study, grounded theory, action research and ethnography.

Strategies such as laboratory experiments and surveys are well suited to testing theories and hypotheses (Bhattacherjee, 2012). Relational research is normally conducted with either survey or experimental research (Oates, 2005). Surveys are associated with the deductive approach and are commonly utilised in business and management research (Saunders et al., 2009). The survey research method is appropriate for this study as it will enable the collection of quantitative data from a large sample of organisations for statistical analysis to determine the relationship between the variables (Saunders et al., 2009).

Survey research has several benefits relative to other research strategies. It provides an effective means of measuring a wide variety of unobservable data (Bhattacherjee, 2012). Survey research is well suited to remotely collect data from large populations and is unobtrusive (Bhattacherjee, 2012). Finally, survey research is economical from a time, cost, and effort perspective (Bhattacherjee, 2012; Saunders et al., 2009). Survey research also has several limitations. Once surveys have been issued, they are not flexible to

change. Generally, surveys focus on the breadth of coverage instead of depth (Oates, 2005). Surveys are also subject to several biases, including recall, sampling, social desirability and non-response (Bhattacherjee, 2012).

The survey is a popular design for a relational study (Creswell and Cresswell, 2017) and was used in this research.

4.2.3 *Time horizon*

This study employed a cross-sectional survey to collect the data on all variables at the same point in time (Bhattacherjee, 2012; Saunders et al., 2009). A limitation of the cross-sectional field survey relates to temporal precedence, as the data on the independent and dependent variables are collected at the same point in time when the survey is administered. As a result, the data from a cross-sectional survey lacks temporal precedence, and causality cannot then be inferred from the evidence (Bhattacherjee, 2012). Any inferences about causality can only be made with reference to the theories underpinning the study.

4.3 Data collection methods

This section covers the inner ring of the Saunders' onion (Figure 5): the research method.

This study aimed to understand the factors that explain the adoption of B2B marketplaces in South African organisations. A survey research strategy has been adopted, and a structured questionnaire was used to collect the data systematically from participants.

4.3.1 *Measurement and instrument construction*

The process of designing accurate measures or indicators for abstract constructs is called operationalisation (Bhattacherjee, 2012). This section will describe the operationalisation process of the dependent variable, independent variables and control variables.

a. *Operationalisation process*

The process of operationalisation consists of several steps:

- The researcher defines the operational definition of the construct (Bhattacherjee, 2012);
- Conducts a literature review to determine if there are existing measures or measures that can be adapted to match the operational definition of the construct (Bhattacherjee, 2012); and
- In the absence of existing measures, the researchers must design, test and validate new measures (Bhattacherjee, 2012).

Constructs in social sciences are difficult to define and measure, which can be a challenging process (Bhattacherjee, 2012). As social sciences constructs are generally subjective, several indicators are used to measure them (Bhattacherjee, 2012).

Content validity refers to the extent that a measurement instrument adequately covers the questions being investigated (Saunders et al., 2009). To establish the content validity of the measures for the questionnaire items, items were drawn from a collection of survey instruments that had been tested and used in previous studies. The measures were adapted from existing scales found in the literature. All scale items were rephrased to relate specifically to B2B marketplaces.

b. *Dependent variable*

The dependent variable in the research model in Figure 4 is B2B marketplace adoption. For the purpose of hypothesis testing, the dependent variable was a simple dichotomous (yes/no) measure reflecting whether or not the organisation participates in a B2B marketplace. In addition, for descriptive purposes, data on adoption was also collected on the stage of adoption or planning, the role(s) the organisations have assumed (or plan to assume) in the B2B marketplace, and as the degree of participation (or expected participation) based on the percentages of sales and transactions occurring through the marketplace.

Table 3: Dependent variable measurement

VARIABLE	CONCEPTUAL DEFINITION	MEASUREMENT ITEM	LITERATURE REFERENCE
Adoption	"The decision stage of the innovation process where the organisation decides to accept and make the innovation available to the organisation."	"Does your organisation participate in a B2B marketplace? Answer either Yes or No."	Soares-Aguiar and Palma-dos-Reis, 2008
		"What role does your organisation assume within the B2B marketplace: buyer, seller, platform owner (run the platform), partner, not sure or other?" An organisation may assume more than one role.	Drewel et al., 2018
		<u>If answer yes to adoption:</u> • "Our core business activities (e.g. sales or procurement) rely heavily on our participation in B2B marketplace(s)." • "A large percentage of our relevant transactions take place through B2B marketplace(s)." • "Use of B2B marketplace(s) is strongly embedded in the execution of our core business processes." **<u>If no to adoption:</u>** • "In the near future, our core business activities (e.g. sales or procurement) rely heavily on our participation in B2B marketplace(s)." • "In the near future, a large percentage of our relevant transactions take place through B2B marketplace(s)." • "In the near future, use of B2B marketplace(s) is strongly embedded in the execution of our core business processes."	Liang et al., 2007

Intention to adopt is measured as a categorical variable representing the stage the organisation is in the adoption of B2B marketplace (Table 4). All other items were measured on a five-point Likert scale ranging from 1 = “strongly disagree” to 5 = “strongly agree”.

Table 4: Measurement items for intention to adopt and routinisation

VARIABLE	CONCEPTUAL DEFINITION	MEASUREMENT ITEM	LITERATURE REFERENCE
Diffusion stages	"Adoption can be considered in terms of a broader assimilation process including initiation, adoption, and routinisation."	**Intention to adopt** • "We have not adopted but we have plans to adopt within the next year." • "We have not adopted but we have plans to adopt within 1 to 3 years." • "We have not adopted but we have plans to adopt within the next 3 to 5 years." • "We have no current plans to adopt." **Adoption** • "We have adopted and already participate in a B2B marketplace." **Routinisation** If adopted • "Our core business activities (e.g. sales or procurement) rely heavily on our participation in B2B marketplace(s)." • "A large percentage of our relevant transactions take place through B2B marketplace(s)." • "Use of B2B marketplace(s) is strongly embedded in the execution of our core business processes." If, not adopted • "In the near future, our core business activities (e.g. sales or procurement) are likely to rely heavily on our participation in B2B marketplace(s)." • "In the near future, a large percentage of our relevant transactions is are likely to take place through B2B marketplace(s)." • "In the near future, use of B2B marketplace(s) is likely to be strongly embedded in the execution of our core business processes."	Zhu et al., 2006b

c. *Independent variables*

Table 5 provides measurement items sourced from the literature that will be used to measure each of the independent variables in the study. The items are all measured on a five-point Likert scale ranging from 1 = “strongly disagree” to 5 = “strongly agree”.

Table 5: Measurement items for independent variables

VARIABLE	CONCEPTUAL DEFINITION	ITEM CODE	MEASUREMENT ITEM	LITERATURE REFERENCE
Security concern	“Security concern is defined as the extent to which an internet-based platform is considered unsafe or unprotected for exchanging data and performing online operations.”	SC1	“The confidentiality and security of my company’s data are not guaranteed when adopting a B2B marketplace.”	Martins et al., 2016; Zhu et al., 2006a
		SC2	“Adopting a B2B marketplace would be a security risk for our IT infrastructure.”	
		SC3	“It is difficult to assess the compliance of B2B marketplaces with information security standards.”	
		SC4	“It is difficult to assess the compliance of B2B marketplaces with data protection laws.”	
Complexity	“The complexity of an innovation refers to how difficult it perceived to be to use and understand.”	CM1	“The use of B2B marketplaces requires skills that my company does not have.”	Martins et al., 2016
		CM2	“The use of B2B marketplaces is too complex for my company’s business operations.”	
Compatibility	“Compatibility is the extent to which an innovation suits with the prospective adopter’s prevailing values, former practices and existing needs.”	CO1	“B2B marketplace technologies are compatible with my company’s existing IT infrastructure.”	Martins et al., 2016; Zhu et al., 2006a
		CO2	“B2B Marketplaces are compatible with my organisation’s business processes and operations.”	

		CO3	"B2B Marketplace technologies are compatible with my company's existing systems (e.g. Finance, ERP, CRM, SCM)."	
Costs	"The expenses of implementing the necessary technologies for marketplace and efforts devoted to organisational restructuring and process re-engineering."	CT1	"Adopting B2B marketplace technologies will increase hardware facility costs."	Shi and Yan, 2016
		CT2	"Adopting B2B marketplace technologies will increase operations and maintenance costs."	
		CT3	"B2B marketplace participation is costly for my organisation."	
Top management support	"A positive attitude on the part of managers toward change creates an organisational environment that is receptive to innovation."	TM1	"Top management is likely to take risks involving the implementation of a B2B marketplace."	Martins et al., 2016; Tomás et al., 2018
		TM2	"Top management actively participates in establishing a vision and formulating strategies for utilising B2B marketplaces."	
		TM3	"Top management communicates its support for the use of B2B Marketplaces."	
Perceived benefits	"Perceived benefits include reduced expenses, enhanced collaboration with partners and clients, improved productivity and greater return on investment."		**Strategic benefits:**	Zollet and Back, 2015
		PB1	"The adoption of a B2B marketplace will increase my company's ability to compete."	
		PB2	"The adoption of a B2B marketplace will allow my company to reach new customers."	
			Operational benefits:	
		PB3	"The adoption of a B2B marketplace will reduce my company's cost of performing business transactions."	

		PB4	"The adoption of a B2B marketplace will enable my company to provide better customer service."	
		PB5	"The adoption of a B2B marketplace will improve our relationship with our existing customers."	
		PB6	"The adoption of a B2B marketplace will improve my company's level of efficiency in terms of improved operational procedures."	
Competitive pressure	"Competitive pressure is the level of tension experienced by the organisation from competitors within an industry, i.e., peer pressure on using a new technology."	CP1	"Our firm is under pressure from competitors to adopt B2B marketplace systems."	Mohtaramzadeh et al., 2018
		CP2	"It is easy for our customers to switch to another company for similar services/products without much difficulty."	
		CP3	"The competition among companies in the industry which my company operates in is very intense."	
		CP4	"An industry move to utilise the B2B marketplace systems would put pressure on my firm to do the same."	
		CP5	"Some of our competitors have already started using B2B marketplace systems."	
		CP6	"Our competitors know the importance of B2B marketplace systems and using them for operations."	
Trust	"The belief the trusting agent has in the trusted agent's willingness and capability to deliver a mutually	TR1	"B2B marketplaces adequately protect all parties from inappropriate behaviours of others on the platform."	Fang et al., 2014

	agreed service in a given context and in a given time slot."	TR2	"B2B marketplaces ensure all transactions on the platform are safe and secure."	
		TR3	"B2B marketplaces ensure that all participating parties are trustworthy."	
		TR4	"B2B marketplaces have adequate rules to regulate the behaviour of participating parties on their platforms."	
		TR5	"There are sufficient laws and regulations to protect parties who participate in B2B marketplaces."	
		TR6	"There are sufficient third parties who can step in should something go wrong for any participant in a B2B marketplace."	
Partner readiness	"The degree to which trading partners, up and down the value chain, have the systems in place to conduct transactions on the marketplace platform."	PR1	"Our downstream customers are ready to transact with us on B2B marketplaces."	Zhu et al., 2006a
		PR2	"Our upstream partners are ready to transact with us on B2B marketplaces."	
		PR3	"Our trading partners work to ensure their systems are interoperable with the B2B marketplace."	

d. *Control variable*

The control variables included in the questionnaire are the industry that the organisation is in, organisation size and the size of the IT function. The industry was classified according to the nine major standard industrial classification (SIC) Codes detailed in Table 6. Organisational size was determined based on the number of employees. The size of the IT function was measured by the number of IT employees and the size of the IT budget.

Table 6: Standard Industrial Classification codes

Standard Industrial Classification (SIC) Code	SIC Description
1	Agriculture, Hunting, Forestry and Fishing
2	Mining and Quarrying
3	Manufacturing
4	Electricity, Gas and Water Supply
5	Construction
6	Wholesale and Retail Trade
7	Transport, Storage and Communication
8	Financial, Insurance, Real Estate and Business Services
9	Community, Social and Personal Services

4.3.2 *Sampling and respondents*

The unit of analysis in this research was the organisation level and the population of interest is South African organisations. The population is defined as all the people or items that meet the criteria of the intended study (Bhattacherjee, 2012). As the population of South African organisations is too broad to study and it is not possible to investigate all these organisations, a sample was needed. A sample is a sub-group or part of the population (Saunders et al., 2009).

A sampling frame is the accessible section of the target population from which the sample will be drawn (Bhattacherjee, 2012). B2B marketplaces can be designed to serve multiple industries (i.e. horizontal marketplaces) or serve the specific needs of a particular industry (vertical marketplaces) (Wang and Archer, 2007). This study included both horizontal and vertical marketplaces, and hence a sample of organisations from different industries in South Africa was required. Therefore, it was decided to utilise Who Owns Whom Directory

(2020 edition) as the sampling frame to identify South African organisations targeted for inclusion in the study. This directory covers all industries, types of organisations, and contains the relevant contact details. For example, the Who Owns Whom Directory lists manufacturers, wholesalers and retailers who might benefit from using a horizontal B2B marketplace, such as Massmart's Makro or Nasper's Takealot. Both Standard Bank and MTN are in the directory and have both launched B2B marketplaces over the last 12 months (TechCentral, 2020; TechCentral, 2021). Guidelines for sample size differ according to the statistical technique utilised. For factor analysis, the sample size depends on the number of items. For 25 items, the sample size should be 250, and for 90 items, the sample size should be 400 (Siddiqui, 2013). This research has 36 items, so a sample size between 250 and 400 would ideally be appropriate for factor analysis.

The final step in sampling is choosing the sampling method. The sampling method defines how the sample members are selected from the sample frame (Bhattacherjee, 2012). There are two broad categories: probability and non-probability sampling. Probability sampling is a technique in which each unit in the population has a chance of being included in the sample, and this chance can be precisely calculated. Non-probability sampling is a sampling method in which certain units of the population have zero chance of selection or where the probability of selection cannot be precisely calculated (Bhattacherjee, 2012). Probability sampling helps improve the external validity or generalisability of the research (Bhattacherjee, 2012). A random sample was selected from the identified list via systematic sampling. Systematic sampling is the process of ordering the sample frame according to predefined criteria and then selecting from the list at a regular interval (Bhattacherjee, 2012). For this study, the list was ordered alphabetically, an organisation was randomly selected as the first organisation, and then every fourth organisation was selected for inclusion in the study. This process was repeated until 400 organisations were randomly selected.

A key informant within each organisation was identified to participate in the study. The key informant was identified as an individual within the organisation that is knowledgeable about the adoption of B2B marketplaces. These included senior resources responsible for the strategic direction and execution within the organisation, including the Chief Digital Officer, Chief Innovation Officer, Chief Information Officer, Head of IT, Head of Operations

or similar roles. To identify the key informants in each company, the profiles of the sampled companies was reviewed in the Who Owns Whom Directory (2020 edition) for directors and managers who fit the above roles. From the initial list, only 25 suitable respondents could be found. When a suitable individual could not be found, 340 e-mails were sent to the listed e-mail address requesting the relevant details. Only five responses were received. A telephone call was then made to the listed number, and a further 70 responses were received. This was followed by a review of the listed website to determine if an appropriate individual could be found.

Non-probability sampling is a sampling practice that does not endeavour to create a representative sample (Cooper et al., 2003) but rather, the researcher picks potential respondents as they are available and they embody qualities the researcher wants to analyse (Creswell and Creswell, 2017). There are several common types of non-probability sampling, including purposive, snowball and convenience sampling (Cooper et al., 2003). Purposive sampling is where the researcher selects participants for their unique characteristics relevant to the objectives of the study. Snowball sampling is where participants direct researchers to other potential respondents that exhibit similar characteristics, experiences, or attitudes to themselves. Finally, with convenience sampling, researchers choose those participants that are readily available (Cooper et al., 2003).

As insufficient responses were received from the initial probability-based approach, a decision was made to complement the approach with a non-probability convenience and snowball sampling. Additional respondents were identified from LinkedIn contacts as a convenience sample. These identified contacts were contacted within LinkedIn messaging and requested to participate. They were all appropriate key informants from organisations with similar characteristics and from similar industries to those listed in the Who Owns Whom directory, and thus B2B marketplaces would have relevance to them. Those respondents who were willing to participate were asked to provide their e-mail addresses, and a link to the survey was sent to them. They were also asked to extend an invitation to suitable candidates in their network.

4.3.3 *Pre- and pilot testing*

Pre- and pilot testing can further enhance content and face validity of a survey instrument (Saunders et al., 2009).

a. *Pre-test*

For pre-testing, the draft questionnaire was sent to two academics familiar with IS adoption research and two industry experts familiar with B2B marketplaces. Feedback was sought on the structure of the questionnaire, clarity of the instructions, clarity of questions, suitability of the questions, consistency of the terms, time taken to complete, and any other general comments (Oates, 2005; Saunders et al., 2009). This was done by e-mail.

Table 7 shows the items before the pre-test and after the pre-test.

Table 7: Pre-test change log

<table>
<tr><th>Item</th><th>Before</th><th>After</th><th>Change made</th></tr>
<tr><td>Instrument introduction</td><td>A business-to-business (B2B) marketplace allows suppliers to sell directly to buyers via an online platform. B2B marketplaces provide the technology infrastructure and value-added services that facilitate relationships and commercial trade between business buyers and sellers and other parties on the platform</td><td>A business-to-business (B2B) marketplace allows suppliers to sell products and services directly to buyers via an online platform. B2B marketplaces provide the technology infrastructure and value-added services that facilitate relationships and commercial trade between business buyers and sellers and other parties on the platform.</td><td>Addition of products and services to the first sentence.</td></tr>
<tr><td>Section 1 demographic information</td><td><u>Section 1</u>
Please specify your job title.
<table><tr><td>Job title</td><td></td></tr></table></td><td><u>Section 1</u>
Please specify your job title and tick the appropriate box relating to your level of seniority.
<table><tr><td>Job title</td><td colspan="2"></td></tr><tr><td rowspan="4">Level</td><td>Executive Management</td><td></td></tr><tr><td>Senior Management</td><td></td></tr><tr><td>Junior Management</td><td></td></tr><tr><td>General Staff</td><td></td></tr></table></td><td>Additions to the instruction.
Added level of job.</td></tr>
<tr><td>Section 1 demographic information</td><td><table><tr><th>Industry SIC Code</th><th>SIC Description</th><th></th></tr><tr><td>1</td><td>Agriculture, Hunting, Forestry and Fishing</td><td></td></tr><tr><td>2</td><td>Mining and Quarrying</td><td></td></tr><tr><td>3</td><td>Manufacturing</td><td></td></tr><tr><td>4</td><td>Electricity, Gas and Water Supply</td><td></td></tr><tr><td>5</td><td>Construction</td><td></td></tr><tr><td>6</td><td>Wholesale and Retail Trade</td><td></td></tr><tr><td>7</td><td>Transport, Storage and Communication</td><td></td></tr><tr><td>8</td><td>Financial, Insurance, Real Estate and Business Services</td><td></td></tr><tr><td>9</td><td>Community, Social and Personal Services</td><td></td></tr><tr><td>Other</td><td></td><td></td></tr></table></td><td><table><tr><th>Industry SIC Code</th><th>Standard Industry Code (SIC) Description</th><th></th></tr><tr><td>1</td><td>Agriculture, Hunting, Forestry and Fishing</td><td></td></tr><tr><td>2</td><td>Mining and Quarrying</td><td></td></tr><tr><td>3</td><td>Manufacturing</td><td></td></tr><tr><td>4</td><td>Electricity, Gas and Water Supply</td><td></td></tr><tr><td>5</td><td>Construction</td><td></td></tr><tr><td>6</td><td>Wholesale and Retail Trade</td><td></td></tr><tr><td>7</td><td>Transport, Storage and Communication</td><td></td></tr><tr><td>8</td><td>Financial, Insurance, Real Estate and Business Services</td><td></td></tr><tr><td>9</td><td>Community, Social and Personal Services</td><td></td></tr><tr><td>Other</td><td></td><td></td></tr></table></td><td>Explanation of the abbreviation SIC.</td></tr>
<tr><td>Section 2 roles</td><td><table><tr><td rowspan="6">Role</td><td>Buyer</td><td></td></tr><tr><td>Seller</td><td></td></tr><tr><td>Platform Owner</td><td></td></tr><tr><td>Partner</td><td></td></tr><tr><td>Not sure</td><td></td></tr><tr><td>Other (please specify)</td><td></td></tr></table></td><td><table><tr><td rowspan="6">Role</td><td>Buyer</td><td></td></tr><tr><td>Seller</td><td></td></tr><tr><td>Platform Owner (run the platform)</td><td></td></tr><tr><td>Partner</td><td></td></tr><tr><td>Not sure</td><td></td></tr><tr><td>Other (please specify)</td><td></td></tr></table></td><td>Clarifying the role of the platform owner.</td></tr>
<tr><td>Section 2 level of adoption</td><td><table><tr><th>Level of adoption</th><th>Strongly Disagree</th><th>Disagree</th><th>Neutral</th><th>Agree</th><th>Strongly Agree</th></tr><tr><td>• In the near future, our core business activities (e.g. sales or procurement) are likely to rely heavily on our participation in B2B Marketplace(s).</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• In the near future, a large percentage of our relevant transactions is likely to take place through B2B Marketplace(s).</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• In the near future, use of B2B Marketplace(s) is likely to be strongly embedded in the execution of our core business processes.</td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td><table><tr><th>Level of adoption</th><th>Strongly Disagree</th><th>Disagree</th><th>Neutral</th><th>Agree</th><th>Strongly Agree</th></tr><tr><td>• In the near future, our core business activities (e.g. sales or procurement) are likely to rely heavily on our participation in B2B Marketplace(s).</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• In the near future, a large percentage of our relevant transactions are likely to take place through B2B Marketplace(s).</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>• In the near future, use of B2B Marketplace(s) is likely to be strongly embedded in the execution of our core business processes.</td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>Rewording of item 2 i.e. is to are.</td></tr>
<tr><td>Section 3 Question 2</td><td><table><tr><th>Complexity</th><th>Strongly Disagree 1</th><th>Disagree 2</th><th>Neutral 3</th><th>Agree 4</th><th>Strongly Agree 5</th></tr><tr><td>"The use of B2B Marketplaces requires skills that my company does not have."</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>"The use of B2B Marketplaces is too complex for my company's business operations."</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>"The skills needed to adopt B2B Marketplaces is too complex for the employees of my company."</td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td><table><tr><th>Complexity</th><th>Strongly Disagree 1</th><th>Disagree 2</th><th>Neutral 3</th><th>Agree 4</th><th>Strongly Agree 5</th></tr><tr><td>"The use of B2B Marketplaces requires skills that my company does not have."</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>"The use of B2B Marketplaces is too complex for my company's business operations."</td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>Removal of the final question.</td></tr>
</table>

<table>
<tr><th>Item</th><th>Before</th><th>After</th><th>Change made</th></tr>
<tr>
<td>Section 3
Question 7</td>
<td>
<table>
<tr><th>Competitive Pressure</th><th>Strongly Disagree 1</th><th>Disagree 2</th><th>Neutral 3</th><th>Agree 4</th><th>Strongly Agree 5</th></tr>
<tr><td>"Our firm is under pressure from competitors to adopt B2B Marketplace systems."</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>"It is easy for our customers to switch to another company for similar services/products without much difficulty."</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>"The competition among companies in the industry which my company operating in, is very intense."</td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>"Our firm is under pressure from competitors to adopt B2B Marketplace systems."</td><td></td><td></td><td></td><td></td><td></td></tr>
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</table>
</td>
<td>Rewording of item 3 i.e., operating to operates.</td>
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</table>

b. *Pilot test*

Pilot testing is a key part of the research process (Bhattacherjee, 2012; Saunders et al., 2009). The pilot test was used to further establish the face validity of the questionnaire and provide an initial evaluation of the internal consistency of the items, assisting in improving the questions, format and instructions of the questionnaire (Creswell and Creswell, 2017). A pilot test was conducted with a convenience sample of eight managers and consultants engaged in B2B marketplaces in organisations in South Africa. The managers and consultants were contacted and requested to participate. After agreeing to participate, an e-mail with instructions and a link to the online questionnaire was sent to them. They were requested to complete the survey within a week and complete a short questionnaire to provide comments and suggestions on the following parts of the survey process:

- Time taken to complete (Oates, 2005; Saunders et al., 2009);
- Clarity of instructions (Oates, 2005; Saunders et al., 2009);
- Clarity of questions (Oates, 2005; Saunders et al., 2009);
- Any issues with any of the questions (Oates, 2005; Saunders et al., 2009);
- Any major omissions (Oates, 2005; Saunders et al., 2009);
- Structure of the questionnaire (Oates, 2005; Saunders et al., 2009);
- General comments (Oates, 2005; Saunders et al., 2009).

Feedback was received from six of the eight participants. Table 8 shows the items before the pilot and after the pilot.

Table 8: Pilot test change log

Item	Before	After	Change made
E-mail introduction	Good day My name is Kent Marais and I am a Masters student in Information Systems at the University of the Witwatersrand. As part of my studies, I have to undertake a research project, and I am investigating the factors that affect the adoption of B2B Marketplaces by South African organisations, under the supervision of Professor Jason Cohen. The aim of this research project is to assess the adoption of B2B Marketplaces in the South African context and determine the factors that drive its adoption. As part of this project, I would like to invite you to take part in an online survey. The survey takes approximately 10 minutes to complete and you are free to withdraw at any stage. Responses will be treated with the utmost confidence and will only be used for the purposes of this study and analysed in aggregate form. You will not be asked to disclose your name nor that of your company. There will be no personal costs or compensation to you if you participate in this project. Please feel free to contact me on 9110185P@students.wits.ac.za, if you have any queries regarding this survey. Thank you for your time. Kind regards, Researcher: Kent Marais Supervisor: Prof Jason Cohen, Jason.Cohen@wits.ac.za, 0117178164	Good day, My name is Kent Marais and I am a Masters student in Information Systems at the University of the Witwatersrand. As part of my studies, I have to undertake a research project, and I am investigating the factors that affect the adoption of Business-to-Business (B2B) Marketplaces by South African organisations, under the supervision of Professor Jason Cohen. The aim of this research project is to assess the adoption of B2B Marketplaces in the South African context and determine the factors that drive its adoption. As part of this project, I would like to invite you to take part in an online survey. The survey takes approximately 10 minutes to complete and you are free to withdraw at any stage. Responses will be treated with the utmost confidence and will only be used for the purposes of this study and analysed in aggregate form. You will not be asked to disclose your name nor that of your company. There will be no personal costs or compensation to you if you participate in this project. Please feel free to contact me on 9110185P@students.wits.ac.za, if you have any queries regarding this survey. Thank you for your time. Kind regards, Researcher: Kent Marais Supervisor: Prof Jason Cohen, Jason.Cohen@wits.ac.za, 0117178164	Addition of “,” and line after Good day. Explanation of the abbreviation B2B. Addition of an extra line after “Thank you for your time” and “Kind regards,”.

4.3.4 *Questionnaire administration*

Data was collected via mono-method only via a questionnaire. The questionnaire was administered online via a web-survey tool called SurveyMonkey. Participants received an e-mail invitation to participate in the survey. This e-mail also contained an embedded link to the questionnaire with a covering letter explaining the purpose of the study, promising anonymity and confidentiality, and stating that participation was voluntary.

For each of the 400 companies identified in the initial sample from the Who Own Whom directory, an attempt was made to obtain e-mail details (either specific individual or company contacts) as described above for the purposes of administering the invitation to participate in the survey.

Follow-up e-mails to potential respondents who had not yet replied were sent after three weeks. Consistent monitoring of the number of responses was done. The random sampling was also supplemented with the above outlined convenience and snowball sampling for an additional two week period, which was used to increase responses. A similar method of emailing potential contacts was employed.

4.4 Data analysis methods

The data collected in this study were analysed using IBM SPSS Statistic 27 and Stata. The first phase of the analysis was to test the validity and reliability of the measurement scales using Principal Component Analysis (PCA) and Cronbach's Alpha. Next, for hypothesis testing, logistic regression was employed where adoption was measured as a dichotomous dependent variable.

4.4.1 *Reliability and validity*

Validity refers to the degree to which the measurement instrument measures the concept that it purports to measure (Bhattacherjee, 2012). Convergent and discriminant validity relates to construct validity. Convergent validity measures how closely the scores on one scale relates to other scales designed to measure the same construct (Bhattacherjee, 2012; Cooper et al., 2003). Discriminant validity is the extent to which scores from a scale

do not correlate with scores from scales designed to measure another construct, i.e. they do not measure constructs that they are not supposed to (Bhattacherjee, 2012; Cooper et al., 2003).

This study used PCA to examine convergent and discriminant validity. PCA is a correlation-based technique that allows the researcher to check how the measurement items correlate with one another. Then, based on the patterns of correlations, create an explanation or structure for the correlations. The PCA output shows how closely the empirical data aligns with the theoretical definitions of the constructs and measurement items. Convergent validity can be confirmed as a general rule if the item is greater than 0.600 against a factor, while discriminant validity can be confirmed as a general rule if the item is less than 0.300 against a factor (Bhattacherjee, 2012). Some researchers provide a more lenient measure of 0.400 for discriminant validity, and this was the benchmark for this study.

A Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and a Bartlett Test were used to assess if the sample size was acceptable to warrant PCA. In general, KMO values between 0.8 and 1 indicate the sampling is adequate. KMO values less than 0.6 indicate the sampling is not adequate and that remedial action should be taken (Field, 2013).

PCA analyses were computed on the items designed to measure each of the technology, organisation and environment factors of the model.

Reliability focuses on the accuracy, neutrality and reliability of the research instrument utilised to conduct the research (Oates, 2005). Reliability is the degree to which a measure provides a consistent or dependable measure of a construct (Bhattacherjee, 2012; Cooper et al., 2003).

Internal consistency or reliability of the measures was established by calculating Cronbach's Alpha. Cronbach's Alpha estimates the measurement error and is required to be greater than 0.700 (Creswell and Creswell, 2017) for reliability to be confirmed in this study.

After reliability and validity were established, composite scores were calculated for each of the variables for use in hypothesis testing.

4.4.2 *Hypothesis testing*

The research model and hypotheses in this study were defined in Section 3, and the hypotheses are listed in Table 9.

Table 9: Summary of hypotheses

Hypothesis	Description
H1	Security concern is negatively related to B2B marketplace adoption.
H2	Complexity is negatively related to B2B marketplace adoption.
H3	Compatibility is positively related to B2B marketplace adoption.
H4	Perceived costs are negatively related to B2B marketplace adoption.
H5	Top management support is positively related to B2B marketplace adoption.
H6	Perceived benefits (strategic and operational) are positively related to B2B marketplace adoption.
H7	Competitive pressure is positively related to B2B marketplace adoption.
H8	Trust is positively related to B2B marketplace adoption.
H9	Partner readiness is positively related to B2B marketplace adoption.

Adoption is measured as a dichotomous measure (a variable with two distinct values). Logistic regression was conducted to investigate whether the independent variables predict the dependent variable. Logistic regression assumes a logistic distribution to predict the probability of a successful outcome by modelling the data against the logistic distribution (Bhattacherjee, 2012).

The R^2 provides a measure of how good the model is, i.e. the overall predictive power of the model. Witte and Witte (2016, p. 139) state that "a value of R^2 in the vicinity of .01, .09, or .25 reflects a weak, moderate, or strong relationship, respectively". When analysing data with a logistic regression, an equivalent statistic to R^2 does not exist. However, to evaluate the goodness-of-fit of logistic models, several pseudo R^2 have been developed. This study used McFadden's pseudo R^2 (McFadden, 1974).

This study examined the significance of the logistic coefficients. The *p*-value is the probability that a statistical inference is caused by pure chance. This value is compared to a significance level which represents the maximum level of risk that the inference is incorrect (Bhattacherjee, 2012). The significance level for this study was set at alpha=0.05. If the *p*-value<0.05, then the null hypothesis can be rejected and the alternative hypothesis accepted.

4.5 Ethical considerations

There is a strong positive relationship between ethics and the quality of scientific research (Rosenthal, 1994). This study was conducted with a strong focus on ethics, and ethics clearance was obtained prior to the commencement of any fieldwork (see Appendix C). There are four key ethical considerations related to this study: voluntary participation, informed consent, anonymity and confidentiality, and potential conflict of interest (Bhattacherjee, 2012; Oates, 2005).

Potential respondents were informed that participation was entirely voluntary and that there was no risk, penalty, or loss if they did not participate. Respondents were also able to withdraw at any stage in the research process.

Respondents were provided with the full details of the research and its intended purpose. Explicit consent to participate was obtained from each respondent.

The responses were anonymous, with neither a request nor storage of any person or company identifiers. Data was password protected and securely stored. Results are only reported in aggregate. The data has only been used for the intended purposes of this research and was not made available to any other parties than the researcher and his supervisor.

4.6 Limitations and threats to internal and external validity

A survey research strategy was adopted, and a structured questionnaire was used to collect the data systematically from participants. The methodology adopted for the study has several potential limitations.

Surveys may be subject to respondent bias that may impact internal validity (Bhattacherjee, 2012). Online surveys can create sampling bias as not all potential respondents may have access to a computer or the Internet (Bhattacherjee, 2012). This may impact the external validity of the study. External validity relates to the generalisability of the research findings to a broader population (Bhattacherjee, 2012; Oates, 2005). The use of a non-probability sampling approach (convenience and snowball) creates a threat to external validity and results may not necessarily be generalisable.

Survey research is known to have a low response rate that may lead to a non-response bias and impact the validity of the study's results and impact generalisability (Bhattacherjee, 2012).

Furthermore, the questionnaire was aimed at decision-makers within South African organisations. There is no assurance that the online applications were completed by the decision-makers.

The study used a cross-sectional survey and may be subject to common method bias as the measures are derived from the same source (Bhattacherjee, 2012). This study only investigates the adoption of B2B marketplaces at one point in time and applying a cross-sectional survey did not allow the interpretation of causal inferences between variables. The use of longitudinal research would be preferable as the adoption of technology by an organisation is a process that will occur over time (Mohtaramzadeh et al., 2018).

A structured questionnaire was used to gather the required data. The close-ended nature of the questionnaire does not allow the study to uncover additional factors that might influence the adoption of B2B marketplaces that were not a priori specified in the research model.

4.7 Conclusion

This section described the research methodology used to address the research question and test the hypotheses. The study is informed by positivism and follows a deductive, quantitative approach. It is a relational study employing a cross-sectional survey to collect the data on all variables at the same point in time. Data were collected from respondents

via an online survey using a combination of random, convenience and snowball sampling. The data was analysed using IBM SPSS Statistic 27 and Stata. The first phase of the analysis was to test the validity and reliability of the measurement scales using PCA and Cronbach's Alpha. Logistic regression was employed for hypothesis testing. Finally, the limitations and ethical considerations were discussed.

The next chapter presents the findings from the data analysis.

5 RESEARCH FINDINGS

This chapter describes the findings of the empirical study used to address the research question and test the hypotheses. It first presents the data screening process. Next, it provides the response profile of participants in the online survey. Thereafter, descriptive statistics are summarised and the validity and reliability of the various factors are established. Finally, it shows the results of the testing of the nine hypotheses.

5.1 Data screening

From the sample of 400 companies, 356 e-mail details for potential key informants could be found. An initial e-mail was sent and followed up by a reminder e-mail. The following results were obtained.

- 97 individuals opened the e-mail.
- 18 individuals responded with ten fully completed and two partially completed.
- 264 individuals did not open the follow-up e-mail.
- 39 e-mails were bounced.
- ten individuals opted out.

Thereafter, the sample was supplemented with the convenience and snowball sampling strategy, and responses increased significantly. After two additional weeks, a total of 126 responses were received.

5.1.1 *Missing data*

Large numbers of responses with missing data can distort the results. Of the 126 responses, 39 were partially completed. These responses had more than 10% of the data items missing and thus could not be used for the analysis. These 39 were eliminated from the dataset, leaving 87 complete responses (Figure 6).

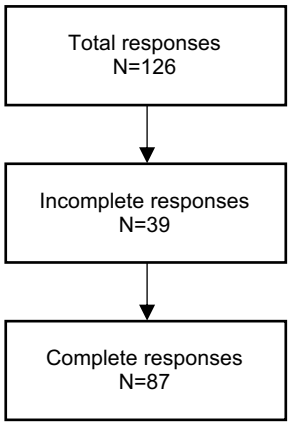

Figure 6: Handling of missing data

5.2 Response profile

The sections below summarise the profiles of the 87 complete respondents by seniority level, industry, IT department size (staff numbers and budget), organisation size and B2B marketplace role.

5.2.1 *Respondents by seniority level*

Table 10 provides a summary of the respondents by level of seniority. Over 94% of responses were received from Executives and Senior managers. Only 6% were Junior Management and General staff.

Table 10: Respondent by organisation level

Level	Total number	Total %	Number adopted	Number not adopted	Adopted %	Not adopted %
Executive Management	51	59%	18	33	35	65
Senior Management	30	34%	13	17	43	57
Junior Management	3	3%	2	1	67	33
General Staff	3	3%	2	1	67	33
TOTAL	**87**	**100%**	**35**	**52**	**40**	**60**

5.2.2 *Respondents by standard industrial classification*

An analysis of the industry that participants are from, highlights that the majority of responses were received from individuals in the Financial, Insurance, Real Estate and Business Services. Five industries (Agriculture, Hunting, Forestry and Fishing; Mining and Quarrying; Electricity, Gas and Water Supply; Construction; Transport, Storage and Communication) were not represented. Over a quarter (26%) of responses were received from individuals in the 'Other' category.

Table 11: Respondent standard industrial classification

Standard industrial classification	Number	Percentage
Agriculture, Hunting, Forestry and Fishing	0	0
Mining and Quarrying	0	0
Manufacturing	4	5
Electricity, Gas and Water Supply	0	0
Construction	0	0
Wholesale and Retail Trade	4	5
Transport, Storage and Communication	0	0
Financial, Insurance, Real Estate and Business Services	55	63
Community, Social and Personal Services	1	1
Other	23	26
TOTAL	**87**	**100**

As the Financial Industry accounted for almost two-thirds of the sample and 'Other' over a quarter (26%), the remaining responses from the other industries were included in 'Other' for the remainder of the analysis. The rate of adoption in the Financial Industry was almost double (49%) compared to all other industries (25%).

Table 12: Respondent by summarised standard industrial classification

Standard industrial classification	Number	%	Number adopted	Number not adopted	Adopted %	Not adopted %
Financial, Insurance, Real Estate and Business Services	55	63%	27	28	49	51
Other	32	37%	8	24	25	75
TOTAL	**87**	**100**	**35**	**52**	**40**	**60**

5.2.3 *Respondents by size of IT organisation*

Respondents work for organisations with an IT department of fewer than 25 employees 37% of the time and for employees with an IT department larger than 500 employees 37% of the time. Over 24% of respondents' IT departments are between 51 and 500 employees.

Table 13: Respondents by size of IT organisation

IT employees	Number	Percentage	Number adopted	Number not adopted	Adopted %	Not adopted %
Less than 25	32	37%	4	28	13%	88%
26-50	2	2%	0	2	0%	100%
51-100	9	10%	4	5	44%	56%
101-500	12	14%	5	7	42%	58%
More than 500	32	37%	22	10	69%	31%
TOTAL	**87**	**100%**	**35**	**52**	**40%**	**60%**

5.2.4 *Respondents by size of IT budget*

The IT budgets of almost a third of respondents (31%) are under R5 000 000, while 41% of respondents have an IT budget of over R100 000 000. A fifth has an IT budget of between R5 000 001 and R25 000 000.

Table 14: Respondents by size of IT budget

IT budget	Number	Percentage	Number adopted	Number not adopted	Adopted %	Not adopted %
Less than R5 000 000	27	31%	5	22	19%	81%
R5 000 001 – R25 000 000	12	14%	2	10	17%	83%
R25 000 001 – R50 000 000	5	6%	1	4	20%	80%
R50 000 001 – R100 000 000	7	8%	4	3	57%	43%
More than R100 000 000	35	41%	23	12	66%	34%
TOTAL	**86**	**100%**	**35**	**51**	**41%**	**59%**

5.2.5 *Respondents by size of organisation*

Over half (53%) of all respondents work in large organisations with employee numbers over 1 000. Just over a quarter (26%) of respondents work in small organisations with less than 150 employees.

Table 15: Respondents by size of organisation

Total employees	Number	Percentage	Number adopted	Number not adopted	Adopted %	Not adopted %
Less than 50	16	18%	3	13	19%	81%
51-150	7	8%	2	5	29%	71%
151-500	13	15%	1	12	8%	92%
501-1 000	5	6%	3	2	60%	40%

1 001-5 000	14	16%	5	9	36%	64%
More than 5 000	32	37%	21	11	66%	34%
TOTAL	**87**	**100%**	**35**	**52**	**40%**	**60%**

5.2.6 *Respondents by stage of adoption*

Table 16 shows that 40% of all respondents already participate in a B2B marketplace. A further 38% of respondents plan to adopt a B2B marketplace within the next year to 5 years. Just over 21% of respondents do not plan to participate in a B2B marketplace in the foreseeable future.

Table 16: Respondents by stage of adoption

Stage of adoption	Number	Percentage
We have adopted and already participate in a B2B marketplace.	35	40%
We have not adopted but we have plans to adopt within the next year.	9	10%
We have not adopted but we have plans to adopt within the 1 to 3 years.	16	18%
We have not adopted but we have plans to adopt within the next 3 to 5 years.	9	10%
We have no current plans to adopt.	18	21%
TOTAL	**87**	**100%**

5.2.7 *Respondents by B2B marketplace role*

Of the respondents who already participate in a B2B marketplace, 73% run a platform, 42% sell their goods and services on a B2B marketplace, 33% buy their goods and services on a B2B marketplace, and 36.36% are partners on a B2B marketplace.

Table 17: Respondents by B2B marketplace role

Role in B2B marketplace	Number	Percentage
Buyer	11	33.33
Seller	14	42.42
Platform Owner (run the platform)	24	72.73
Partner	12	36.36
Not sure	1	3.03
Other	1	3.03

5.2.8 *Summary of the demographic analysis*

After reviewing the profile of respondents by seniority level, industry, IT department size (staff numbers and budget), organisation size, and B2B marketplace role, several insights can be gleaned. The seniority of respondents is high, with over 90% being either Executives or Senior Management. This profile is consistent with the aim of the study to obtain input from senior role-players within South African organisations on their adoption of B2B marketplaces. The size of the organisations and the investment in technology provides a balanced view of both large and small organisations. The industry mix is heavily weighted (over 60% of total respondents) towards Financial, Insurance, Real Estate and Business Services. While many were already engaged in platforms, others were planning to adopt them in the near term. Respondents using platforms are also well balanced in terms of roles played in a B2B marketplace.

5.3 Review of the conceptual model factors

Before hypothesis testing can be conducted on the factors posited by the model used in this study, descriptive statistics are summarised and the reliability and validity of the scores of the scales used to measure the factors then need to be determined.

5.3.1 *Descriptive statistics*

Technology context included four factors, namely security, complexity, compatibility and cost. The mean, standard deviation for individual items are presented in Table 18. The scores for security concern, complexity and costs have been reversed for consistency with other scales.

Table 18: Descriptive statistics for technology factors

Technology variable	Item code	Item description	Mean	Std deviation	% of respondents agree or strongly agree
Security Concern	SC1	"The confidentiality and security of my company's data are not guaranteed when adopting a B2B Marketplace."	3,46	1,11	56%
	SC2	"Adopting a B2B Marketplace would be a security risk for our IT infrastructure."	3,67	0,95	68%
	SC3	"It is difficult to assess the compliance of B2B Marketplaces with information security standards."	3,22	1,11	47%
	SC4	"It is difficult to assess the compliance of B2B marketplaces with data protection laws."	3,28	1,14	51%
Complexity	CM1	"The use of B2B Marketplaces requires skills that my company does not have."	3,20	1,19	49%
	CM2	"The use of B2B Marketplaces is too complex for my company's business operations."	3,59	1,15	64%
Compatibility	CO1	"B2B Marketplace technologies are compatible with my company's existing IT infrastructure."	3,22	1,04	51%
	CO2	"B2B Marketplaces are compatible with my organisations' business processes and operations."	3,16	1,07	47%
	CO3	"B2B Marketplace technologies are compatible with my company's existing systems (e.g. Finance, ERP, CRM, SCM)."	3,20	1,04	47%
Costs	CT1	"Adopting B2B Marketplace will increase technology costs."	2,76	0,91	26%
	CT2	"Adopting B2B Marketplace technologies will increase operations and maintenance costs."	3,01	0,95	39%
	CT3	"B2B Marketplace participation is too costly for my organisation."	3,64	0,83	66%

There was general agreement that adopting a B2B marketplace would be a security risk for organisations, with over two-thirds (68%) agreeing or strongly agreeing. Respondents tended to agree or strongly agree that the adoption of a B2B marketplace would be too costly (66%) and too complex (64%) for their organisation. However, the mean of items for CT1 (2.76) factor was lower than all other factors.

The organisation context included four factors, namely security, complexity, compatibility and cost. The mean, standard deviation for individual items is presented in Table 19.

Table 19: Descriptive statistics for organisation factors

Organisation variable	Item code	Item description	Mean	Std deviation	% of respondents agree or strongly agree
Top Management Support	TM1	"Top management supports taking risks in the adoption of a B2B Marketplace."	3,43	1,02	60%
	TM2	"Top management actively participates in establishing a vision and formulating strategies for utilising B2B Marketplaces."	3,49	1,03	60%
	TM3	"Top management communicates its support for the use of B2B Marketplaces."	3,45	1,03	57%
Perceived Benefits	PB3	"The adoption of a B2B Marketplace will reduce my company's cost of performing business transactions."	3,34	0,91	51%
	PB4	"The adoption of a B2B Marketplace will enable my company to provide better customer service."	3,69	0,99	66%
	PB1	"The adoption of a B2B Marketplace will increase my company's ability to compete."	3,84	0,85	74%
	PB2	"The adoption of a B2B Marketplace will allow my company to reach new customers."	3,95	0,78	79%
	PB5	"The adoption of a B2B Marketplace will improve our relationship with our existing customers."	3,67	0,95	59%
	PB6	"The adoption of a B2B Marketplace will improve efficiency of our operational procedures."	3,76	0,91	68%

As can be seen, there was general agreement that the adoption of a B2B marketplace will increase a company's ability to compete (74%) and allow companies to reach new customers (79%). Respondents tended to agree that top management supporting risk-taking (60%) and actively participating in establishing a vision and strategy (60%) aids in the adoption of a B2B marketplace. The mean of all items is above 3.3, which shows strong support for the organisation context as a key variable.

The environment context included four factors, namely security, complexity, compatibility and cost. The mean, standard deviation for individual items is presented in Table 20.

Table 20: Descriptive statistics for environment factors

Environment variable	Item code	Item description	Mean	Std deviation	% of respondents agree or strongly agree
Trust	TR1	"B2B Marketplaces adequately protect all parties from inappropriate behaviours of others on the platform."	3,37	0,81	49%
	TR2	"B2B Marketplaces ensure all transactions on the platform are safe and secure."	3,52	0,78	64%
	TR3	"B2B Marketplaces ensure that all participating parties are trustworthy."	3,28	0,82	46%
	TR4	"B2B Marketplaces have adequate rules to regulate the behaviour of participating parties on their platforms."	3,31	0,75	43%
	TR5	"There are sufficient laws and regulations to protect parties who participate in B2B Marketplaces."	3,05	0,89	33%
	TR6	"There are sufficient third parties who can step in should something go wrong for any participant in a B2B Marketplace."	2,93	0,86	29%
Competitor Pressure	CP1	"Our firm is under pressure from competitors to adopt B2B Marketplace systems."	3,18	1,14	51%
	CP2	"It is easy for our customers to switch to another company for similar services/products without much difficulty."	3,06	1,08	43%
	CP3	"The competition among companies in the industry which my company operates in is very intense."	3,85	0,96	77%
	CP4	"An industry move to utilise the B2B Marketplace systems would put pressure on my firm to do the same."	3,63	0,94	64%
	CP5	"Some of our competitors have already started using B2B Marketplace systems."	3,53	1,01	62%
	CP6	"Our competitors know the importance of B2B Marketplace systems and using them for operations."	3,49	0,93	57%
Partner readiness	PR1	"Our downstream customers are ready to transact with us on B2B Marketplaces."	3,10	0,96	40%
	PR2	"Our upstream partners are ready to transact with us on B2B Marketplaces."	3,28	0,91	48%
	PR3	"Our trading partners work to ensure their systems are interoperable with the B2B Marketplace."	3,15	0,90	37%

The results indicate that competition is intense, with close to 80% (78%) agreeing or strongly agreeing. Respondents tended to agree (64%) that B2B marketplaces provide safe and secure mechanisms to process transactions. However, the mean of items for TR6 (2.93) factor was lower than all others, indicating that there is a belief that there may be insufficient parties to step in should something go wrong.

The study could then proceed to examine the validity and reliability of these scales.

5.3.2 *Validity*

This study used PCA to examine convergent and discriminant validity of the scores of the measurement scales used. PCA is a correlation-based technique that explains the total amount of variance in the correlation matrix by transforming the original items into linear components. Then, based on the patterns of correlations, it creates an explanation or structure for the correlations. The PCA output was used to evaluate how closely the empirical data aligned to the theoretical definitions of the factors posited by the model used in the study. Convergent validity can be supported as a general rule if the correlations between the items intended to be measuring a single construct correlate at least moderately with a single component (greater than 0.600), while discriminant validity can be supported with loadings of less than 0.300 against all other components (Bhattacherjee, 2012).

A KMO measure of sampling adequacy and a Bartlett Test were calculated to assess if the sample size was acceptable to warrant PCA. In general, KMO values between 0.8 and 1 indicate the sampling is adequate. KMO values less than 0.6 indicate the sampling is not adequate and that remedial action should be taken.

PCA analyses were computed on the items designed to measure each of the TOE factors of the model. The section that follows describes these analyses in detail.

a. *Technological factors*

The KMO measure was calculated to be 0.676, and Bartlett's Test of Sphericity was significant ($p<0.001$). The PCA extracted four components, with three components having eigenvalues greater than 1, while component 4 had an eigenvalue of 0.873. As the fourth component supported the theoretical rationale, it was retained. Combined, these components explained over 70% (73.7%) of the total variance in the 12 items designed to measure the technology factor of the model.

All security concern (SC) items correlated most strongly with the first component. While complexity items correlated most strongly with the fourth component. Compatibility items correlated with the second component. Cost (CT) items correlated highest with the third component except for CT3, suggesting the possible omission of the CT3 item.

Cronbach's Alpha was calculated for the cost variable, including CT3 (0.66) and excluding CT3 (0.77). The Cronbach's Alpha value is improved despite the number of items decreasing from three to two. Furthermore, the internal consistency reliability of the items measuring a construct assumes unidimensionality, and so CT3 was excluded from future analysis. All remaining items were designed to measure the same construct load more strongly on the relevant component, demonstrating convergent reliability and discriminant validity.

From the analysis, the following labels were assigned to the various components: component 1 – security concern; component 2 – complexity; component 3 – costs; and component 4 – compatibility.

Table 21: Principal component analysis of technology factors

Technology	Component			
	1	2	3	4
SC1	0,737	-0,024	0,224	0,215
SC2	0,804	-0,017	0,072	0,212
SC3	0,878	-0,143	-0,053	-0,027
SC4	0,897	-0,120	-0,111	0,104
CM1	0,076	-0,379	-0,070	0,692
CM2	0,245	-0,267	-0,043	0,861
CO1	-0,015	0,789	0,020	-0,286
CO2	0,022	0,716	-0,273	-0,342
CO3	-0,254	0,818	0,124	-0,033
CT1	-0,103	0,029	0,867	0,099
CT2	0,159	-0,047	0,879	-0,131
CT3	0,413	-0,030	0,406	0,528

Table 22: KMO and Bartlett's Test of Sphericity for technology factors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,676
Bartlett's Test of Sphericity	Approx. chi-square	496,295
	df	66
	Sig.	0,000

b. *Organisational factors*

The KMO measure was calculated to be 0.823, and Bartlett's Test of Sphericity was significant ($p<0.001$). The PCA extracted three components with eigenvalues greater than 1, and these components explained over 80% (81.9%) of the total variance in the nine items designed to measure the organisational factor of the model.

The first principal component is strongly correlated with four of the perceived benefits (PB) items. All top management (TM) support items correlated most strongly with component 2. PB items correlated highest with the first component except for PB3 and PB6, suggesting that an additional component is required to explain the variance of six perceived benefits items, and the possible omission of PB3 and PB6 items.

Cronbach's Alpha was calculated for the PB variable including PB3 and PB6 (0.87) and excluding PB3 and PB 6 (0.89). The Cronbach's Alpha value is slightly improved even though the number of items is reduced from six to four items. Furthermore, the internal consistency reliability of the items measuring a construct assumes unidimensionality, and so PB3 and PB6 were excluded from future analysis. All remaining items were designed to measure the same construct load more strongly on the relevant component, demonstrating convergent reliability and discriminant validity.

From the analysis, the following labels were assigned to the various components: component 1 – perceived benefits; and component 2 – top management support.

Table 23: Principal component analysis of organisation factors

Organisation	Component		
	1	2	3
TM1	0,159	0,897	0,166
TM2	0,210	0,885	0,155
TM3	0,233	0,900	0,044
PB3	0,040	0,189	0,923
PB4	0,788	0,170	0,372
PB1	0,824	0,290	0,143
PB2	0,835	0,150	0,028
PB5	0,874	0,186	0,097
PB6	0,531	0,090	0,725

Table 24: KMO and Bartlett's Test of Sphericity for organisation factors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,823
Bartlett's Test of Sphericity	Approx. chi-square	493,349
	Df	36
	Sig.	0,000

c. *Environmental factors*

An initial PCA was computed for the environment factors (see Appendix D Table 34 and Table 35). The KMO measure was calculated to be 0.743, and Bartlett's Test of Sphericity was significant ($p<0.001$). The PCA extracted four components with eigenvalues greater than 1, and these components explained approximately two-thirds (67.5%) of the total variance in the 15 items designed to measure the environment factor of the model.

All partner readiness (PR) and all trust (TR) items correlated most strongly with the first and second components, respectively. Competitor pressure (CP) items correlated highest with the first component except for CP3, CP4 and CP2, suggesting that an additional two components are required to explain the variance of the six competitor pressure items, and the possible omission of the CP3, CP4 and CP2 items.

Cronbach's Alpha was calculated for the CP variable including CP3, CP4 and CP2 (0.70) and excluding CP3, CP4 and CP2 (0.85). The Cronbach's Alpha value is improved despite the number of items decreasing from six to three. Furthermore, the internal consistency reliability of the items measuring a construct assumes unidimensionality, and so CP3, CP4 and CP2 items were excluded from future analysis.

The PCA was re-run with the results shown in Table 25. The KMO measure was calculated to be 0.754 and Bartlett's Test of Sphericity was significant ($p<0.001$). The PCA extracted three components with two components having eigenvalues greater than 1, while component 3 had an eigenvalue of 0.936. As the third component supported the theoretical rationale, it was retained. Together, these components explained over two-thirds (68.6%) of the total variance in the 12 retained items designed to measure the environment factor of the model.

All TR items correlated most strongly with the first component, while the remaining CP items correlated most strongly with the second component. PR items correlated with the third component. All remaining items were designed to measure the same construct load more strongly on the relevant component, demonstrating convergent reliability and discriminant validity.

From the analysis, the following labels were assigned to the various components: component 1 - trust; component 2 – competitor pressure; and component 3 – partner readiness.

Table 25: Principal component analysis of environment factors

Environment	Component		
	1	2	3
TR1	0,644	0,420	-0,271
TR2	0,702	0,141	0,269
TR3	0,808	0,055	0,093
TR4	0,830	0,116	-0,098
TR5	0,748	-0,010	0,359
TR6	0,721	-0,049	0,219
CP1	0,098	0,689	0,393
CP5	0,039	0,790	0,364
CP6	0,087	0,871	0,265
PR1	0,139	0,367	0,778
PR2	0,137	0,388	0,663
PR3	0,160	0,299	0,795

Table 26: KMO and Bartlett's Test for Sphericity for environment factors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,754
Bartlett's Test of Sphericity	Approx. chi-square	541.906
	df	66
	Sig.	0,000

5.3.3 *Reliability*

Internal consistency or reliability of the measures was established by calculating Cronbach's Alpha. Cronbach's Alpha estimates the measurement error and is required to be greater than 0.700 (Creswell and Creswell, 2017) for reliability to be confirmed in this study.

Table 27 presents the mean inter-item correlation, Cronbach's Alpha, mean of composite and standard deviation of composite for all surviving items. Reliability is confirmed as all measures are above 0.700.

Table 27: Cronbach's Alpha as a measure of reliability

Variable	No. of original items	No. of surviving items	Mean inter-item correlation	Cronbach's Alpha	Mean of composite	Std dev. of composite
Security Concern	4	4	0.63	0.87	3.41	0.92
Complexity	2	2	0.63	0.77	3.39	1.05
Compatibility	3	3	0.51	0.75	3.14	0.69
Costs	3	2 (CT3 dropped)	0.39	0.77	3.11	0.84
Top Management Support	3	3	0.78	0.92	3.46	0.95
Perceived Benefits	6	4 (PB3 and PB6 dropped)	0.68	0.89	3.79	0.78
Trust	6	6	0.49	0.85	3.24	0.62
Competitive Pressure	6	3 (CP2, CP3, CP4 dropped)	0.66	0.84	3.40	0.89
Partner Readiness	3	3	0.61	0.82	3.18	0.79

5.4 Tests of hypotheses

Following the examination of the reliability and validity of the scores of the scales, composite scores were calculated for the items that survived the validity and reliability testing for each of the scales used to measure the factors of the model for hypothesis testing. Mean scores were calculated for the composite scores of the items retained from the PCA and reliability analysis.

The outcome variable, adoption, is measured as a dichotomous measure. The following table summarises the hypotheses of the study.

Table 28: Summary of hypotheses

Hypothesis	Description
H1	Security concern is negatively related to B2B marketplace adoption.
H2	Complexity is negatively related to B2B marketplace adoption.
H3	Compatibility is positively related to B2B marketplace adoption.
H4	Perceived costs are negatively related to B2B marketplace adoption.
H5	Top management support is positively related to B2B marketplace adoption.
H6	Perceived benefits (strategic and operational) are positively related to B2B marketplace adoption.
H7	Competitive pressure is positively related to B2B marketplace adoption.
H8	Trust is positively related to B2B marketplace adoption.
H9	Partner readiness is positively related to B2B marketplace adoption.

5.4.1 *Logistic regression*

To examine adoption as a dichotomous measure (a variable with two distinct values), a logistic regression was conducted to investigate whether the independent variables predict the dependent variable significantly. The two distinct values of the dependent variable are adopted or not adopted a B2B marketplace.

Out of the sample of 87 respondents, 35 (40%) have adopted and 52 have not adopted a B2B marketplace. The minimum sample size is at least ten times the number of events per predictor variable (Peduzzi et al., 1996). This equates to a maximum of three predictors or covariates for the sample of 87.

A correlation analysis was conducted on the control variables – IT employees, IT budget and organisational size (Table 25) to assess which control variables should be entered in the regression models. As highly intercorrelated control variables could cause the undesirable situation of multicollinearity in the model, as organisation size correlated highly with the control variables of the size of IT budget and organisation size, it was selected to

accompany the predictor variable(s) of each regression model. The primary industry (financial/non-financial) was included as a second covariate in the regression models.

Table 29: Correlation analysis of control variables

Variable	Financial primary industry	Number of IT employees	IT budget	Organisation size
Financial Primary Industry	1,00	0,44	0,42	0,37
Number IT Employees	0,44	1,00	0,79	0,84
Size of IT Budget	0,42	0,79	1,00	0,81
Organisation Size	0,37	0,84	0,81	1,00

Note: correlations in red font are significant at $p < .05$

Hence, organisation size together with financial industry, were used as covariates in the logistic regression analyses. Table 30 depicts the nine logistic regression models created to test the hypotheses.

Table 30: Regression models used to test the hypotheses

Model No.	Hypothesis	Outcome	Predictor	Covariate 1	Covariate 2
1	H1	Adopted	Security concerns	Financial industry	Organisation size
2	H2	Adopted	Complexity	Financial industry	Organisation size
3	H3	Adopted	Compatibility	Financial industry	Organisation size
4	H4	Adopted	Costs	Financial industry	Organisation size
5	H5	Adopted	Top management support	Financial industry	Organisation size
6	H6	Adopted	Perceived benefits	Financial industry	Organisation size
7	H8	Adopted	Trust	Financial industry	Organisation size
8	H7	Adopted	Competitor pressure	Financial industry	Organisation size
9	H9	Adopted	Partner readiness	Financial industry	Organisation size

The results of the logistical regression analyses showed that financial industry was not a significant predictor; hence financial services was removed as a covariate (see Table 33 in Appendix D). The models were re-run with organisation size as a covariate within each. The results are summarised in Table 31.

Table 31: Logistic regression model output summary

Model	Predictor	LR chi^2(2)	Pseudo R^2	Coefficient (b)	Odds ratio	Std. error	z	*p*>|z|
1	Security concerns	16,27	0,14	0,42	1,52	0,41	1,53	0,126
2	Complexity	21,37	0,18	0,68	1,97	0,52	2,58	0,010
3	Compatibility	17.38	0.15	0.67	1.96	0.72	1.83	0.067
4	Costs	14,81	0,13	0,28	0.75	0.22	0,99	0,324
5	Top management support	32,81	0,28	1,45	4,26	1,72	3,60	0,000
6	Perceived benefits	21.29	0,18	0.95	2.60	0.98	2.53	0.011
7	Trust	20.06	0,17	1,00	2,71	1,15	2,35	0,019
8	Competitor pressure	36.42	0,31	1,85	6,39	3,19	3,72	0,000
9	Partner readiness	21.32	0,18	0,95	2,59	0,97	2,53	0,011

Assuming a 5% level of significance ($p<.05$) throughout, the likelihood ratio chi-square values (LR chi^2(2)) show that six of the nine regression models considered as a whole represent a significantly better fit or prediction of the outcome variable of B2B marketplaces, than models with no predictors. Models 1, 3 and 4 with predictor variables of SC, compatibility and CT, respectively, are not significant.

Correspondingly, McFadden's (1974) pseudo R^2 suggest that the fit of each of the six remaining models is improved over the intercept-only model. Notably, Models 8 and 5 (CP and TM Support) improve the null model fit by 31% and 28%, respectively.

The regression coefficient for each predictor represents the difference in predicted logits (log of the odds) for the organisations that have adopted a B2B marketplace versus those that have not adopted. The regression coefficients are positive for each predictor variable, thus indicating that organisations with more favourable values on each are more likely to have adopted than not have adopted a B2B marketplace. It should be noted that all scores on the negatively phrased items of SC, complexity and CT were reversed for consistency with the other measurement scales.

Finally, the odds ratios are interpreted as the odds that organisations with a more favourable value on a predictor variable are more likely to have adopted a B2B marketplace than organisations with less favourable values on the predictor variables. For example, the odds of an organisation with greater CP adopting a B2B marketplace are 6.39 times that of the odds of an organisation with less CP.

The detailed results per hypothesis are described.

a. *Hypothesis 1*

Model 1 investigates the relationship between SC and adoption of B2B marketplaces with organisation size included as a covariate. Although SC is positive (b=0.42), the model as a whole is not significant (p=0.126), and thus the results are not considered further. Hypothesis 1 is rejected.

b. *Hypothesis 2*

Model 2 investigates the relationship between complexity and B2B marketplace adoption with organisation size included as a covariate. The positive regression coefficient indicates that organisations with more favourable (lower) complexity are more likely to have adopted than not have adopted a B2B marketplace. The LR $chi^2(2)$ values of the regression model are significant (LR=21.37, p=.01), indicating a significantly better fit than the null model. The pseudo R^2 value suggests an 18% improvement over the fit of the null model. The odds ratio value of 1.97 shows that the odds of an organisation with greater complexity adopting a B2B marketplace are nearly twice the odds of an organisation with lower complexity adopting B2B marketplaces. Hypothesis 2 is supported.

c. *Hypothesis 3*

Model 3 investigates the relationship between compatibility and B2B marketplace adoption with organisation size included as a covariate. Although compatibility is positive (b=0.67), the model as a whole is not significant (p=0.07), and thus the results are not considered further. Hypothesis 3 is rejected. Although compatibility is not significant at p<.05, it is close to the cut-off (p=0.07) and is thus not necessarily immaterial for all firms. Compatibility may not be important for the average adopter but may be an important factor for a subset of the sample. Future research should explore the subset of organisations for which compatibility is likely to be of greatest concern.

d. *Hypothesis 4*

Model 4 investigates the relationship between costs and adoption of B2B marketplaces with organisation size included as a covariate. Although cost is positive (b=0.28), the model as a whole is not significant (p=0.324), and thus the results are not considered further. Hypothesis 4 is rejected.

e. *Hypothesis 5*

Model 5 investigates the relationship between TM support and B2B marketplace adoption with organisation size included as a covariate. The positive regression coefficient indicates that organisations with more favourable (higher) top management support are more likely to have adopted, than not have adopted, a B2B marketplace. The LR chi^2(2) values of the regression model are significant (LR=32.81, p=.00), indicating a significantly better fit than the null model. The pseudo R^2 value suggests a 28% improvement over the fit of the null model. The odds ratio value of 4.26 shows that the odds of an organisation with greater top management support adopting a B2B marketplace are nearly quadruple the odds of an organisation with lower top management support adopting B2B marketplaces. Hypothesis 5 is supported.

f. *Hypothesis 6*

Model 6 investigates the relationship between perceived benefits and B2B marketplace adoption with organisation size included as a covariate. The positive regression coefficient indicates that organisations with more favourable (higher) perceived benefits are more likely to have adopted, than not have adopted, a B2B marketplace. The LR chi^2(2) values of the regression model are significant (LR=21.29, p=.01), indicating a significantly better fit than the null model. The pseudo R^2 value suggests an 18% improvement over the fit of the null model. The odds ratio value of 2.6 shows that the odds of an organisation with greater perceived benefits adopting a B2B marketplace are just over two and half times the odds of an organisation with lower perceived benefits adopting B2B marketplaces. Hypothesis 6 is supported.

g. *Hypothesis 7*

Model 7 investigates the relationship between trust and B2B marketplace adoption with organisation size included as a covariate. The positive regression coefficient indicates that organisations with more favourable (higher) trust are more likely to have adopted, than not have adopted, a B2B marketplace. The LR $chi^2(2)$ values of the regression model are significant (LR=20.06, p=.02), indicating a significantly better fit than the null model. The pseudo R^2 value suggests a 17% improvement over the fit of the null model. The odds ratio value of 2.71 shows that the odds of an organisation with greater trust adopting a B2B marketplace are over two and half times the odds of an organisation with lower trust adopting B2B marketplaces. Hypothesis 7 is supported.

h. *Hypothesis 8*

Model 8 investigates the relationship between competitor pressure and B2B marketplace adoption with organisation size included as a covariate. The positive regression coefficient indicates that organisations with higher competitor pressure are more likely to have adopted than not have adopted a B2B marketplace. The LR $chi^2(2)$ values of the regression model are significant (LR=36.42, p=.00), indicating a significantly better fit than the null model. The pseudo R^2 value suggests a 31% improvement over the fit of the null model. The odds ratio value of 6.39 shows that the odds of an organisation with greater competitor pressure adopting a B2B marketplace are nearly six times the odds of an organisation with lower competitor pressure adopting B2B marketplaces. Hypothesis 8 is supported.

i. *Hypothesis 9*

Model 9 investigates the relationship between partner readiness and B2B marketplace adoption with organisation size included as a covariate. The positive regression coefficient indicates that organisations with more favourable (higher) partner readiness are more likely to have adopted, than not have adopted, a B2B marketplace. The LR $chi^2(2)$ values of the regression model are significant (LR=21.32, p=.01), indicating a significantly better fit than the null model. The pseudo R^2 value suggests an 18% improvement over the fit of the null model. The odds ratio value of 2.59 shows that the odds of an organisation with

greater partner readiness adopting a B2B marketplace are over two and half times the odds of an organisation with lower partner readiness adopting B2B marketplace. Hypothesis 9 is supported.

5.5 Conclusion

This section discussed the findings of the research analysis. It presented the process used to screen the data obtained from the online survey. Next, it described the sample of 87 respondents by seniority level, industry classification, size of IT budget, size of organisation, stage of adoption and role within a B2B marketplace. The validity and reliability of the data were then examined. Finally, the hypotheses were tested using logistical regression techniques. Results showed six of the study's nine hypotheses were supported.

The next chapter will provide a detailed discussion of the results.

6 DISCUSSION OF RESULTS

The purpose of this research was to explain the factors which influence the adoption of digital B2B marketplaces in South African organisations. Drawing on the TOE framework and theories of INT, a research model was developed with nine hypotheses. Data were collected from 87 South African organisations using a structured online questionnaire. The reliability and validity of the data were examined using PCA and assessing the computed Cronbach's Alphas. The hypotheses were tested using logistical regression techniques. Results showed six of the study's nine hypotheses were supported.

The remainder of this chapter discusses the results pertaining to each hypothesis.

Table 32: Summary of hypotheses

HYPOTHESIS	DESCRIPTION	OUTCOME
H1	Higher security concern is negatively related to B2B marketplace adoption.	Rejected
H2	Higher complexity is negatively related to B2B marketplace adoption.	Supported
H3	Higher compatibility is positively related to B2B marketplace adoption.	Rejected
H4	Higher perceived costs are negatively related to B2B marketplace adoption.	Rejected
H5	Top management support is positively related to B2B marketplace adoption.	Supported
H6	Perceived benefits (strategic and operational) are positively related to B2B marketplace adoption.	Supported
H7	Competitive pressure is positively related to B2B marketplace adoption.	Supported
H8	Trust is positively related to B2B marketplace adoption.	Supported
H9	Partner readiness is positively related to B2B marketplace adoption.	Supported

6.1 Technology factors

This section provides the results of hypotheses for the four factors associated with the technological context. Technology factors in the TOE framework relate to the applicable technologies inside and outside the organisation (Gibbs and Kraemer, 2004; Oliveira and Martins, 2011). It includes the characteristics of how the technology is used and the skills required to use it (Sila, 2013).

6.1.1 *Security concerns*

This hypothesis suggested that an increase in security concerns would result in decreased B2B marketplace adoption. This was predicted to occur because B2B marketplaces organisations are heavily dependent on the supplier for security measures and procedures. This presents the possibility of information leakages, fraud, the opportunity for unauthorised access to data and for privacy to be compromised (Martins et al., 2016; Zhu et al., 2006a). Security concerns may result in organisations being less likely to adopt an e-business as a channel for doing business (Martins et al., 2016; Zhu et al., 2006a).

However, the results did not confirm the hypothesis as security concerns were not a significant (p=0.126) predictor of B2B marketplace adoption. This is surprising as potential adopters are expected to be concerned about data privacy and prevent fraud. However, results might suggest that platforms are already perceived as being sufficiently secure, capable of protecting company data and adhering to data protection laws, and thus potential adopters are shifting their adoption considerations more toward factors like benefits and partner readiness, among others. For platform developers, this finding implies that security might best be seen as a necessary hygiene factor but is not on its own sufficient for adoption, which is more likely to be gained by shifting resources toward gaining top management support and the readiness of partners to adopt a B2B marketplace is more important. This is discussed below.

6.1.2 *Complexity*

This hypothesis suggested that an increase in complexity would result in decreased B2B marketplace adoption. This was predicted to occur because organisations are less likely to adopt an innovation that requires a high level of new skills (Martins et al., 2016). Complexity is frequently considered an important technological factor (Low et al., 2011; Wang et al., 2010). It has roots in the theory of DOI and is defined as how difficult it is perceived to be to use and understand (Rogers, 1995).

The results confirmed the hypothesis as complexity is positively and a significant predictor of B2B marketplace adoption. Therefore, if platforms are perceived as being too complex to operate or requiring new skills, then organisations are less likely to adopt B2B marketplaces. For platform developers, this implies ensuring that the design of the B2B marketplace is simple to implement and operate and easy to navigate.

6.1.3 *Compatibility*

This hypothesis suggested that an increase in compatibility would result in increased B2B marketplace adoption. This was predicted to occur as organisations are more likely to adopt an innovation that is considered to be compatible with an organisation's existing processes, operations, IT infrastructure and systems (Kapoor et al., 2014; Low et al., 2011; Martins et al., 2016; Zhu et al., 2006a). Compatibility is another frequently cited factor in the DOI studies (Oliveira and Martins, 2011). It has been shown to predict adoption of cloud computing systems (Low et al., 2011) and digital transformations (Zhu et al., 2006b) among others.

However, the results did not confirm the importance of compatibility in the context of B2B marketplace adoption as a highly significant predictor of adoption. B2B marketplaces do need to be compatible with existing IT infrastructures, business processes and operations, but it appears that for the average organisation, platforms are sufficiently inter-operable with existing technologies, they are often Internet and web-based and do not require proprietary technology licenses to participate and can easily be integrated into existing operations. This suggests that compatibility may not present an obstacle in many

organisational contexts. There may be some organisations for which it is more important than others, which future work should explore.

6.1.4 *Cost*

This hypothesis suggested that an increase in cost would result in decreased B2B marketplace adoption. This was predicted to occur because the perceived high expenses associated with the initial deployment, integration, operation and ongoing support when participating in B2B marketplaces could detract from their adoption (Mohtaramzadeh et al., 2018; Rahayu and Day, 2015; Shi and Yan, 2016; Sila, 2013).

However, the results did not confirm the hypothesis as costs were found not to be a significant predictor of B2B marketplace adoption. Therefore, adopters of B2B marketplaces are not necessarily put off by expenses to implement, operate and maintain their use of these platforms. This is somewhat surprising as costs would be expected to be a major consideration for an organisation. However, the greater value created by access to new markets through participation in these platforms may outweigh the cost variable. For platform developers, this finding implies that costs should not necessarily take priority and that better returns are more likely by shifting resources toward value and created by ensuring partners are ready for the implementation of a B2B marketplace, which is discussed below.

6.2 Organisational factors

This section provides the results of hypotheses for the four factors associated with the organisation context. Organisation factors in the TOE framework relate to the resources available to support the adoption of innovation within the organisation (Tomás et al., 2018). This is evaluated by several characteristics of the organisation, including quality of staff, available capacity of staff, size of the organisation, the magnitude of decentralisation or centralisation, and the formalisation of management controls and structures (Gibbs and Kraemer, 2004; Oliveira and Martins, 2011).

6.2.1 *Top management support*

This hypothesis suggested that an increase in top management support would result in increased B2B marketplace adoption. This was predicted to occur as new innovations impact multiple aspects of an organisation, require clear communication of benefits and require financial support (Shi and Yan, 2016). Top management support has been shown to be of importance in technology adoption contexts such as cloud computing (Cohen et al., 2014; Low et al., 2011; Martins et al., 2016), B2B e-Commerce (Mohtaramzadeh et al., 2018), e-Procurement (Teo et al., 2009), among others. Without top management support, it is not likely that the adoption of the technology innovation will be successful (Martins et al., 2016).

The results confirmed the hypothesis as top management is a positive and significant predictor of B2B marketplace adoption. Therefore, when top management is actively involved in establishing and communicating the vision and their support of a B2B marketplace, organisations are more likely to adopt them. Top management support is a critical factor as organisations decide to embark on a B2B marketplace journey.

6.2.2 *Perceived benefit*

This hypothesis suggested that an increase in perceived benefits would result in increased B2B marketplace adoption. This was predicted to occur because the positive benefits of reduced expenses, enhanced collaboration, improved productivity and greater return on investment (Gibbs and Kraemer, 2004) should encourage organisations to adopt a B2B marketplace. Perceptions of benefits are important in prior contexts of B2B e-Commerce (Gibbs and Kraemer, 2004) and e-Procurement (Teo et al., 2009). In the B2B marketplace context, benefits can often include reducing cost of delivery (Edelman and Geradin, 2016; Schadler and Fenwick, 2018; Zhu and Iansiti, 2019), accelerating growth (Drewel et al., 2018; Hagiu and Altman, 2017; Zhu and Iansiti, 2019), enabling scale (Schadler and Fenwick, 2018; Zhu and Iansiti, 2019) and expanding reach (Schadler and Fenwick, 2018, 2019).

The results confirmed the hypothesis as perceived benefits is a positive and significant predictor of B2B marketplace adoption. Hence, when the benefits associated with the

adoption of a platform are perceived to be higher, then organisations are more likely to adopt B2B marketplaces. To encourage adoption of a B2B marketplace, platform owners and participants should clearly articulate the benefits associated with adoption, such as improved customer relationships and improved organisation efficiencies.

6.3 Environmental factors

This section provides the results of hypotheses for the four factors associated with the environment context. Environment factors in the TOE framework surfaces the relevance of the external context. The environment context is the external environment the organisation works within and encompass the competitive, legal, social and regulatory environment (Gibbs and Kraemer, 2004; Oliveira and Martins, 2011; Tomás et al., 2018).

6.3.1 *Competitive pressures*

This hypothesis suggested that an increase in competitive pressure would result in increased B2B marketplace adoption. This was predicted to occur because, based on the perceived success of competitors (Gibbs and Kraemer, 2004), organisations believe that by adopting this new technology, they will strengthen their competitive position and improve performance (Mohtaramzadeh et al., 2018).

The results confirmed the hypothesis as competitive pressure was a positive and significant predictor of B2B marketplace adoption. Therefore, when organisations operate under intense competition and are put under pressure from competitors, or it is easy for customers to switch to other providers of similar products and services, then organisations are more likely to adopt B2B marketplaces. For platform developers, this implies the need to understand the competitive landscape and nature of competition and the role marketplace participation can play in strategic positioning.

6.3.2 *Trust*

This hypothesis suggested that an improvement in trust would result in increased B2B marketplace adoption. This was predicted to occur because trust is a critical factor

between buyers and sellers and must be developed before the adoption of e-Commerce solutions (Antoniou and Batten, 2011). Trust is an important factor influencing adoption in contexts such as organisation virtualisation (Liu et al., 2008), B2B e-Commerce (Sila, 2013; Sila and Dobni, 2012) and B2B marketplaces (Pavlou, 2002).

The results confirmed the importance of trust in this study's context as trust is a positive and significant predictor of B2B marketplace adoption. Hence, trust is key to protect all parties from inappropriate behaviours of others and ensure there are adequate rules to regulate the behaviour of participating. Improved trust will encourage the adoption of B2B marketplaces.

6.3.3 *Partner readiness*

This hypothesis suggested that an increase in partner readiness would result in increased B2B marketplace adoption. This was predicted to occur because partner relationships are an important determinant of inter-organisational system adoption (Lin and Lin, 2008), and as B2B marketplaces extend beyond the walls of a single organisation, it may be more appropriate for there to be tight integration with partners' systems (Soares-Aguiar and Palma-dos-Reis, 2008).

The results confirmed the hypothesis as partner readiness is a positive and significant predictor of B2B marketplace adoption. Therefore, when platforms are perceived as being interoperable, and there is good upstream and downstream support from both customers and partners, the more likely organisations are to adopt B2B marketplaces. The developers of platforms should consider open standards to encourage ease of integration and participation of both customers and producers.

6.4 Conclusion

B2B marketplaces hold much promise for South African organisations, but there is still much uncertainty relating to their adoption. This study has contributed by developing a framework based on the TOE framework and testing it with the objective of creating a deeper understanding of the adoption of B2B marketplaces in the South African context.

This study considered nine factors representing technological, organisational and environmental contexts. Data gathered from 87 South African organisations was used to test nine hypotheses related to the adoption of B2B marketplaces. The analysis found that six of these were significant for encouraging B2B marketplace adoption. The most important factors are competitor pressure, top management support and perceived organisational benefits. The least important are technology security, compatibility and cost. Thus, B2B marketplace adoption appears more strongly influenced by organisational and environmental considerations than by technical considerations, although some technology factors are not insignificant. The study provides useful insight into the technological, organisational and environmental variables that drive the adoption of B2B marketplaces.

The next chapter discusses the summary of findings, the implications for academia and practice, limitations, and potential for future research.

7 CONCLUSION

In this chapter, the research study is concluded by summarising the findings, providing implications for both academia and practice. It then concludes with a discussion on the limitation of this research and proposes direction for future research.

7.1 Summary

As previously stated, the purpose of this research was to explain the factors that influence the adoption of digital B2B marketplaces in South African organisations. Drawing on TOE framework and theories of INT, a research model was developed with nine hypotheses. Data were collected from a sample of 87 South African organisations using a structured online questionnaire. The reliability and validity of the data were examined using PCA and assessing the computed Cronbach's Alphas. The hypotheses were tested using logistical regression techniques. Results showed six of the study's nine hypotheses were supported. The study supported that reduced complexity, top management support, perceived benefits, trust, competitor pressure and partner readiness positively related to the adoption of B2B marketplaces. While, security concerns, compatibility and costs were not well supported as factors of the adoption of B2B marketplaces.

The most important factors are competitor pressure, top management support and perceived organisational benefits. The least important are technology security, compatibility and cost. Thus, B2B marketplace adoption appears more strongly influenced by organisational and environmental considerations than by technical considerations, although some technology factors are not insignificant.

7.2 Implications for academia

Through the systematic literature review performed for this study, it was determined that quantitative empirical studies on B2B marketplace adoption at an organisation level are limited. There is still much to be learnt about B2B marketplace adoption. This section provides some implications for academia.

This study has shown that the TOE framework is a useful way to understand B2B marketplaces. Other researchers studying this topic can apply the TOE framework in their work.

The adapted measurement items from other studies and contexts have been found to provide an adequate basis to measure these factors in the B2B context. This provides future researchers with items that they can use as the basis of their research.

The study has also shown that organisation and environment factors are more salient predictors of B2B marketplace adoption than technology factors. As future researchers explore the adoption of B2B marketplaces, it implies that the focus should be on a deeper analysis of the organisation and environment factors. Researchers could draw further on INT to gain deeper insight into environmental factors, in addition to those of competitor pressure and partner readiness. This study shows that INT and DOI can be usefully integrated into an overall TOE model to derive important insights into technology adoption.

The systematic literature review highlighted that it is evident that the adoption of B2B marketplaces in developing country contexts is an understudied problem. While B2B marketplaces or B2B e-Commerce have been given consideration in developed market contexts such as North America and Europe (Gibbs and Kraemer, 2004; Scupola, 2009; Sila, 2013; Sila and Dobni, 2012; Teo et al., 2009; Zhu et al., 2006a). This study has extended the extant literature that originated from other contexts to the developing country of South Africa. Researchers undertaking similar research in developing countries can apply the framework and findings of this study.

7.3 Implications for practice

This study provides guidance for organisations looking to understand the factors influencing decisions to adopt B2B marketplaces. The key take-out is that organisation and environment factors are more important than technology factors. Technology factors are not immaterial, and organisations need to deal with the complexity of integrating B2B marketplaces into their environment. However, once that hurdle has been overcome the focus needs to be on organisation and environment-related factors. Those responsible for

driving the change within organisations should focus on designing the right business model, ensuring senior support, and engaging with partners and competitors.

Overcoming the complexity associated with B2B marketplace adoption is key. For platform developers, this implies ensuring that the design of the B2B marketplace is simple to operate and easy to navigate. Organisations should include customer experience designers and user interface designers in their project teams to ensure that client needs are clearly understood and designed for.

Surprisingly, costs were found not to be a significant predictor of B2B marketplace adoption. This could indicate that adopters of B2B marketplaces are not necessarily put off by expenses to implement, operate and maintain B2B marketplaces. This is somewhat surprising as costs would be expected to be a major consideration for an organisation. However, the greater value created by access to new markets through participation in these platforms may outweigh the cost variable. It is key that organisations look at the full financial and non-financial implications associated with adoption and make a balanced decision on both benefits and costs.

Top management support is highly significant and requires that managers actively participate in creating the vision for the B2B marketplace, communicate the benefits of change and allocate the necessary financial and non-financial resources to the initiative.

Factors like trust emerged as important. This requires platforms to implement adequate rules to regulate the behaviour of participating parties, work with legislators to ensure sufficient laws and regulations exist to protect parties who participate, increase trust through cooperation with third parties who can step in should something go wrong and ensure that all transactions on the B2B marketplace are safe and secure.

7.4 Limitations

There are several limitations to this study.

This study received a limited number of complete responses (87). This may impact on the various variables within the TOE research model, especially those not found significant,

as their significance may be more evident with a larger number of responses. Moreover, the combined effects of the variables on adoption could not be adequately explored due to sample size limitations.

The study used a cross-sectional survey and may be subject to common method bias as the measures are derived from the same source (Bhattacherjee, 2012). This study only investigates the adoption of B2B marketplaces at one point in time and applying a cross-sectional survey did not allow the testing of causal relationships and casual inferences between variables is made only with reference to adoption theories discussed in the report.

The online survey was self-completed by the participants and may therefore be subject to respondent bias (e.g. questions may have been incorrectly interpreted). Online surveys can create sampling bias as not all potential respondents may have access to a computer or the Internet (Bhattacherjee, 2012). This may impact the external validity of the study.

This study was conducted on South African organisations, but almost two-thirds (63%) of the responses were concentrated on Financial Services organisations, which may limit the generalisability of the findings to other sectors.

7.5 Future research

This research used a model based on the TOE framework and informed by INT. Further research on adoption of B2B marketplaces could be studied utilising an alternative theoretical basis.

A key contribution of the TOE framework is the broad context it embraces in viewing innovation adoption (Bose and Luo, 2011), but it does not take into account all factors (Martins et al., 2016). TOE does not provide a definitive model for expressing the factors that influence the adoption of innovation but provides a taxonomy for classifying these factors. Future research could use alternative variables to improve the overall accuracy of the research model.

Furthermore, adopting a qualitative study (e.g. case study) on a specific sector (e.g. Finance) could add deeper insight into the dynamics of B2B marketplace adoption within South African organisations.

This study focuses on the decision to adopt or not adopt B2B marketplaces. Future research could examine other areas of the diffusion process, such as the factors involved in the implementation of a B2B marketplace.

The use of a longitudinal research design may improve the understanding of how B2B marketplaces are adopted over a period of time. The use of longitudinal research would be preferable as the adoption of technology by an organisation adoption is a process that will occur over time (Mohtaramzadeh et al., 2018).

Compatibility was found not to be significant for the average South African organisation, but it was not immaterial. Future research could explore compatibility in more depth, potentially segmenting by the type or size of organisation to determine in which circumstances it may be more significant.

7.6 Conclusion

B2B marketplaces hold much promise for South African organisations, but there is still much uncertainty relating to their adoption. The purpose of this research was to explain the factors that influence the adoption of digital B2B marketplaces, and as the results of the study, it has been found that competitor pressure, top management support and perceived organisational benefits are three of the most important factors driving adoption. Other factors such as technology complexity, partner readiness and trust were also significant. Results have important implications for platform owners and participants.

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APPENDIX A: FINAL INSTRUMENT

B2B Marketplace Research

B2B Marketplaces

The purpose of this survey is to conduct a research study on perceptions toward, and the participation of South African organisations in, B2B Marketplaces.

A business-to-business (B2B) Marketplace allows suppliers to sell products and services directly to buyers via an online platform. B2B Marketplaces provide the technology infrastructure and value-added services that facilitate relationships and commercial trade between business buyers and sellers and other parties on the platform.

You are invited to participate whether or not your organisation is currently engaged in a B2B Marketplace. This questionnaire consists of three sections and should take approximately 10 minutes to complete.

B2B Marketplace Research

Section 1

1. Please tick the appropriate box relating to your level of seniority.

- [ ] Executive Management
- [ ] Senior Management
- [ ] Junior Management
- [ ] General Staff

2. Please specify your job title.

3. Please indicate the industry your organisation primarily operates in (please tick the appropriate box).

- ◯ Agriculture, Hunting, Forestry and Fishing
- ◯ Mining and Quarrying
- ◯ Manufacturing
- ◯ Electricity, Gas and Water Supply
- ◯ Construction
- ◯ Wholesale and Retail Trade
- ◯ Transport, Storage and Communication
- ◯ Financial, Insurance, Real Estate and Business Services
- ◯ Community, Social and Personal Services
- ◯ Other (please specify)

4. Please answer the following question about your organisation's IT department (please tick the appropriate box).

	Less than 25 employees	26-50 employees	51-100 employees	101-500 employees	>500
Total number of IT employees	◯	◯	◯	◯	◯

5. Please answer the following questions about your organisation's IT department (please tick the appropriate box).

	Less than R5 000 000	R5 000 001 - R25 000 000	R25 000 001 - R50 000 000	R50 000 0001 - R100 000 000	More than R100 000 000
Approxiamate size of your IT budget	◯	◯	◯	◯	◯

6. Please answer the following question about your organisation's size (please tick the appropriate box).

- ◯ Less than 50 employees in your organisation
- ◯ 51-150 employees in your organisation
- ◯ 151-500 employees in your organisation
- ◯ 501-1000 employees in your organisation
- ◯ 1001-5000 employees in your organisation
- ◯ More than 5000 employees in your organisation

B2B Marketplace Research

Section 2

7. Please indicate whether you have adopted, are planning to adopt, or have no plans to adopt a B2B Marketplace (please tick the appropriate box).

- ◯ We have adopted and already participate in a B2B Marketplace.
- ◯ We have not adopted but we have plans to adopt within the next year.
- ◯ We have not adopted but we have plans to adopt within the 1 to 3 years.
- ◯ We have not adopted but we have plans to adopt within the next 3 to 5 years.
- ◯ We have no current plans to adopt.

8. If your organisation has already adopted a B2B Marketplace please answer the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
"Our core business activities (e.g. sales or procurement) rely heavily on our participation in B2B Marketplace(s)."	○	○	○	○	○
"A large percentage of our relevant transactions take place through B2B Marketplace(s)."	○	○	○	○	○
"Use of B2B Marketplace(s) is strongly embedded in the execution of our core business processes."	○	○	○	○	○

9. If you have adopted or are planning to adopt, what role(s) would your organisation assume within the B2B Marketplace? You could play more than one role. Please tick the appropriate response.

- ☐ Buyer
- ☐ Seller
- ☐ Platform Owner (run the platform)
- ☐ Other (please specify)
- ☐ Partner
- ☐ Not sure

10. If your organisation has not already adopted a B2B Marketplace please answer the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
"In the near future, our core business activities (e.g. sales or procurement) are likely to rely heavily on our participation in B2B Marketplace(s)."	○	○	○	○	○
"In the near future, a large percentage of our relevant transactions is are likely to take place through B2B Marketplace(s)."	○	○	○	○	○
"In the near future, use of B2B Marketplace(s) is likely to be strongly embedded in the execution of our core business processes."	○	○	○	○	○

11. If you have adopted or are planning to adopt, what role(s) would your organisation assume within the B2B Marketplace? You could play more than one role. Please tick the appropriate response.

- ☐ Buyer
- ☐ Seller
- ☐ Platform Owner (run the platform)
- ☐ Other (please specify)
- ☐ Partner
- ☐ Not sure

12. If your organisation has not already adopted a B2B Marketplace please answer the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
"In the near future, our core business activities (e.g. sales or procurement) are likely to rely heavily on our participation in B2B Marketplace(s)."	○	○	○	○	○
"In the near future, a large percentage of our relevant transactions is are likely to take place through B2B Marketplace(s)."	○	○	○	○	○
"In the near future, use of B2B Marketplace(s) is likely to be strongly embedded in the execution of our core business processes."	○	○	○	○	○

B2B Marketplace Research

Section 3

The following statements ask about your perceptions of B2B Marketplaces. Please indicate to the extent you agree with each statement

13. Security Concerns.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
"The confidentiality and security of my company's data is not guaranteed when adopting a B2B Marketplace."	○	○	○	○	○
"Adopting a B2B Marketplace would be a security risk for our IT infrastructure."	○	○	○	○	○
"It is difficult to assess the compliance of B2B marketplaces with information security standards."	○	○	○	○	○
"It is difficult to assess the compliance of B2B marketplaces with data protection laws."	○	○	○	○	○

14. Complexity.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The use of B2B Marketplaces requires skills that my company does not have.	○	○	○	○	○
The use of B2B Marketplaces is too complex for my company's business operations.	○	○	○	○	○

15. Compatability.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
B2B Marketplace technologies are compatible with my company's existing IT infrastructure.	○	○	○	○	○
B2B Marketplaces are compatible with my organisations businesses processes and operations.	○	○	○	○	○
B2B Marketplace technologies are compatible with my company's existing systems (e.g. Finance, ERP, CRM, SCM).	○	○	○	○	○

16. Costs.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Adopting B2B Marketplace will increase technology costs.	○	○	○	○	○
Adopting B2B Marketplace technologies will increase operations and maintenance costs.	○	○	○	○	○
B2B Marketplace participation is too costly for my organisation	○	○	○	○	○

17. Top management support

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
"Top management supports taking risks in the adoption of a B2B Marketplace."					
"Top management actively participates in establishing a vision and formulating strategies for utilizing B2B Marketplaces."					
"Top management communicates its support for the use of B2B Marketplaces."					

18. Trust.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
"B2B Marketplaces adequately protect all parties from inappropriate behaviours of others on the platform."					
"B2B Marketplaces ensure all transactions on the platform are safe and secure."					
"B2B Marketplaces ensure that all participating parties are trustworthy."					
"B2B Marketplaces have adequate rules to regulate the behaviour of participating parties on their platforms"					
"There are sufficient laws and regulations to protect parties who participate in B2B Marketplaces."					
"There are sufficient third parties who can step in should something go wrong for any participant in a B2B Marketplace."					

19. Competitive Pressure.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
"Our firm is under pressure from competitors to adopt B2B Marketplace systems."					
"It is easy for our customers to switch to another company for similar services/products without much difficulty."					
"The competition among companies in the industry which my company operates in, is very intense."					
"An industry move to utilize the B2B Marketplace systems would put pressure on my firm to do the same."					
"Some of our competitors have already started using B2B Marketplace systems."					
"Our competitors know the importance of B2B Marketplace systems and using them for operations."					

20. Perceived Benefits

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
"The adoption of a B2B Marketplace will reduce my company's cost of performing business transactions."					
"The adoption of a B2B Marketplace will enable my company to provide better customer service."					
"The adoption of a B2B Marketplace will increase my company's ability to compete."					
"The adoption of a B2B Marketplace will allow my company to reach new customers."					
"The adoption of a B2B Marketplace will improve our relationship with our existing customers."					
"The adoption of a B2B Marketplace will improve efficiency of our operational procedures."					

21. Partner readiness.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
"Our downstream customers are ready to transact with us on B2B Marketplaces."					
"Our upstream partners are ready to transact with us on B2B Marketplaces."					
"Our trading partners work to ensure their systems are interoperable with the B2B Marketplace."					

Thank you for completing this questionnaire. For any questions and queries related to the research, please email me at 9110185P@students.wits.ac.za.

APPENDIX B: SURVEY COVER LETTER

WITS
UNIVERSITY

Dear Sir / Madam,

My name is Kent Marais, I am completing my Master of Commerce degree in Information Systems at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating the adoption of Business-to-Business (B2B) Marketplaces, across South African organisations, under the supervision of Professor Jason Cohen. The aim of this research project is to promote a better understanding of adoption of B2B Marketplaces by South African organisations and the factors influencing the organisational adoption decision.

As a senior IT or business decision-maker within your organisation I am inviting you to complete an online questionnaire pertaining to whether your organisation has adopted a B2B Marketplace. If you consent to participate, the online survey will take approximately 30 minutes to complete. The questionnaire consists of three sections related to your organisations size and industry, adoption of a B2B Marketplace, and factors influences the adoption of a B2B Marketplace.

There will be no personal costs to you if you participate in this project. You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any question if you do not want to. The results of the online questionnaire will be completely confidential and anonymous as I will not be asking for your name or any

identifying information, and the information you give to me will be held securely and not disclosed to anyone else. All data will be only used for the purposes of this study, and destroyed once the requirements of the University have been met. The researcher works for a large financial institution which is in the process of adopting a platform business model. The research data will not be made available to any parties, will remain strictly confidential and will be used solely for the purposes of completing the degree. A copy of the research report will be made available to all respondents on request. Results will be reported in aggregate, all responses are anonymous and will be kept strictly confidential.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, e-mail hrecnon-medical@wits.ac.za

Yours sincerely,

Kent Sean Marais

Researcher:

Kent Sean Marais, 9110185P@students.wits.ac.za, 083 254 6561

Supervisor:
Jason Cohen, Jason.Cohen@wits.ac.za, X78164

APPENDIX C: ETHICS CLEARANCE CERTIFICATE

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

SCHOOL OF BUSINESS SCIENCES ETHICS COMMITTEE
CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: CBUSE1905**
PROJECT TITLE	The adoption of B2B marketplace platforms by South African organisations: A technological-organisational-environmental perspective.
INVESTIGATOR	Marais Kent
SCHOOL/DEPARTMENT OF INVESTIGATOR	School of Business Sciences
DATE CONSIDERED	17 August 2021
DECISION OF THE COMMITTEE	Approved unconditionally
RISK LEVEL	Low Risk
EXPIRY DATE	31 December 2023

ISSUE DATE OF CERTIFICATE 24 August 2021 **CHAIRPERSON** _____
(Neetu Ramsaroop)

cc: Supervisor: Prof Jason Cohen

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am are authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

Kent Marais
Signature

30 / 08 / 2021
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX D: SUPPORTING COMPUTATIONS

Table 33: *p*-value of financial industry

Hypothesis	Outcome	Predictor	Covariate 1	P-value
H1	Adopted	Security concerns	Financial industry	0,273
H2	Adopted	Complexity	Financial industry	0,332
H3	Adopted	Compatibility	Financial industry	0,224
H4	Adopted	Costs	Financial industry	0,281
H5	Adopted	Top management support	Financial industry	0,641
H6	Adopted	Perceived benefits	Financial industry	0,469
H8	Adopted	Trust	Financial industry	0,312
H7	Adopted	Competitor pressure	Financial industry	0,577
H9	Adopted	Partner ready	Financial industry	0,333

Table 34: Principal component analysis of environment factors

ENVIRONMENT	Component			
	1	2	3	4
TR1	0,127	0,677	-0,020	-0,166
TR2	0,239	0,697	0,198	0,197
TR3	0,082	0,809	0,074	0,055
TR4	0,011	0,844	0,145	-0,064
TR5	0,184	0,710	-0,245	0,348
TR6	0,068	0,707	-0,291	0,179
CP1	0,746	0,121	0,292	0,144
CP2	0,133	0,070	0,241	0,782
CP3	-0,143	0,084	0,739	0,194
CP4	0,426	-0,100	0,690	-0,003
CP5	0,868	0,096	-0,007	-0,177
CP6	0,839	0,149	0,146	-0,142
PR1	0,760	0,132	-0,131	0,311
PR2	0,681	0,118	-0,236	0,389
PR3	0,683	0,157	0,031	0,400

Table 35: KMO and Bartlett's Test of Sphericity for environment factors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,743
Bartlett's Test of Sphericity	Approx. chi-square	614.898
	df	105
	Sig.	0,000