



e-Commerce adoption in South African SMMEs

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DECLARATION

I declare that this research report is my own unaided work. It is being submitted to the Degree of Master of Science in Industrial Engineering to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

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...18... day of ...October..., ...2024...

Abstract

In this research study e-Commerce adoption in Small, Medium and Micro enterprises (SMMEs) in South Africa was studied. The purpose of this study was to determine the factors that constitute for a successful implementation of the e-Commerce strategy and compare this to the adoption of e-Commerce in SMMEs. The study evaluated frameworks/standards for successful e-Commerce implementation and with this evaluation a consolidated conceptual framework for the successful implementation of e-Commerce was developed. Through samples of both SMME and successful/most visited platforms, functionality and performance assessments of the platforms were conducted using the Jaccard similarity method, and time and method study. T-tests and ANOVA were conducted for performance assessments, to assess if there was a significant difference in performance between SMME and successful e-Commerce sites. Through these assessments it was found that there is a clear gap in adoption from both a functionality and performance perspective, 6 out of 7 of the successful sites had advanced to the last stage of adoption while only one SMME platform reached the last stage which is an external integration stage of the developed framework.

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LIST OF SYMBOLS

Jaccard Coefficient for set A and B	$J(A, B)$
Average of averages	$\bar{x}$
Correlation coefficient	R
Probability	P
Sum of squares	SS
Degrees of freedom	df
Mean Squares	MS

Nomenclature

Acronym	Name
ICT	Information and Communications Technology
e-Commerce	Electronic Commerce
e-Marketplaces	Electronic Marketplaces
SMME	Small, Medium and Micro Enterprises
GDP	Gross Domestic Product
JIT	Just In Time
CMS	Content Management System
C2C	Customer to Customer
B2B	Business to Business
B2C	Business to Customer
SaaS	Software as a Service
API	Application Programming Interface
DaaS	Delivery as a Service
HTML	Hypertext Mark Up language
CSS	Cascading Style Sheet
SPA	Single Page Application
MPA	Multiple Page Application
UX	User Experience
UI	User Interface
WWW	World Wide Web
FAQs	Frequently Asked Questions
AI	Artificial Intelligence
UPI	Unified Payments Interface
EDI	Electronic Data Interchange
RFID	Radio Frequency Identification
IOT	Internet Of Things
ANOVA	Analysis of variance

Chapter 1

1. Introduction

1.1 Background

The rise in Information and Communications Technologies (ICT) has resulted in an increase in digitalization in the past decades. This has caused considerable growth in the interconnectivity of different countries around the world. This increase has also been identified as one of the factors that have contributed to the increase in globalisation along with the increase in trade, labour and capital mobility [1]. The increase in globalisation has also meant an increase in global markets and competition which has now escalated to a global scale. One of the ICT approaches taken by global companies includes the ability to trade products and offer services online which is referred to as e-Commerce. Through this e-Commerce, consumers are able to order goods and business can process the order online and be able to facilitate the financial transactions online [2].

The adoption of this e-Commerce strategy includes the integration of an online business into the processes of daily operations of the business. So, throughout the organisations transformational process from the inputs, the transformation and the output, the e-Commerce strategy has to be considered. For a fully integrated strategy, it has to be considered through the value chain [3]. It is the conversion of the bricks and mortar business strategy into an online business, handling business transactions online and interfacing with clients through the web [3]. Through this strategy the constraints of location, time and capacity are eliminated as in this strategy customers can have access to view the organisations services or products anywhere and at any time, thus the ability to form a globally participating organisations with capacity to compete at a global level [3].

Since this strategy removes many of the constraints that hinders on organisations to grow, Goga et al [3] states that this strategy is favourable for small businesses with minimal resources to tackle the growth and expansion of their business. The elimination of the physical constraints means that the business can grow as much as the owners allow it to and though this is the case, a new strategy like this also comes with its own requirements as the organisation grows and these factors that impact or enhance the adoption of this strategy are further considered below in literature.

There are different types of these e-Commerce strategies that organisations can opt for depending on the one that aligns with their business strategy. These e-Commerce strategies are segregated into three main types of e-Marketplaces which includes Third party e-marketplaces, Consortia e-marketplaces and Private e-marketplaces [4]. The Third-party e-marketplaces are more independent trading platforms on the internet which are characterised by a community of many independent buyers and sellers [4]. A modern example of these marketplaces includes websites like Amazon and eBay which

are characterised by many independent buyers and sellers on one platform, these are business models which serve as intermediary services to connect buyers and sellers.

Consortia e-marketplaces are more dependent and are formed through the collaboration of industry leaders, these includes organisations such as Covisint marketplace which was formed through the collaboration of Daimler Chrysler, Ford Motor Company and General Motors in February 2000 [5]. This marketplace is characterized by a network of key participants in the value chain such as suppliers and buyers [4] and the model serves to collaborate businesses with the same services or offering complementary services, and thus promoting each business while within a collaboration.

The private e-marketplaces include individual enterprises dealing with their own suppliers and buyers, this would be any company with a site that is used to monitor trade between the organisation, its suppliers, and buyers [4]. As seen from these types, except for the private e-marketplaces, the other marketplaces are characterised by a collaboration between businesses or acting as connections between sellers and buyers. Hence through the collaborative capability that the strategy exhibits, businesses of the same services can grow through networks and support one another in their expansion.

According to Statista [6], retail e-Commerce sales are projected to reach 3.647 trillion US Dollars globally in the year 2024 with an annual growth rate of 9.83 percent, and 6.41 billion US dollars in revenue is expected in South Africa, with an annual growth rate of 9.04 percent [7]. This then demonstrates a rapid growth in this market and a market that is worth exploring.

1.2 Problem Statement and Motivation

As indicated above, there is an increase in globalisation and global markets in the 21st century and majority of well-established companies have adopted e-Commerce strategies to take advantage of this growth. Though this is the case for large, well-established companies, there is still a slow adoption of this approach in SMME's as stated in [8], which constitutes 90 percent of businesses in South Africa, accounting for 40 percent of the country's GDP and is responsible for 60 percent of employment in the country [8][9].

This causes a loss of 70 percent of South Africans who shop online according to research by Schaefer et al [10] and who could be potential customers of these enterprises. This increase in online shopping behaviour was further exacerbated by the covid 19 pandemic [10]. And there is a loss in SMME's in having the ability to connect with other business and connect with their buyers and suppliers through a single interface. Even though some form of e-Commerce has been detected in some SMME's in South Africa, these are only at the lowest stage of implementation, with static interfaces which are less interactive [8]. The slow adoption in SMMEs hinders on the growth of these organizations and their ability to compete with global or local e-Commerce giants. Resulting in loss of customers, which are mainly younger audiences who enjoy browsing through the internet for convenient products and services which these SMMEs can otherwise supply.

1.3 Critical Research Question

The above problem then led to the following question:

How is the current adoption of e-Commerce in South African SMME's compared to successful cases/models of e-Commerce implementation?

1.4. Research Objectives

The overall objective of the research is to determine the gap that exists between the successful implementation of e-Commerce and the current adoption of e-Commerce in South African SMME's.

This required the research,

- To evaluate industry standards for e-Commerce implementation which includes the tools, techniques and frameworks used for successful implementation of the e-Commerce strategy.
- To develop a conceptual framework for the successful implementation of e-Commerce in SMMEs.
- To investigate the current e-Commerce employed in South African SMME's.

1.5 Research Method summary

The research method used in this paper, was mainly focused on classifying the e-Commerce adoption of SMMEs within the South African landscape and determining the gap that exists between successful implementation and the current adoption in SMMEs. And so, analyses on factors and frameworks for e-Commerce adoption was performed through the literature review, to assess the best practices that can be employed by platforms in order to progress in their adoption of the e-Commerce strategy.

Through the analysis of the different models and frameworks in literature, a consolidated conceptual model was developed with elements resonating that which is in literature. This was to tackle the classification of platforms. To then determine the gap that exists in e-Commerce implementation, methods to be used in the experiment to determine the gap, were identified through literature which included Jaccard Similarity, time study and method study. These dictated the data required to accomplish the required investigations.

After the methods were identified for conducting the gap analysis, tools to conduct the experiment were selected with relation to the method to be used in the experiment. And then the platforms to be involved in the experiment were sampled, which comprised of selecting a sample of successful platforms and SMME platforms within the South African landscape. Through the platforms sampled, data collection was performed based on the data required for each of the methods identified in literature and the data was processed through the computations required for the methods. Results from these computations were then deduced and presented for analysis. And after the results were analysed,

discussion points were raised which highlighted the concurrence in the outcomes of the different computations and also in relation to the literature review. Then based on the results and discussion, inferences on e-Commerce adoption were made including recommendations to assist in alleviating the problem outlined in the problem statement.

1.6 Delimitations

The focus of this research paper was on e-Commerce adoption in South African Small Medium and Micro sized enterprises (SMMEs) in comparison to successful cases found in larger enterprises. South Africa was the system boundary though global companies which affect trade even in the South African context were also considered, and only verified platforms were studied.

SMMEs in this research were further delimited to those that offer retail services. And the application approach which involves the tools utilized in e-commerce such as websites and the different systems supporting these platforms was considered instead of the organisational approach which considers the organisational aspects of adopting the e-Commerce strategy such as the level of expertise within the organisation to adopt the e-Commerce strategy or the acceptance of the strategy across the organisation. Further delimitations are outlined in the chapters to follow.

1.7. Outline of Chapters

Chapter 1: Introduction- this includes information on the background of the research, the problem statement or motivation, the research question, objectives and delimitations of the research.

Chapter 2: Literature Review-this includes the consideration of previously performed studies on the subject matter, information on similar studies performed is recorded based on its applicability to the study.

Chapter 3: Research Method- this comprises of the research design, the instrumentation used, sampling or the sampling plan, data collection, and analysis procedures, information on the Validity and Reliability of the research, and Ethical considerations.

Chapter 4: Analysis and Results- this includes the analysis of the processed results obtained through the application of the research method, it also includes the display of the analysed results.

Chapter 5: Discussion-This includes a thorough discussion on the research results and their relation to the research problem, objectives, and question, and also in relation to the literature review.

Chapter 6: Conclusions and Recommendations- This includes conclusions on the research problem and potential recommendations on how the problem can be addressed. Further research opportunities are also outlined in this chapter.

Chapter 2

2. Literature Review

2.1 What are SMME's.

SMMEs are Small, Medium and Micro enterprises which offer products and services at a comparatively small scale with relation to number of employees, turnover and asset value. According to Ndayizigamiye et al [11] SMMEs are sometimes referred to as SMEs (Small, Medium Enterprises) because Small and Micro Enterprises are often categorised under small businesses.

Ndayizigamiye et al [11] also states SMMEs have proven to contribute substantially to employment opportunities which concurs with the 60 percent of employment rate for South Africa mentioned in [8].

SMME's in this research are described in accordance to the Amendment Act No. 26 of 2003, refer to table A1 in appendix A for further information on parameters used to define SMME's in this paper. And the main focus of this research will be on retail services, which is classified as Retail and Motor Trade and Repair Services in the table. For medium, small, very small and micro enterprises in this segment, number of full-time employees are expected to be 200, 50, 20 and 5 respectively and the total turnover is expected to be R39 million, R19 million, R4 million and R0.20 million respectively [12]. And for gross asset value these enterprises are valued at R6 million, R3 million, R0.60 million and R0.10 million respectively [12].

2.2 e-Commerce

In addition to the definition of eCommerce in the introduction, Ghada [13] further asserts that eCommerce has provided business organisations with the capability of connecting with corresponding businesses, to reduce production and delivery times. This also makes it easier for organisations to implement Just In Time (JIT) production and delivery strategies, following the Toyota management system [13]. According to Ghada [13] eCommerce has the ability to reduce costs, generate revenue and provides access to new markets globally. It provides the opportunity to improve customer service through straight forward contacts, fast enquiries and responses, maximize trade benefits and can give under industrialized economies a chance to grow [13]. Ghada [13] also elaborates on the benefits reaped by organisations that have implemented eCommerce, which includes increased information sharing, time to market, supply chain efficiency and the convenience of shopping for customers.

2.2.1 eCommerce Value Chain

The following outlines eCommerce value chain from the customer's perspective, as stated in [3].

Choice of eCommerce store

This includes customers selecting an eCommerce store on the basis of marketing or customers awareness [3]. Common forms of marketing involves online marketing which further expands into direct online advertising, personalized online advertising and social media [3].

Selecting and ordering

This is the customer browsing through the website for products, and selects them into a shopping cart with competing qualities in this case being price, quality, range, quality of the website's interface with increased user experience through minimized number of clicks to access products and personalization such as recommendations based on previous searches or purchases [3].

Payment

Customer in this case checks out and pays through a payment gateway [3]. This can be done through an in-house method or through a third-party gateway providing a variety of payment options e.g., credit, debit cards, EFT, online credit, reward points, online wallets, and crypto currency [3].

Table 2.1: Websites Payment options [3].

Website	Payment options accepted										
	Credit card	Debit card	Conventional EFT	Instant EFT (i-Pay, SID, etc)	Mobile payments using QR codes (Snapscan and Zapper)	Mobile credit (eg. Mobicred)	Direct deposit	Cash On Delivery	Loyalty points (Discovery miles, Ucount, ebucks etc)	Payment at counter (Pay@, Scode)	Store credit
Takealot	X	X	X	X		X	X	X		X	X
Spree	X	X	X	X	X	X			X	X	X
Loot	X		X	X			X			X	X
Wantitall	X		X				X				
Zando	X	X	X	X			X		X	X	X
Superbalist	X		X	X	X	X			X	X	X

Pick n Pay	X	X									
Woolworths	X	X	X								X
Yuppiechef	X	X	X		X		X		X	X	X
Amazon (shipping to South Africa)	X	X									
Makro	X		X						X		
Mr Price	X	X	X	X							
Foschini group stores	X	X	X	X	X		X				X
Truworths group stores	X										

Order processing

Here orders are processed and sent to the supplier, with suppliers managing orders for each website they listed and have inventory ready through an order management system [3]. And through a channel advisor tool suppliers, can have a unified view of all platforms they sell from [3].

Dispatch

Orders are then dispatched from either the supplier or manufacturer, or from a centralized warehousing and distribution centre [3].

Delivery

A courier or logistics company transports the order to the final customer which is managed through a delivery system or transport management system [3].

Table 2.2: Websites Delivery Options [3].

Website	Delivery options							Deliver to door cost if under threshold (main Centre/outlying)	Delivery to door (Same day delivery/Exprs)	Collection
	Postal Delivery	Premium/ expedited delivery	Courier/ door to door	Collection	Counter to counter/ Pick up points	Locker	Free delivery threshold			
Takealot			X	X			450	60	120/95	0 (CT)
Spree		X	X	X	X		350	50/100	+39-49	
Loot	X	X	X	X	X		250	35/60	45	0 (CT)

Wantitall			X				None	Dependent on location and weight		
Zando		X	X		X		250	25	80 (CT) /60 (main centres)	
Superbalist		X	X	X			350	60	80/70	
Pick n Pay			X		X			60-90		0
Woolworths			X					50-95		
Yuppiechef			X	X	X		400	60		
Amazon (shipping to South Africa)			X					\$6.99 plus per item charges	\$13.99 plus per item charges	
Makro			X		X	X		Dependent on size and location.		
Mr. Price (clothing)			X		X		350 (store delivery)	45		5/35 (express)
Foschini group stores		X		X	X		500	R 50	125/75	50 (over 500 is free)
Truworths group stores			X	X				R50		

2.2.2 e-Commerce in south Africa

According to Johnson et al [2], there is still minimal adoption of eCommerce by South African businesses especially those in the retail sector. e-Commerce by South African stores is mainly to facilitate the merchandising and selling of products to the public, and this is done at a minimal scale as there is still an increased reliance on the traditional “bricks and mortar” approach which has caused them to struggle in increasing productivity, market access, competitiveness and being sustainable [2]. Concerns for adoption in this regard includes poor internet security, high illiteracy rates and lack of beneficial frameworks [2].

Johnson et al [2] identified factors that influence the adoption of eCommerce in South Africa which encompasses organisational requirements, the network of people, technology architecture and culture.

2.2.2.1 Online retailing in South Africa

It is stated in [3] that the growth of eCommerce in south Africa is hindered by high prices and poor-quality internet services, and the reliability and cost of delivery mechanisms. According to Goga et al [3] the ability to shop over mobile devices has increased though it is still in its infancy. Most South African shoppers are higher income earners with 35% earning more above R30000 per month as expressed in [3]. These are higher income earners but are time poor, but Goga et al [3] state that even in this bracket penetration is still low and reasons for this is trust in payment methods and high delivery costs.

Products most users use online channels for, includes a range of digital and downloadable services, travel and event tickets [3]. Retail product categories encompasses fresh food, non-perishable foods, home, fashion, computers, electronics, toys, movies, musical, alcohol, flowers, cars, etc. And the fastest growing of these includes consumer electronics, media, fashion and clothing [3]. There is also an increase in sales for bulkier products [3]. According to Goga et al [3] online stores are better positioned to sell a wide range of low volume items than would be possible in physical stores, which requires large inventory. This can also form one of the reasons for reluctance to adopt the eCommerce business strategy.

Table 2.3: Online retailing product categories [3].

	Home	Fashion	Computers and phones	Electronics	Toys	Movies and music	Alcohol	Non-perishable food	Fresh food	Sport and Outdoors	Flowers and gifting	Books	Health and beauty
Takealot	X	X	X	X	X	X	X			X		X	X
Loot	X	X	X	X	X	X	X			X		X	X
Makro	X	X	X	X	X		X	X		X		X	X
Wantitall	X		X	X	X	X				X			X
Zando		X											
Spree		X											
Superbalist		X											
Yuppiechef	X												

Amazon (shipping to South Africa)	X	X	X	X	X	X		X		X		X	X
Mr Price	X	X			X					X			
Foschini group stores	X	X											X
Truworths group stores		X											
Pick n Pay									X				
Woolworths	X	X					X	X	X			X	X
Incredible Connection			X										
Clicks	X			X									X
Game	X		X	X	X		X	X		X			X
Netflorist											X	X	

Channels where most traffic is observed is on mobile devices, with most of the deliveries originating in metro areas and this can be attributed to the fact that most warehouses are located in these areas.

2.2.3 e-Commerce in SMMEs

According to Garg et al [8], SMMEs in South Africa have not yet expanded their businesses into e-Commerce, the paper states that these enterprises are hindered by resources such as lack of knowledge in ICT and e-commerce, total cost of ICT infrastructure, illiteracy levels in the organisation, lack of awareness on e-commerce benefits, regulatory policies and requirements which are unpleasant, dependence on supply chain partners preferences and cultural issues. Findings in [8] further indicate that SMMEs e-Commerce adoption in the retail sector is at level 3, which stipulates that SMME websites sampled are still composed of static content, with low number of websites with interactive and transactional content.

Other limiting factors within SMMEs highlighted by Ndayizigamiye et al [11] include low use of e-Commerce among customers, low use of e-Commerce among suppliers, low levels of computerization, telecommunications not dependable and concerns about internet security. Findings in [11] also reveal that online payments are the major limiting capability with regards to the adoption of e-Commerce and this trend might be the case for all transactional activities. And this concurs with some of the concerns voiced by online shoppers/consumers in [10], that influence their choice of online stores which includes Poor security of online payments, high delivery fees, difficult to return products, lack of personal data protection and unreliable delivery times.

2.3 What constitutes an e-Commerce platform.

According to Optimizely [14], an e-Commerce platform is a platform that allows enterprises to offer products and services and be able to manage these catalogued products. Ndayizigamiye et al [11] further asserts this as the process of purchasing, selling or trading products, services or information through the internet or intranets. Through the platform purchases can be facilitated and customer relationships can be maintained through their interaction with the interface [14]. All these is catered by a **content management system** further elaborated below and a commerce engine enabling these functions to be performed [14]. e-Commerce platforms are suitable for different business strategies whether C2C, B2B, C2B and B2C, it also caters companies selling tangible products or offering a service [11]. The platforms enable businesses to create virtual assets and manage these assets, and also allowing omnichannel marketing, digital sales and operations [14]. These platforms can enable access to foreign markets, thus trading at a global scale [11].

2.3.1 Content Management Systems (CMS)

This section elaborates on the content management system mentioned above.

According to Browning and Lowndes [15, p. 4] the goal of CMS is the “increased integration and automation of the processes that support efficient and effective internet delivery”. In [16] it is stated that CMS is a server that is used to secure web text and publishing details in a database, it allows pages to be loaded once requested by a client’s browser [16]. The system gives the ability to easily manipulate content which includes publishing details, appearance and structure since the program is based on templates and additional functionality can be added through plug-ins [16]. These systems also allow for content to cater to different customers with different languages and in different locations [16]. The below wheel shows some of the functions that CMS encompasses [15].

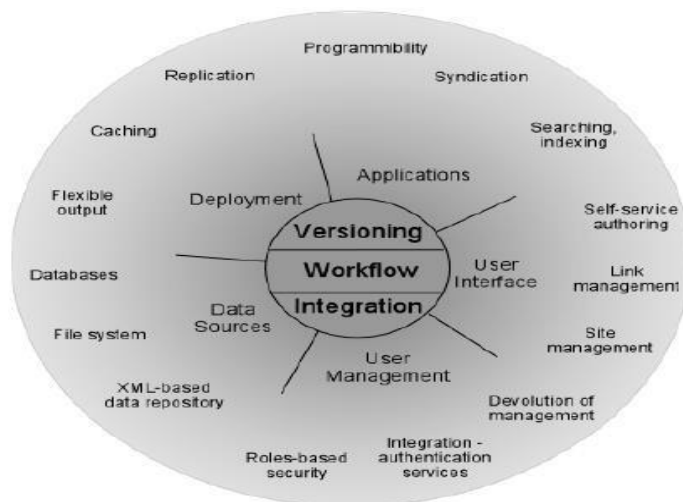


Figure 2.1: CMS features [15]

Some of the functions are further expanded on in table B1 in appendix B. The different types of these systems are also highlighted in [15] and presented in appendix C to distinguish between the different types of these systems.

2.3.2 Types of platform offerings

In addition to the above types of e-Marketplaces mentioned in the background, there are three types of platform offerings which are the different platform services and configurations available in the market. These include the following,

Open-source platforms

This offering gives enterprises the flexibility to modify and control their platforms [14]. This kind of platform requires an enterprise with software developing capability and who have knowledge of the architecture design of the open-source platform and code editing ways in order to manipulate the interface to suit their business strategy [14].

Software as a service platform (SaaS)

This type of software does not require individuals to build or maintain the software, but also gives the ability to modify and redesign the user interface [14]. In this platform type there is a partnership with a SaaS provider who assists businesses in managing their e-Commerce platforms [16]. The providers host the software themselves on cloud and offer licenses to enterprises looking for this type of software [16].

Headless e-Commerce Platform

Here content is distributed as a service, this platform type disconnects the e-Commerce business from a CMS [14]. According to Optimizely [14] the following benefits are gained from this, which includes.

- Increased platform flexibility
- Through the use of **Application Programming Interface (APIs)** which allow for different software applications to communicate and exchange information, separate SaaS platforms can be set up.
- More flexible and susceptible to front end changes in the future.

In [14] it is stated that this kind of platform is more preferable due to its ability to “control monolithic, cloud-based storage over marketing, sales and product assets”. Enterprises can select their preferred **front-end services** they can utilize and also have the ability to connect to them through **API’s** [14].

This type of platform is further expanded to digital experience platforms and agile CMS.

Delivery as a Service (DaaS)

In addition to the above three platforms, DaaS is used to support these platforms. DaaS is defined as “service-oriented delivery and business processes in line with customer expectations and needs in the on-demand economy” [17, p. 62]. According to Huschebeck, and Jacques [17] this integrates different transport services into a single mobility service.

In [14] DaaS allows for enterprises,

- To generate new business models with the service as a contributing factor
- To use an open and neutral service, which allows access to various transport options for enterprises to utilize and manage.
- To attend to customer requirements responsively

2.3.3 Platform Design and Development

2.3.3.1 Front End Platform Design

Front end web development is the component of web development that deals with Front facing platform design. This includes the use of technologies such as HTML, CSS, JavaScript etc. which are development languages or frameworks [18].

According to Robbins [19] Front End Development Tasks include:

- Graphic Design and image production
- Interface Design
- Information design relating to User Experience on the site.
- HTML document and Stylesheet (CSS) development
- JavaScript

HTML

This is ‘Hypertext Mark Up language’(HTML) which is used to create web pages, it was created based on a standardized generalized language which was used for marking documents which started with the ability to create text only browsers with hyperlinks, to browsers having images, lists and forms which customers can interact with [20]. The latest iteration of this technology is HTML5 released in 2008 [20].

CSS

CSS is cascading style sheet, this is used to enhance the appearance of an html document with capability such as setting the colours of texts and the background of any element, creating borders, increasing or decreasing the space around borders [21].

JavaScript

This is identified as a client-side dynamic programming language [18]. This allows the web page to have functionality, allowing platform and user interaction. It allows for the simple activities performed over the loaded web page or interface [22]. This gives life to the static web page and allows for transactions to be performed. JavaScript uses frameworks which are component oriented and after certain computation the component returns a user interface template as an output [22]. Most used frameworks according to [22] include react, Vue.js and Angular. In [19] JavaScript task include the following.

- Checking Form entries for valid entries
- Swapping out styles for elements in the site or for the entire site
- Ensuring that the browser remembers information about the user for the next time they visit.
- Building interface functionality and widgets such as expanding menus.

According Purushotham [18] in order to improve the performance of a website, elements such as the website download time, HTML tags usage, CSS, scripting, images and graphics need to be taken into consideration. In [22] it is stated that a website can developed as a multiple page application (MPA) or a single page application (SPA). Kaluža [22] states that analysis of the architectural features and user needs is needed when deciding between SPA or MPA. MPA is more intended for larger systems with a number of different types of services, which requires more types of interactions with their visitors. SPA on the other hand is used in development of simpler applications with less content [22].

MPA

Here any change in the web page necessitates the retrieval of new pages from a server [22]. The server has routes which are registered onto it and each browser/HTTP request from a client to the server retrieves a new page. So as a response to a request a page will be generated, or an error is displayed [22]. The application logic is catered with the server and the client is only the recipient of the web pages which are retrieved from the server [22]. Due to the increase in complexity of web pages which required a lot of time to develop on the server, to transfer and present to the client, a solution in the form of AJAX was established for MPA [22]. This enables only parts of the web page to refresh instead of the entire page [22]. Through this, complex interface can be developed faster, with improved performance.

SPA

This type of application entails having only one page that caters for everything on the interface [22]. Resources such as JavaScript, HTML, CSS are loaded only once throughout the application's work cycle, and data for the application is refreshed from a prior state to a new state. From the entry point, the page loads dynamically and independently with reloading the page [22]. So, after an initial request

to a server is made, a browser would load the complete HTML page, and then subsequent client and server interaction is executed using AJAX, so that the browser can update dynamically without having to refresh the page.

The key difference between the two application types, is the nature of the request and response. MPA's work cycle terminates by receiving a response while for SPA it depends on the user's interaction with interface [22]. SPAs utilize AJAX when presenting a request to a server and as a response receive data, and small parts of HTML to view received data [22]. Some of these key differences are further expressed below.

Advantages of SPA compared to MPA

- Quick Response time: this is achieved through establishing the structure of the site in advance eliminating constant requests to obtain new pages from the server [22].
- Separating Presentation from business logic: Code to monitor the user interface's behaviour is contained on the client side instead of the server and only critical business logic elements are maintained on the server [22].
- Faster and easier data transfer: Activities with the server is easier and faster because after delivery only data is sent or received from the server [22].
- Possibility of offline support: Connection to the server might not be necessary at all times as the JavaScript is running on the client side thus can be disconnected from the internet temporarily [22].

Disadvantages of SPA compared to MPA.

- Difficulty to implement search engine optimization which is optimizing website application to attain the highest rank in ranking content on search engines [22].

This includes optimization for the following search engine functions:

1. Crawling: which is the disclosure of web page information e.g., location, headlines, images, keywords, etc [22].
2. Indexing: This is processing and storing data collected through crawling to a database [22].
3. Serving: Which is retrieving relevant content at the of a user's query [22].

In SPA a user performs a function and new data is downloaded, JavaScript adjusts the part of the page without refreshing and opening a new page [22]. Crawling scans content on the basis of URLs and page changes and SPA has only one initial page [22].

- JavaScript must be enabled: if JavaScript is disabled the application will not be shown [22].
- Security requires more work [22].

Web Design

The pillars of web design include.

Colour Theory

This includes the rules and guidelines used by web designers to present appealing interfaces through the use of appealing colour schemes. Sik-Lányi [23] asserts that different colours can convey different emotions as outlined below.

- White is associated with purity.
- Purple or Gold is associated with royalty.
- Green is associated with freshness.

The paper further expanded on this to express how colours can invoke both negative and positive emotions, as shown below.

Table 2.4: Colour and emotions [23]

Colour	Emotions	
	Positive	Negative
Red	Sense of power, Strength, Action, Passion, Sexuality and Love	Anger, Forcefulness, Danger, Impatience, Violence and Revenge
Yellow	Brightness, Warmth and Joy	Caution and Warning
Blue	Cool and Tranquil, Patience, Comfort, Loyalty and Security	Fear, Coldness, Passivity and Depression
Orange	Warmth, Friendliness and Cheerfulness, Excitement and Energy	Ignorance
Purple	Royalty, Sophistication, Religion	Bruising or Foreboding
Green	Nature, Growth, Freshness and Soothing	Envy, Greed, Guilt and Jealousy
Black	Dramatic, Sophisticated and Stylish, Serious	Evil and Death
White	Pure, Fresh, Easy, Cleanliness or Goodness	Blind, Winter, Cold, Distant

General rules include that background and text colours have to align to ensure readability on the site and another one is that one primary colour and one or two secondary colours should be chosen for the site. This is further expanded on with Colour Harmonizing.

Colour Harmony

This is ensuring that there is a sense of order and balance in the visual experience thus pleasing users visually [23]. This requires a logical colour structure, which creates a sense of order [23]. According to Sik-Lányi [23] emphasis can be given to an object in a scene if its coloration clashes with the background but to harmonize the interface the object has to balance colour and size, a strong coloured object has to be smaller than its background [23].

Three solutions for selecting harmonious colours outlined in [23] includes.

- Picking varying shades of one colour
- Picking complementary colours
- Picking analogous colours

User Experience

This is the experience users have when utilizing your website/interface. Best practices in this aspect of web design include.

- Simplicity
- Consistency
- Reading Patterns which comprise of either F pattern or Z patterns as outlined in [24]. Where F reading pattern is due to the absence of subheadings to direct the user on the page according to UX Collective [24]. The user in this type, scans the page in a F shape pattern, the user focusses on the first few rows on the top of the page, then the user mostly scan the words left of the sentences and down the page [24]. Then the Z pattern, focuses on the user's Z shaped scanning pattern, where the user starts at the top left corner, to the top right corner, then from this to the bottom left corner then finally the user goes to the bottom right corner [24]. Other patterns explored in [24], include the layer cake pattern where the pages headings and subheadings guide the user's reading pattern. Another pattern also mentioned is the commitment pattern this includes keeping users focus on the content, encouraging the user to go through the entire page [24].
- Understanding the human psycho
- All platforms design.

User Interface

This represents the platform where human and computer interaction occur, it is the point of contact between the user and computer system. This aspect of web design encompasses the following.

- Hierarchy of information

- Website layout
- Alignment of web content
- Simplicity
- Understanding the Audience

Typography

This is the art of organising letters and text on an interface in a way that is appealing to the user. According to Retore et al [25] this influences the way in which the information is received and understood.

Guidelines of typography given in [25] include.

Function of the texts:

This is employing font families according to the texts function [25]. Texts to attract the attention of users should have more elaborated or strong font design and those texts used to inform should ensure readability and legibility [25].

Identity of typography:

This highlights that typography can communicate subjective meanings and its essential that the font family applied correlates to this meaning [25].

Balance:

The combination of font families should be balanced to ensure order. Excess of varying fonts can be chaotic and one font with few variations can be monotonous [25].

Hierarchy:

This is the use of typography to present a sequence in which users can go through to read the information on the page, this includes important text been highlighted while less important text receives less emphasis [25]. This can be related to the Z and F reading patterns outlined above.

Legibility and readability:

This guideline is to ensure that text is legible and easy to read, and this should be considered when selecting the font family [25].

Type size according to the medium:

Here consideration of the font size across different media and platform/devices is highlighted, this is also dependent on the font itself, some fonts might need to be sized up or down [25].

Adequate spacing:

It is advised that balance between lines, words, and letter spacing which can affect readability should be maintained by texts [25]. And line length should also be considered as lengthy lines may cause disinterest [25].

User centred design

This is designing around the user's needs, this includes consultation with users through interviews or observations, in order to create an interface tailored for its users [19].

2.3.3.2 Backend Platform Development

Backend development is mainly concerned with the web server. Purushotham et al [18] states that web server technologies provide the tasks related to web content organisation, storage, loading time and hosting the website. In [19] this involves the scripts and programs that work on the server in the backend to make web pages dynamic and interactive. The following are backend tasks according to [19].

- Information design pertaining to the way information is organised on the server.
- Forms processing
- Database Programming
- Content management systems explored in section 2.3.1 above.
- Server-side web applications using technologies such as PHP, JSP, Ruby, ASP.NET, Java and other programming languages.

A web server with a browser program constitutes a client server system, which is a file server connected to its clients through the internet [26]. This can contain a number of different web browsers running on various hardware platforms and connected to the internet [26]. These servers can perform simultaneous jobs where each server competes for various shared resources which are processing times, file access and network bandwidth. This leads to waiting times or queues depending on the job [26].

In [27] a web server is described as software and hardware that uses HTTP and other protocols to respond to clients' requests on the world wide web (www). Web server hardware is connected to the internet and allows data to be exchanged with other connected servers and the software controls how the hosted files are accessed by the user [27]. These files are stored up in a data warehouse [27]. This software is then accessed through the domain names of the websites.

Dynamic Vs Static Web servers

For static web servers' content is shown as is, in its static condition, the web server sends hosted files 'as is' to a browser while for dynamic web servers' content can be changed and updated [27].

Dynamic web servers contain application servers and databases where application servers enable

updates to be made on hosted files before they are displayed by the browser and through the database content can be generated by the web server when requested [27].

Database management

A database acts as a reservoir of collected data through an integrated and shared computer structure [28]. It is where data collected through the interaction with users is stored and browser files can be reserved. The following sets of data is normally stored in these reservoirs.

- End User data
- Metadata (“data of data”) through which data is integrated and managed. This describes the data characteristics and relationships that link the data found in the database [28].

These databases allow for the data to be shareable in a secure way.

Database Management Systems

This includes programs that manage the structure of the databases and control the access to data stored in the database [28]. These systems serve as the middleman between the database and the user (or application program). They provide the user with a single integrated view of the data in the database [28]. The systems receive all application requests and translate these to operations required to fulfil the requests [28]. Through these systems data can be shared among multiple applications or users, and can incorporate many different user’s views of data to a single all-encompassing data repository [28].

Different providers can also give access to cloud-based databases, eliminating the need to buy, install, configure, or maintain any hardware, operating systems or network services [28]. Providing the processing capability for data and applications [28].

There are different types of database categories, these include.

General Purpose Databases which provide a wide variety of data which is used in multiple disciplines. And **discipline-Specific databases** which contain data focused on specific subject areas. Then databases which support day to day operational activities are classified as **operational databases or online transaction processing databases or transactional databases or production databases** [28].

Then **analytical Databases** is where historical data is stored.

- The data warehouses which preserve data in a composition which is optimized for decision support, contains historical data acquired from operational databases and external sources [28].

- Through online analytical processing tools, advanced data analysis for retrieving, processing and modelling data from the data warehouse can be achieved [28].

Data can also be structured or unstructured, unstructured being data that exists in its original state, which is the state it was collected [28]. Structured is the result of processing unstructured data to facilitate storage, use and generation of information [28]. One language to manipulate unstructured and semi-structured data storage and usage is XML and XML databases support storage and management of Semi-structured XML data [28]. The following are some of the data management systems.

Table 2.5: Data management systems features [28].

Product	Types of Databases							
	Number of users			Data Location		Data Usage		XML
	Single	Multiuser		Centralized	Distributed	Operational	Data Warehouse	
	User	Work Group	Enterprise					
MS Access	X	X		X		X		
MS SQL Server	X ³	X	X	X	X	X	X	X
IBM DB2	X ³	X	X	X	X	X	X	X*
MySQL	X	X	X	X	X	X	X	X
Oracle RDBMS	X ³	X	X	X	X	X	X	X
* Supports XML functions only. XML data are stored in large text objects.								

The following are the advantages of database management system as stated in [28]

- Improved data sharing
- Improved data security
- Better data integration
- Minimized data inconsistency.
- Improved data access
- Improved decision making
- And increased end user productivity

Database Design

This deals with the design of the database structure that will be used to store and manage end user data [28]. According to Coronel et al [28] proper database design requires the designer to recognise

what the database is expected to use. Designing a transactional database demands accurate and consistent data at operational speed [28].

Data warehouses require historical and aggregated data [28]. And integrated data can be segregated into its separate parts, where each can be stored in its own table, this is the process of decomposing, and relationships can be created for these tables making it possible to have an integrated view of the data [28]. Through these relationships a relational database can be created.

Web Design Guidelines

Some of the standard web design guidelines expressed by the World Wide Web Consortium (W3C) include the following,

For **privacy, safety and security** includes that the designed APIs for the platform should not compromise on the safety of users visiting the site [29]. Trusted interfaces such as the address bar, security indicators and permission prompts should be designed in way that enables users to trust and verify the information that they provided [29]. Then if a feature comes with the possibility of harm, then consent needs to be acquired from the user for the feature to be used [29]. Moon [29] also states that features should be limited to secure contexts if it would pose a risk to the user without the authentication, integrity and confidentiality that is present in the secure context [29]. And when private browsing mode is engaged this should not be revealed [29]. Moon [29] further states that powerful APIs which expose user data and perform background activities should require user activation [29]. And when assistive technologies are utilized, this should not be revealed, there should not be a way to detect that a user is using assistive technologies, unless consent is given [29].

For **platform performance and functionality** W3C states that designed features or platforms should work across different devices, screen sizes, interaction modes, platforms, and media, to ensure that the site supports a full range of devices and platforms [29]. And any addition of new capabilities on the platform, must be executed in such a way that improves the overall platform [29]. The interface should be able to detect features introduced, and also detect when the feature is not present and adjust to this [29]. And with the addition of new capabilities on the interface usability should be prioritized over compatibility with third party tools. Features that require resource loading or other operations before loading the site should be avoided, as they can result in a blank page which is poor user experience. There should be a consideration of the trade-offs between high level and low-level APIs where high-level APIs allow for the ability to intervene in various ways on behalf of the user such as ensuring accessibility and privacy and low-level API which enables creators' room for experimentation. Moon [29] also states that there should be a consideration of how functionality behaves in non-fully active backward/Forward cached web pages which is when a user navigates away from a web page and the page is cached in a non-active state until user navigates back [29]. If non fully active web pages are not supported, this can make the experience of navigating back and

forth less optimal [29]. Consistency should also be established where there is both internal consistency with the rest of the system and external consistency with the rest of the world [29].

Refer to appendix D for more information on these guidelines.

2.4 Frameworks and Factors of eCommerce adoption

In [11] a stage approach to eCommerce adoption is mentioned, these stages include **presence, portals, transactions integration and enterprise integration**. The first level which is **presence** is an entry level characterised by setting up a website that advertises the company's products and service offerings [11]. The content in this level must be appealing to the user which includes thorough application of colour theory and UX practices expressed above [11]. Through the application of these aspects the website is thus user friendly. The prices in this stage should be flexible enough to attract sales and at the same time yield profits, this can be achieved through initiatives or incentives such as discounts on the company's products when purchased through the website [11]. Customers should be able to perceive the site as inexpensive [11]. Barriers in this level mentioned in [11] include financial implications, acceptance by managers and lack of inhouse expertise.

The second level which is the **portals stage** includes two-way interaction in the form of supplier or customer order planning [11]. Here business to business interaction needs to be accommodated in the functionality, culture and language issues also need to be considered as more partners are added to the platform [11]. Then in the **transactions integration** level performing financial transactions through the website is encompassed which can require third party payment method capabilities to be enabled on the platform [11]. Some honourable mentions of these third part services include PayPal, Stax, Stripe etc. SMMEs in this case would need to select the most suitable of these services and create partnerships with them. Barriers in this level includes security, privacy, lack of compatibility with financial systems which can even hinder on cross border trading [11]. The last level which is **enterprises integration** encompasses business processes being fully integrated to the online business model [11]. This includes complete integration between eCommerce, customer relationship management and supply chain management where Garg et al [8] stated that eCommerce enables business process re-engineering or supply chain industry value chain integration initiatives such as Just In Time inventory, continuous replenishment and quick response retailing.

Success factors in this case would need an organisation to have accurate and full understanding of current and future strategic needs of partners and devising solutions to tackle these needs through reliance on information sharing and having long term contracts [11]. Barriers in this case includes availability of technology, technology diffusion and the complexity of networks [11]. It is mentioned that ICT enabled eCommerce was found to lead to improved performance in sales, internal processes and customer/supplier relationships through market expansion, improved information sharing

mentioned above and improved transactional efficiencies which concurs with the transactional stage above [8].

Another approach explored in [8], includes **wait and see** as the first step, which encompasses waiting for a competitor to see if they are benefiting from their eCommerce strategy [8]. Then as a second step a **static online presence** is established which includes having contact details, products, service information and catalogues [8]. In the third step an **interactive platform** with email, browsers/websites but it is not used for transactions, it is just to support business processes [8]. Then the fourth stage is an **electronic commerce** with a capability of performing transactions and step five is **internal integration**, integrating internet transactions within businesses through the support of internet technology and information systems [8]. Then in step six is the **external integration** which integrates business processes and technologies with the network of business partners [8].

2.4.1 Model of Internet Commerce Adoption

Here three stages of adoption are expressed, these comprise of **basic adoption, intermediate adoption and advanced adoption** [8]. At the **basic level**, websites would be providing basic information or having basic web presence, **intermediate adoption** would be an extension of basic information through including e-mails, online inquiry and contact information, FAQs, information on extended services and value add information [8]. **Advanced adoption level** would then be an organisation having higher level of value-added services which involves secure online transactions processing capability handling online ordering, online payments and enquiry, links to warehouses and distributors [8].

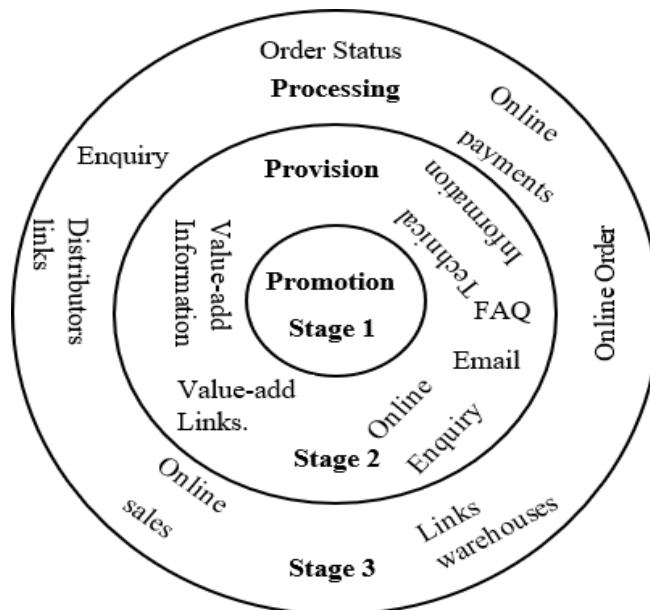


Figure 2.2: Model of Internet Commerce Adoption stages and features [30]

2.4.2 Three by Four-Dimensional Matrix

This model classified websites into three categories which included the **promotion of products** and services, the **provision of data and information**, and lastly the processing of **business transaction** [30]. The value created from these stages involves timely response to customers' needs, customized/Personalized experience, improved logistics and sensational user experience attracting users to the site [30].

2.4.3 e-Commerce Sophistication Model

This model by Ally et al [30], is expanded into five levels which incorporate the following.

Level 1: Brochure Type

In this level basic website information is displayed, with static, limited content which serves to create a web presence for advertising and marketing purposes [30].

Level 2: Catalogue

Here there is a navigable product/service catalogue offered in a simple order form with offline payment options and basic emailing capability [30].

Level 3: Transaction

This level offers shopping carts, check out, online ordering and payment via credit card. But there is still minimum security [30].

Level 4: Registration

Herer customer registration is enabled, which enables login options on the website, order tracking, advanced security options and multiple payment options [30].

Level 5: Personalization

This includes customisable webpages and innovative use of emerging technologies [30].

A list was developed in [30] with functionality placement per level of the above model and this shown in the table E1 in appendix E.

2.4.4 Centre of Electronic Commerce framework

This framework established six categories for the adoption of electronic commerce, which encompassed **company information and function**, **product/service information and promotion**, **performing transactions**, **customer services**, **ease of use** and **innovation in services and technology** [31].

Additional elements were defined into each of the categories.

Company information and function includes ownership, financial performance and company mission statement, product/service and operations areas, reputation building, contact details and possibly a list of distributors and a set of company functions [31].

Product/service information and promotion includes product/service clusters, detailed product/service specifications, pricing, promotions on special products/services and information about new or future products/services [31].

Transactions includes Supporting on-line purchasing, security, simplified transactions, online payment, information on full transaction cost, order confirmation, delivery time /mode and trust assurance [31].

Customer services includes sales assistance, customer policies, after sales procedures, customized services and broader approach to customized services [31].

Ease of use includes layout and design, site map, website easily searchable, site information easily assessable and caters for a range of users [31].

Innovation in services and technology includes improved customer service in orders, improved customer service through feedback, improved customer service through communities, improved customer service through website customization and new and effective use of multimedia [31].

Through analysing six frameworks, a website evaluation checklist was established in [32] see table F1 in appendix F for functionality compared for each model. Three content areas were identified by David et al [32] through these analyses, which included.

Static Content, which is a simple presence on the web, this stage is informational in nature with low sophistication in terms of programming and technical expertise [32]. This static content includes the following.

- **Company Information:** this is information about the company and what they stand for [32]. Including financial information and company history all under the about us section [32].
- **Contact information:** which is information relating to the physical address, email, and other contact details.
- **Pricing information:** showcasing the prices of products and services provided by the organisation [32]. This should be done in a way to attract sales from customers.
- **Product Catalogue:** This includes advertising promotion on the products offered and outlining the product offering [32].
- **Graphical Content:** these are all the images and styling of the website which supports the aesthetic or design of the site.

Transactional content, here functionality and features that support transactions between the buyer and the SMME organisation are introduced, these are facilitated online [32].

- Order form: this is to facilitate online ordering where the user is required to enter information about their order to complete the order [32].
- Online Payment option: these are the tools used to facilitate payments, these options are usually provided with contact information in order to for the payment to be confirmed [32].
- Shopping Cart: this records customer's selection of products on the site and to keep track of customer's potential purchases [32].
- Security: This facilitation of security across the site through a policy document or a lock on transactional data. This can involve encryptions and privacy seals utilized to ensure security and privacy on the site [32].
- Order Tracking: this is the ability to monitor order confirmation and delivery [32].

Interactive content, this stage groups all the features and functionality that facilitate communication whether internally within the SMME boundaries or externally [32].

- Email facilities: this is emailing facilities incorporated on the website for real time contact with the organisation [32].
- Customer registration and login: This incorporating customer information into the company's business processes which includes creating customer profiles that can also enable personalization of the webpage.
- Customizability and personalization: here a personalized and customized interface is created based on customer profiles, differentiating product/service offering for individual customers [32].
- Links to social media sites: this is an extension to social media platforms or profiles for increased visibility and networking capability [32].
- User groups: Includes chats rooms, blogs and discussion groups which enables for easy communication and can act as sources of feedback for the products or services that the organisation is offering [32].
- Multimedia: this is where multimedia options are enabled such as audio, videos, 3D graphics and animations.
- Search engine: Allows users to search through the website using phrases that are inputted on the search bar which are then recognised by the search engine, returning the most matching results [32].
- Help Function: Allowing users to learn about the website and its functionality.
- Newsletters: includes newsletters from the organisation.

- Links to distributors: this allowing access to links to upstream and downstream partner websites [32].
- Customer Support: This is supporting capabilities used to support customers throughout their experience which includes support when a customer is having trouble using the interface. This can involve helpful features such as FAQs, sitemaps, on-site support, etc.

2.4.5 Inhibitors of Ecommerce

Ecommerce adoption factors which inhibit or motivate adoption of eCommerce adoption expressed in [8] involves individuals(owner/manager's) characteristics, level of education, level of ICT and eCommerce knowledge, social and cultural issues, technological factors which include lack of or slow speed of the internet, complexity of technology and lack of payment facilities. Organisational factors include security, trust and privacy concerns, financial ability, cost implications, size of the organisation and perceived benefits. Environmental factors include governmental support, business partner affiliation, economic and political instability, natural disasters, business culture and micro economic policies [8].

2.5 New technologies in e-Commerce

2.5.1 AI in eCommerce

2.5.1.1 Bots and Search

This technology allows for eCommerce websites to assist its customers 24/7, providing customer support and help [33]. This utilizes artificial intelligence (AI) to have online conversations via text or a speech medium, to facilitate conversations with people visiting the app, assisting them with their personal needs and requirements [33].

Through these communication mediums, customer interactions can be facilitated without any human intervention and AI can enable real time interaction with customers. The organisation can use customer acquired data from these interactions to offer the right and customized recommendations tailored to customer's expectation and requirements [33]. An example of this technology is eBay's shop bot which interacts with customers and then suggests the best deals to customers by understanding their preferences.

AI can also allow for visual search of related images where customers are able to search by images and compare related items to unique images [34]. Voice searching can also be enabled, which allows the AI assistant chat bot server to respond to customer request automatically through addressing voice commands [34].

2.5.1.2 Customer Relationship Management

This assists in gathering a wide range of information, evaluates this information to ensure that it provides the best services to potential customers. It allows for the transfer, use and sharing of large volumes of data which is then utilized for observing customer buying trends, choices and factors which affect their buying decision [33]. Through this practice services can be tailored according to individual customers' needs, and prediction models can be formulated for customers buying behaviour for increased accuracy and better prediction results [33]. According to Soni [33] the fundamental component of AI which has propelled the success of eCommerce giants is the ability to identify and predict patterns of customers purchasing behaviour.

2.5.1.3 Assist in sales goals.

Here AI can be utilized to generate better insights and forecasts at a micro and macro level in sales trends. AI can support targeted marketing and advertising through enabling personalization techniques to customize content by user, and this is achieved through analysing purchase histories and customer interactions [34]. And through delivering targeted marketing and advertising personalized for their customer, this can increase customer retention thus boosting sales [34]. Customer data seems to be influential in creating efficient sales processes as mentioned above, but this data can be used further to automate follow ups on abandoned cart enquiries and having customers move through the sales processes by having engagements with chat bots and other customer assistance services [34].

2.5.1.4 Product Content Management

Through better catalogue designs which put customers' needs in mind, AI can ensure that customers have the best experience in the websites [33]. Quality product content management can be ensured through evaluation of customer data and providing personalized products to customers, which can even boost sales. Through AI real time product targeting can be enabled by providing an easy way customers can find items they are looking for [34]. Utilizing machine learning online shoppers can be provided with product reviews, discounts and customized deals [34].

From this we can see the relationship between sales, customer relationship management and product content management.

2.5.1.5 Customer Service

AI can assist in knowing how to satisfy customers and how to address the needs and requirements of the customers irrespective of the time and situation [33]. Through AI organisations can construct a balanced environment where both man and machine work together to achieve profits and sales [33].

2.5.1.6 Automation through AI

This includes assisting businesses by allowing them to understand what their customers want, can allow connectivity across the globe, within the organisation and with customers to ensure customer experience and high sales volumes [33]. AI can also provide support by automating repetitive tasks that keep online stores functioning [34]. Product recommendations can also be automated, as well as loyalty discounts [34].

It can assist in automating internal processes to accommodate the eCommerce business model. Kalaivani et al [34] adds that business operations of successful eCommerce technologies needs to include external operations such as network marketing, UPI transactions, wallet payments, logistics and delivery and internal operations such as electronic data interchange (EDI), internet, intranet, emails, databases and software creation technologies.

2.5.1.7 AI Use Cases in eCommerce

Kalaivani et al [34] also compiled some of the use cases of AI in eCommerce.

1. Personalized Product Recommendations

This is offering personalized product recommendations based on past customer behaviours and behaviours of similar groups of customers [34]. Here machine learning is used to capture data, analyse it and use it to deliver personalized experiences, implement a marketing campaign, optimize pricing and generate customer insights [34]. This use case is related to product content management explored in section 2.3.1 above and highlights providing a personalized product offering [34].

2. Pricing Optimization

This incorporates AI enabled dynamic pricing, which is a strategy of changing pricing based on supply and demand [34]. This involves predicting when and what to discount and dynamically calculating the minimum discount necessary for a sale [34].

3. Enhanced customer service

Through virtual assistants and bot technology already explored above, high service customer support can be provided [34]. These bots can assist in facilitating simple transactions and be able to handle low level questions and issues without the customer having to wait [34].

4. Customer Segmentation

AI systems can explore highly complex and varied options for customer engagement and continuously optimize their performance as more data becomes available [34]. Marketers can therefore set parameters and allow AI to optimize and learn about the varied market [34].

5. Smart logistics

Utilizing machine learning transit times can be forecasted including demand levels and shipment delays [34]. Smart logistics or intelligent logistics is about real time information

through sensors, RFID tags, etc. for inventory management and better forecast of demand [34]. Machine learning systems have become smarter to build better predictions for the supply chain and logistics function [34].

6. Sales and demand forecasting

As stated above AI can assist in planning inventory with both real-time and historical data [34]. Real time analytics can be significant in monitoring and reacting a shift in consumer demand and this information can be utilized for building other models such as price optimization and targeted marketing [34].

2.6 Internet of Things (IOT) in eCommerce

IOT is the technology of physical objects being connected and monitored through the internet through the use of embedded sensors which can extend information about the object of concern [35].

2.6.1 Characteristics of this technology includes.

Interconnectedness where IOT can facilitate people to device and device to device interaction [35]. Then there is **Smart Sensing** which Provides sensing technology that can create experiences that reflect awareness of the physical world, people, and objects [35]. The **Intelligence** characteristic enables IOT to impart a certain level of intelligence into connected devices [35]. **Expressing** is the ability of IOT to express the current state of devices relative to other connected devices in the surrounding and thus facilitating better communication flow between human and machine [35].

2.6.2 IOT Architecture for eCommerce

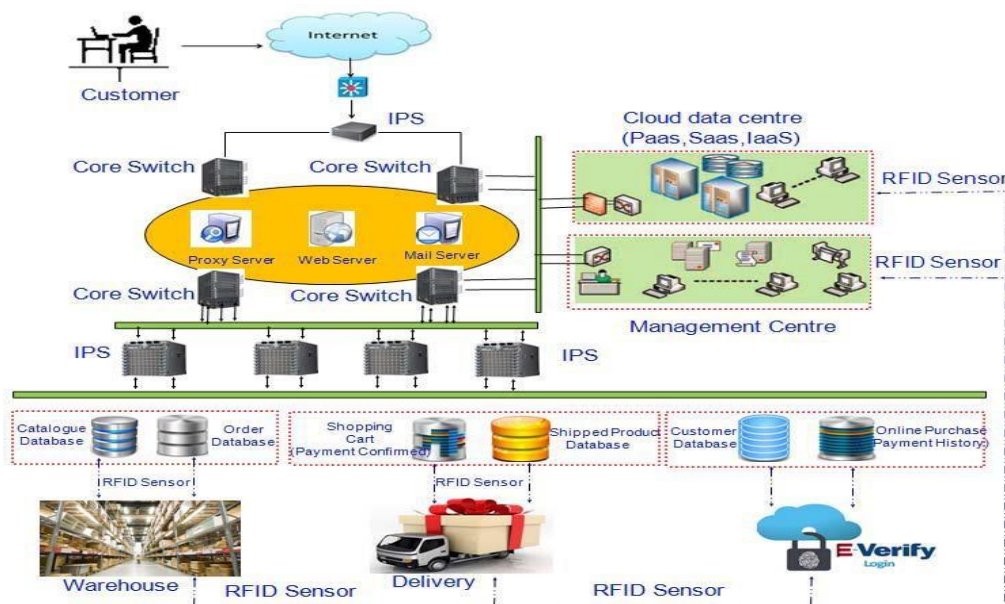


Figure 2.3: IOT e-Commerce architecture [35]

In the architecture delivery is connected through RFID sensors with shopping cart payment confirmation database, shipped products database, management centre and cloud data centre [35]. Warehouses are connected through RFID sensors with the catalogue database, order database, management centre and cloud data centre [35]. Customer logins are E-verified using a customer database and an online purchase database which are also connected to the management centre and cloud data centre [35].

This architecture shows how customers actions can be connected through the supply chain using sensors and how information and goods can be tracked in real time throughout the chain to keep customers informed about their purchases [35]. The retail and logistics sector is expected to be a key area where IOT will have a big impact [35]. An example of this systems is the SAP HANA Cloud platform for IOT, which provides infrastructure to enable businesses to tap into a network of millions of connected devices [35].

Chapter 3

3. Research Method

The following outlines the method that was used to perform the research study.

3.1 Research Design

In this study a combination of qualitative and quantitative research methods were utilized. The qualitative research methods used include secondary research through the literature review. For quantitative research, the Jaccard Index expanded on in section 3.5.1 was used as a quantitative research method to measure similarity and dissimilarity between the different sampled e-Commerce platforms. Time and method study were then used to determine the performance differences of these platforms. Through the qualitative research method, already researched factors of e-Commerce adoption from a platform perspective were identified, which included already established frameworks, then the quantitative research method assessed the gap that exists between successful cases of e-Commerce adoption and e-Commerce adoption in SMMEs with relation to the identified factors or frameworks.

3.2 Instrumentation

3.2.1 Qualitative research

The instrument used includes secondary research through the literature review to determine factors that influence the adoption of e-Commerce platforms from a platform perspective, this includes literature on platform design and offering, and the different frameworks which feed into these aspects.

3.2.2 Quantitative research

The Jaccard Index was used as a quantitative research method to measure similarity and dissimilarity between the different sampled e-Commerce platforms and to determine the gap that exists in adoption. Observations were also performed in the form of time and method study, where time study was used to determine the efficiency of the e-Commerce platforms through measuring the time required to perform transactions in the sampled platforms which includes the consideration of the customer journey of purchasing a product or using a service hosted by these platforms and thus establishing a standard. Method study on the other hand was used to determine the best methods that can be employed, which includes examining the steps, clicks and methods needed to perform transactions or use services hosted by these platforms.

3.3 Sampling

Selective sampling was used in this research for e-Commerce platforms. The top five successful e-Commerce companies/platforms locally which are within the top five companies with the highest number of visits on their platforms were selected, this was based on the analysis done in [36]. These platforms included Takealot, Amazon, Makro, Woolworths and Gumtree, they were considered as successful platforms based on the amount of traffic for the sites as analysed in [36]. In addition to these sites UberEATS and Mr D which offer delivery services were also considered as they are also in the top five for food and drinks apps as analysed in [37]. These were specifically selected within the top five because they are organisations which are entirely concerned with delivery services for the food and beverages sector. Then through yelloso [38] business services category, small businesses listed with websites in South Africa were selected based on the delimitations in sections 1.5 and 2.1 above. In addition to the delimitations already mentioned, e-Commerce platforms sampled in this research were retail services under the Clothing, beauty and personal care, Flavour and Fragrance, Textiles, Paper, pulp and lumber, plastics, metal fabrication, Leather and Footwear sector, Food, Beverages, chemicals and Tobacco subsector within agro-processing and the electrotechnical sector. And only those which were verified, South African based and not subsidiaries of larger institutions were selected. The directory listed businesses from the following cities in South Africa, which are Johannesburg, Pietermaritzburg, Polokwane, Cape Town, Nelspruit, Mafikeng, Bloemfontein, Kimberley, Alexander Bay and Aliwal North. Out of 414 small businesses listed on the directory, only 96 were identified to fit the delimitations of this research, and only 51 of the 96 had platforms which were accessible and usable, see appendix I for the list of these platforms. Hence the sample had a margin of error of 12.87% against the larger small business population, and 9.60% against the 99 retail services population, refer to appendix G and H for the computations.

3.4. Data Collection Procedures

3.4.1 Literature/Content Analysis

Through literature the factors and frameworks that contribute to the successful implementation of e-Commerce were identified. And through these sources a consolidated framework was developed as outlined below with themes related to e-Commerce adoption. These themes were then utilized to determine adoption stages for e-Commerce by consolidating functionalities required for a site to qualify for each stage of the framework.

3.4.1.1 Consolidated Conceptual Framework

This framework was created using aspects of structural equation modelling (SEM), where the measured value in this case are the different stages of e-Commerce adoption observed, the true value are the contributing factors to each stage and the error/disturbance are the inhibitors of each stage.

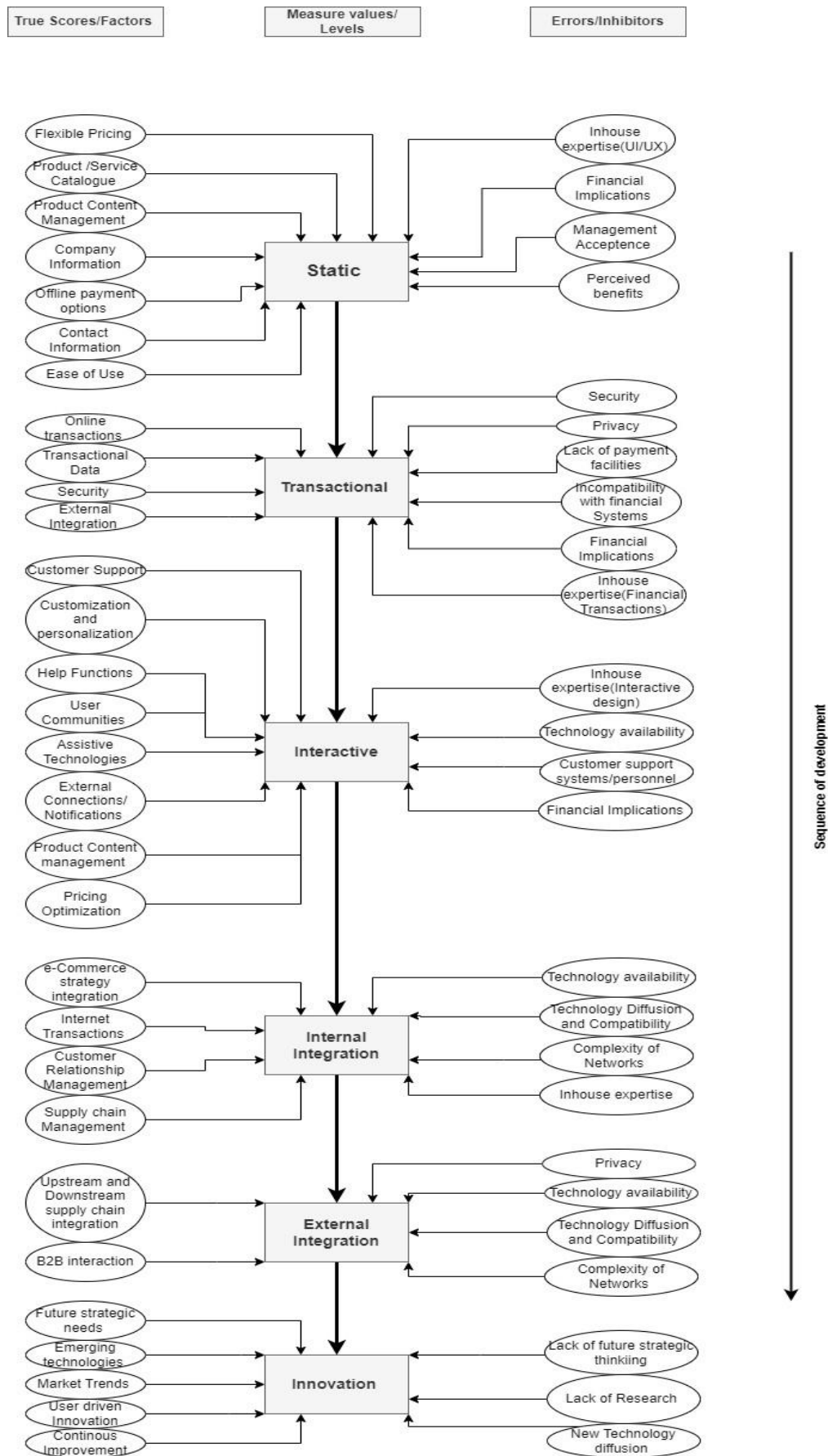


Figure 3.1: Consolidated Conceptual Framework

Where,

Static e-Commerce platform

This is a platform which hosts static content, to mainly showcase the product/Service offering of the company. To create a web presence for the organisation so that potential customers can access company information and offerings on the internet. The main attributes to this level of e-Commerce adoption are as follows:

- Product Or Service Catalogue

As with the above frameworks, this includes exhibiting the company's product/service offerings and information on each of the offerings such as product specifications, requirements, user guides, etc.

- Product Content Management

This is the management of the above catalogue, including what product is to be shown and when it needs to be shown such as seasonal products, products based on trends, and based on available stock. There is data impact in this aspect but for this level legacy systems i.e., Excel can be used with minimal data analysis required.

- Company Information

Here information about the organization is displayed, such as 'About Us' content, Mission, Vision, Service promises and address.

- Flexible Pricing

Since this is the first level in the adoption of e-Commerce where a web presence is set up, pricing needs to be flexible to entice users to use the platform this includes the use of mechanisms such as discounts, promotions, and some level of negotiable pricing. Here low level of data analysis might be needed to assess the products that can be offered at a discounted price for certain customers, or which products should be in promotion.

- Offline payments options

This is information on how you can order and pay for products displayed on the site, this may involve redirecting users to offline payment options.

- Contact information

The organisation's contact information needs to be displayed on the site such as Emailing information, postal addresses, Telephone numbers, etc.

- Ease of Use

This includes the proper use of layout design on the site to display product/Service information. There should be effective use of web design principles such as UI, UX, Colour theory, Typography and User centred design as explored above.

Static stage inhibitors

The inhibitors in this stage and expressed in the model, includes.

Management Acceptance, since this would be a new strategy within the organisation, this would need all stakeholders to understand the strategy the organisation has adopted and this should be communicated and accepted through the organisation.

Perceived benefits, along with the acceptance of the strategy the benefits for the organisation should also be determined and accepted by management.

Inhouse expertise to design and maintain the user interface which considers the user experience. This includes applying proper front end or web design standards such as within colour theory and typography.

Financials implications associated with initiating the platform and maintaining it, this includes also the resources to be used.

Transactional e-Commerce platform

This level of adoption involves a platform that enables users to perform transactional activities on the platform. This level allows for the complete process of product take up by the customer.

- Online transactions

This aspect involves all the transactions performed by the customer to buy a product or use a service. Transactions in this regard includes activities such as online ordering and tracking, order confirmation, Shopping carts, online payments and enquiry, delivery modes and time.

- Transactional Data

With transactional activities being performed in this stage, transactional data needs to be recorded to support these activities. This includes having transactional databases as explained above and to a lesser extent analytical databases to analyse past transactions.

- Security

To ensure that customers feel safe to perform transactions on the site, there needs to be security measures to ensure secure transactions. Some of the approaches that can be employed include having

a registration process on the site and creating user profiles with login credentials, applying multiple factor authentication, etc. This also involves having the ability to store user information, in databases to verify them upon login.

- External Integration

Though this forms one of the levels of adoption, here it serves to cater for third party services that allow users to perform financial transactions such as payments via PayPal.

Transactional stage inhibitors

For this stage the inhibitors include.

Security and Privacy, since transaction and customer information are going to be exchanged in this stage, so a certain level of security needs to be employed to ensure that customer information is protected.

Lack of payment facilities and incompatibility with financial systems, since transactions are performed in this stage, the platform has to be compatible with third party financial systems to enable users to make financial transactions on the platform, this includes being able to plug third party services on platforms.

Financial implications, this includes implications associated with enabling financial transactions and being able to track these transactions. The implications of supporting systems to the ability to perform transactions needs to be considered as well, which as mentioned above, the security to be applied to ensure safety.

Inhouse Expertise to manage and track transactions on the platform is needed including platform security expertise to manage the risk exposed to users when performing transactions on the platform.

Interactive e-Commerce Platform

This level encompasses an interactive platform allowing the user to interact with the platform and for the platform through its services to interact with the user. This includes the complete loop of user and platform interaction where the platform feeds from users' interactions and the user also benefits from their interaction with the platform. The factors contributing to this level includes.

- Customer Support

This includes having an on-site support for users navigating through the site, this can be in the form of stand by sales assistants, chat bots or online inquiry capabilities set up to assist customers with their transactions on the site. Data in this stage can be collected to assist in improving these services for

better responses such as the chat bot through machine learning could increase its accuracy in its responses.

- Customization and personalization

Through customers interaction with the site, data collected from these interactions can be used to personalize the site based on customer profiles. Here the platform feeds from the customers interaction with the platform and personalizes their experiences which can include the products/Services offered, platform design and even with the customer support services. The platform can also enable for customers to be able to customize their views on the platform and these changes can be recorded in the CMS's databases and rendered when requested.

- Product Content Management

As slightly outlined above and in the first level, in this level this involves the extensive use of data to influence content displayed to the customers. Including the analysis of trends, seasonality, cycles, user behaviours and profiles to determine what products or services need to be offered to the customer including any discounts or promotions.

- Pricing optimization

As explained above in section 2.5.1.7, this involves AI or data driven pricing strategies which dynamically changes.

- Help Functions

Here all the functionality to assist in customers to navigate through the platform are grouped, this encompasses functionality such as FAQs, sitemaps, search engine, Filters etc.

- Assistive Technologies

Technologies to assist in the use of the platform are considered in this aspect, this includes technologies to cater for disabled individuals, technologies such as voice commands, read out/accessibility mode, etc. This also requires data to determine which profile these technologies need to be considered.

- User Communities

This is enabling user communities on the platform to encourage engagement on the platform, this includes having chat rooms, blogs, discussions rooms, newsletters, etc. These allow for users to stay informed about the platform.

- External Connections/Notifications

Following the enablement of user communities, this aspect involves extending communications to encompass external media/communications sites such as being connected to the users social media profiles and cell phone messaging capability, and email to be able to send notifications about their user profiles and activities.

Interactive stage inhibitors

The inhibitors in this stage include.

Inhouse expertise needed to ensure that an interactive design is implemented which includes the different features on the platform making it interactive to the user.

Technology availability, along with the expertise expressed above, the hardware and software capabilities to implements and maintain an interactive interface needs to be available. This includes all the capabilities needed to keep track of users' interactions.

Customer support systems or personnel, since this stage includes customer support the organization should then be able to track and attend to customer queries which come through the platform's customer support systems.

Financial implications, as with the other stages implications with relation to having an interactive design needs to be considered including all the resources involved.

Internal Integration

In this level there is complete adoption of -Commerce and its integration into the organisation's daily operations. Contributing factors include.

- e-Commerce strategy integration

This is the integration of the e-Commerce strategy to business processes and reengineering these processes to accommodate this strategy. This means online transactions affects business processes and business can influence online transactions.

- Internet Transactions

As mentioned, online transactions in this level affect business processes, and so business processes have to accommodate transactions such as online ordering and tracking, order confirmation, Shopping carts, online payments and enquiry, delivery modes and time.

- Customer Relationship management

With customers having customer profiles on the platform, this means that the business can integrate these customers into their system and be able to manage the service offered to these customers. This can include having mechanisms such as loyalty cards to further accommodate them and for them to feel like they are part of the business.

- Value/Supply Chain Management

This aspect considers integrating the e-commerce value chain into the organisations business strategy, and benefits considered include the ability of organisations to implement Just In Time (JIT), continuous replenishment and quick responses to customer orders.

Internal integration stage inhibitors

The following are the inhibitors for this stage.

Technology availability, this includes hardware and software capabilities to have a platform with ability to integrate other business services.

Technology diffusion and compatibility, this is creating a platform that can integrate easily with other functionalities or services to enrich the user interface with features. An example can be the ability of the platform to integrate different APIs which bring more interactive features on the platform.

Complexity of networks, with the ability to integrate different business services on the platform, the organisation needs to be able to deal with the different plugged in services and the connections between these services and the organisation or platform.

External Integration

This level includes integrating external parties to the adopted e-Commerce strategy, factors considered include.

- Upstream and Downstream Supply chain integration

This is the integration of major players in the organisations supply chain, this encompasses upstream players such as distributors, customers, wholesalers, retailers etc. and downstream players such as the suppliers, manufacturers, etc. This can include having links to warehouses and distributors.

- B2B Interaction

This is integrating all the businesses networks to the platform strategy and adding partners to platform.

External integration stage inhibitors

Inhibitors in this stage are similar to those applied in the internal stage, but in this level all are applied from an external integration point of view, which includes the integration of external parties, external to the organisations but partnering with the organisation in one of its services.

Innovation

As the last stage in this model, this does not act as a level in adoption but an aspect to ensure a sustainable e-Commerce strategy. This aspect affects all the levels outlined above, as innovation can occur in/affect any of the levels. This aspect considers the following factors.

- Future strategic needs

This is to ensure that the organisations consider future strategic needs for the adopted e-Commerce strategy.

- Emerging technologies

As new technologies and methods are introduced, the organisation needs to refine its e-Commerce strategy to accommodate these and to ensure that the platform is compatible with new standards.

- Market Trends

Continuous assessment of the e-Commerce market trends need to be made to ensure that the platform is up to date with its features and functionality, and even the products/services offered.

- User driven innovation

As more data becomes available through customers interaction with the platform, innovative ways to satisfy customers and improve their experience of the platform needs to be considered. This includes innovation based on feedback, usage and transactions performed.

- Continuous Improvement

Following from the user driven innovation factor, there needs to be a continual search to improve users experience on platform this can be through consideration of all the aspects in this section.

Innovation stage inhibitors

The inhibitors in this stage include the following.

Lack of future strategic thinking, which is when the management lack future planning to enhance the platform strategy and thus the platform becomes outdated.

Lack of research and developments efforts to continuously improve the platform to be up to standard and research on new innovations to excite and improve users experience of the platform.

New technology diffusion, this is having a platform that is able to integrate new technologies/functionalities that might have been identified through research. And this can be applicable if the platform is within industry standards that the new technologies would most likely adhere to.

3.4.2 Functionality Data

For functionality data the following procedure was followed.

Utilizing the sampled e-Commerce platforms, functionalities across the platforms were recorded, this includes recording the type of functionality and variation in the functionality e.g. 'How many payment methods exist'. These functionalities were then segregated based on what appears in successful e-Commerce platform implementation and those that appear in South African SMME's platforms. Then applying Jaccard Index, the gap in similarity between the two sets of e-Commerce platforms was determined.

3.4.3 Performance Data

Time study is examining the optimal time required to perform specific tasks, and **method study** is establishing the preferred or best way to perform a specific task [39].

And for performance data the following procedure was followed.

Time study

The time to execute transactions was measured across interfaces, and averages recorded, this included performing different transactions at least 5 times and recording the average time observed per transaction. The whole customer journey of product take up on the interface was recorded through a stopwatch.

Method Study

The number of steps/screens/clicks to perform transactions or product take up were measured across interfaces and recorded. As with time study above, this included counting the number of clicks needed to use certain functionality in the interface, considering the whole customer journey from opening the website to check out.

These methods were done for the following reasons.

1. Developing the preferred method
2. Determining standard practices
3. Determining the standard time to perform a task
4. Training operator or in this case apply standards and practices on platforms

[39]

Through applying method and time study within each of the platforms the gap that exists in performance between these platforms can be gauged. Results from the above can then be recorded and the factors that contribute the most to the gap that exists in adopting e-Commerce can be noted.

3.5 Analysis Procedures

3.5.1 Functionality

The following methods were utilized to analyse functionality data.

Jaccard Index

This is a statistical measurement used to compare the similarity or dissimilarity of several sets of statistical data [40]. It is divided into set based Jaccard similarity and vector based weighted Jaccard similarity.

Set Based Jaccard similarity.

This is computed as the intersection of the sets divided by the union of values in the sets where the sets are meeting. Using Set Based Jaccard similarity index, similarity between the interfaces in terms of functionality can be applied. And the similarity and dissimilarity coefficients can be computed. The Jaccard coefficient is expressed in the below equation.

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|} \quad [40]$$

An example includes sets A, B where;

$A = \{a, b, c\}$ and $B = \{b, c, d, e\}$

$|A \cap B| = |\{b, c\}| = 2$

$|A \cup B| = |\{a, b, c, d, e\}| = 5$

Therefore, $J(A, B) = 2/5 = 0,4$

Weighted Jaccard index

This is computed as the sum of the minimum values of two sets divided by the sum of the maximum of the two sets per feature or attribute. Using Weighted Jaccard index the variations of functionality in the interfaces can be measured for example the number of payment methods available for the customer to use. This can be compared across the sampled platforms through a generated similarity coefficient. The coefficient is expressed below.

$$J(A, B) = \sum_{k=1}^n \frac{\min(A_k, B_k)}{\max(A_k, B_k)} \quad [40]$$

Example,

Table 3.1: Feature Comparison Example

	Feature 1	Feature 2	Feature 3
Platform 1	2	3	4
Platform 2	1	2	6

Therefore,

$$J(A, B) = \frac{1 + 2 + 4}{2 + 3 + 6} = 0,64$$

Based on these coefficients we can determine the similarity, with values closer to one showing more similarity and coefficients closer to zero showing weak similarity between the two sets. Dissimilarity in this case is just one minus the coefficients.

3.5.2 Performance

For both time and method study, a t-test was used to compare similar processes and see if there is a significant difference in time and methods used between all the platforms. And with comparisons between three means or more for a specific factor, ANOVA analysis was performed in excel.

3.6 Validity and Reliability

The following was applied to ensure validity and reliability.

Internal Consistency was ensured through the concurrence of e-Commerce success factors identified through analysis to those identified in previous experimental studies.

Through these consistencies in the research study internal consistency was established and thus **reliability**. **Reliability** was further re-enforced by the use of already established frameworks and Methods to conduct analysis

The research study covered most relevant factors in literature related to the adoption of e-Commerce. And through considering all these factors there is **validity through content**.

Construct was ensured by using methods used in other similar studies, methods such as Jaccard index, method, and time study.

3.7 Ethical Considerations

- All companies sampled in this research were treated/analysed without bias.
- Offensive and other unacceptable language was avoided in this research.
- Information collected in this research was also kept in the researcher's one drive, to avoid loss of information.

Ethics waiver was applied for and obtained from the School of MIA Ethics Committee and the ethics number is MIAEC 108/23W.

Chapter 4

4 Data Analysis and Results

In this chapter the data collected through the sampled platforms was analysed using methods mentioned in chapter 3 and the results are presented.

4.1 Data

4.1.1 Functionality Data

Based on the conceptual framework developed above, a list of standard functionalities for e-Commerce platforms was developed to assist with the functionality analysis. This list includes the following functionalities or services:

- Product/Service Catalogue
- On-site Payments
- Off-site Payments
- Online ordering and tracking
- Shopping carts
- Security (login, Registration, Authentication)
- Customer Support
- Help Functions
- Flexible Prices
- Customisation and Personalization
- User Communities/Initiatives
- Internal Integration
- External Integration
- Notifications
- Assistive Technologies
- Company Information
- Contact Information
- Delivery and collection
- All platforms design.

This list of functionalities assisted in matching sites analysed, to the conceptual framework stages.

4.1.1.1 Successful e-Commerce sites

Table 4.1 below assesses if the functionality can be found in the most visited sites in South Africa. Here a one (1) indicates that a variation of the functionality can be found in the site while a zero (0) means the functionality is not available in the site, then an average was taken for all the sites considered. *Please note that this assessment excluded gumtree which acts as an intermediary platform to connect buyers and sellers.*

Table 4.1: Successful Platforms Functionality availability matrix

	Takealot	Amazon	Makro	Woolworths	Uber Eats	Mr D	Average
Product/Service Catalogue	1	1	1	1	1	1	1
On-site Payments	1	1	1	1	1	1	1
Off-site Payments	1	0	1	1	1	1	0,8
Online ordering and tracking	1	1	1	1	1	1	1
Shopping carts	1	1	1	1	1	1	1
Security (login, Registration, Authentication)	1	1	1	1	1	1	1
Customer Support	1	1	1	1	1	1	1
Help Functions	1	1	1	1	1	1	1
Flexible Prices	1	1	1	1	1	1	1
Customisation and Personalization	1	1	1	1	1	1	1
User Communities/Initiatives	1	1	1	1	1	1	1
Internal Integration	1	1	1	1	1	1	1
External Integration	1	1	1	1	1	1	1
Notifications	1	1	1	1	1	1	1
Assistive Technologies	1	1	1	1	1	1	1
Company Information	1	1	1	1	1	1	1
Contact Information	1	1	1	1	1	1	1
Delivery and collection	1	1	1	1	1	1	1
All platform design	1	1	1	1	1	1	1

Table 4.2 then shows the variations of functionality within each of the sites, zero (0) being that no variation of the functionality exists and more than zero shows the number of variations for each functionality. *Please note that this assessment excluded gumtree which only acts as an intermediary platform to connect buyers and sellers.*

Table 4.2: Successful Platforms Functionality Variation Matrix

	Takelot	Amazon	Makro	Woolworths	Uber	Mr D	Average
	Eats						
Product/Service Catalogue	1	1	1	1	1	1	1
On-site Payments	10	6	18	4	6	4	8
Off-site Payments	1	0	8	3	1	1	2,333333
Online ordering and tracking	5	7	8	5	5	4	5,666667
Shopping carts	1	1	1	1	1	1	1
Security (login, Registration, Authentication)	3	3	3	3	3	3	3
Customer Support	2	3	3	3	1	3	2,5
Help Functions	7	8	5	8	7	5	6,666667
Flexible Prices	1	1	1	1	1	1	1
Customisation and Personalization	2	2	1	2	2	1	1,666667
User Communities/Initiatives	4	4	3	3	4	1	3,166667
Internal Integration	1	1	1	1	1	1	1
External Integration	1	1	1	1	1	1	1
Notifications	3	3	3	3	3	3	3
Assistive Technologies	1	1	1	1	1	1	1
Company Information	1	1	1	1	1	1	1
Contact Information	3	3	3	3	1	3	2,666667
Delivery and collection	5	6	4	8	4	2	4,833333
All platform design	1	1	1	1	1	1	1

4.1.1.2 SMME Sites

Due to the large volume of sites considered for SMMEs, table 4.3 summarises the presence of the above functionalities on SMME sites, the 'Features' columns are summed values from the different sets of platforms considered and then an average is taken for the sample. See appendix J for the complete tables used for this table.

Table 4.3: SMME Platforms Functionality availability matrix

	Features1	Features2	Features3	Features4	Features5	Average
Product/Service Catalogue or specification	10	10	10	10	11	1
On-site Payments	3	2	3	3	1	0
Off-site Payments	8	10	7	9	10	1
Online ordering and tracking	3	0	3	2	2	0
Shopping carts	3	4	5	5	2	0
Security (login, Registration, Authentication)	3	2	5	2	4	0
Customer Support	10	10	10	10	11	1
Help Functions	10	10	10	10	11	1
Flexible Prices	0	2	3	2	1	0
Customisation and Personalization	1	0	0	0	0	0
User Communities/Initiatives	5	5	5	6	7	1
Internal Integration	10	10	10	10	11	1
External Integration	4	4	3	1	4	0
Notifications	10	10	10	10	11	1
Assistive Technologies	10	10	9	10	11	1
Company Information	10	9	10	10	11	1
Contact Information	10	10	10	10	11	1
Delivery and collection	10	7	10	8	4	1
All platform design	10	10	10	10	11	1

Table 4.4 below summarises the variations of the above functionalities on SMME sites, the ‘sum’ columns are summed values from the different sets of platforms considered and then an average is taken for the sample. See appendix K for the complete tables used for this table.

Table 4.4: SMME Platforms Functionality Variation Matrix

	sum1	sum2	sum3	sum4	sum5	Average
Product/Service Catalogue or specification	10	10	10	10	11	1
On-site Payments	7	3	7	20	1	0,745098039
Off-site Payments	10	10	7	11	14	1,019607843
Online ordering and tracking	9	0	5	5	2	0,411764706
Shopping carts	3	4	5	6	2	0,392156863
Security (login, Registration, Authentication)	6	3	6	2	6	0,450980392
Customer Support	19	17	18	21	18	1,823529412
Help Functions	32	39	35	31	40	3,470588235
Flexible Prices	0	2	3	2	1	0,156862745
Customisation and Personalization	1	0	0	0	0	0,019607843
User Communities/Initiatives	7	10	8	11	10	0,901960784
Internal Integration	10	10	10	10	11	1
External Integration	4	4	3	1	4	0,31372549
Notifications	27	29	25	26	31	2,705882353
Assistive Technologies	10	10	9	10	11	0,980392157
Company Information	10	9	10	10	11	0,980392157
Contact Information	29	28	25	26	28	2,666666667
Delivery and collection	20	11	21	16	7	1,875
All platform design	10	10	10	10	11	1

4.1.2 Performance Data

4.1.2.1 Successful e-Commerce sites

The following table shows time measurements in second(s) taken through the observation of the process from selecting a product to check out (or placing a quote), this was done for all the sampled platforms. And averages were taken with relation to each iteration and to each platform for all

iterations. The number of steps were also taken and recorded on table 4.5, this is for the same process of selecting a product to check out and an average was taken for this.

Table 4.5: Successful Platforms performance matrix

Iteration	Takealot	Amazon	Makro	Gumtree	Woolworths	Über Eats	Mr D	Averages(s)
1	15,52	14,06	16,08	12,86	18,28	15,74	13,05	15,08428571
2	17,01	15,62	11,75	12,68	34,5	22,02	12,07	17,95
3	17,76	14,52	19,6	11,86	27,48	16,23	11,62	17,01
4	18,25	11,11	18,36	11,71	18,36	14,24	12,48	14,93
5	15,59	11,72	20,69	14,34	23,28	10,25	13,74	15,65857143
Average	16,826	13,406	17,296	12,69	24,38	15,696	12,592	
Number of steps	3	2	3	1	3	4	4	2,857142857

4.1.2.2 SMME Sites

Table 4.6 below also shows time measurements in second(s) taken through the observation of the process from selecting a product to check out (or placing a quote) for SMME sites which had the checkout capability as listed in the table. And averages were taken with relation to each iteration and to each platform for all iterations. The number of clicks or steps were also taken and recorded on the table.

Table 4.6: SMME Platforms performance matrix

Iteration	Gmh Gift Box Packaging Manufacturer	Baker Baynes (PTY) Ltd	HSG Distributor	Beckers Heaters Cc	Nutape CC	IT Paradise	Window Sox	Narayan textiles	Mobile Signal Boosters	Vikings Vape
1	23,57	23,72	23,2	13,26	41	37,8	45,52	34,52	28,53	18,2
2	22,81	23,54	19,84	11,9	30,18	33,24	48,19	36,96	25,19	16,83
3	23,19	23,09	21,56	13,75	31,68	35,65	46,65	32,92	23,33	17,78
4	22,98	18,76	19,48	13,67	29,72	35,71	46,67	36,76	25,32	16,37
5	19,78	17,67	19,86	12,86	32,23	34,43	46,05	40,09	23,27	18,27
Average	22,466	21,356	20,788	13,088	32,962	35,366	46,616	36,25		17,49
Number of steps	5	4	5	3	5	3	4	3	3	4

Chemkor Chemical Supplies	Vasilis Cleaning Supplies	The Coffee Co	The Papery	Perfumes for Africa	Holmes and Company	Hafre trading	Beaudele	SmartEdge Technologies	Rise SA Business Solutions	Average
34,32	24,55	24,2	38,94	13,52	12,12	13,12	15,45	29,29	31,97	26,34
22,8	20,75	29,05	26,08	14,1	14,36	12,13	10,76	28,35	24,94	23,6
25,15	15,47	23,15	26,13	10,16	14,27	10,16	10,44	31,65	26,82	23,15
21,99	17,26	24,18	22,45	11,27	12,27	11,19	10,36	28,73	27,33	22,6235
24,33	17,34	22,8	22,71	10,97	12,38	10,57	10	29,75	28,88	22,712
25,718	19,074	24,676	27,262	12,004	13,08	11,434	11,402	29,554	27,988	
3	4	4	3	2	3	3	3	5	1	3,5

4.2 Data Processing

4.2.1 Functionality Data

The list of functionalities outlined above were grouped into the different stages expressed in the framework of e-Commerce adoption in figure 3.1 in section 3.4.1.

Table 4.7: Functionalities per adoption stage

Static Platforms	Transactional Platforms	Interactive Platforms	Internally Integrated Platforms	Externally Integrated Platforms
Product/Service Catalogue	Product/Service Catalogue	Product/Service Catalogue	Product/Service Catalogue	Product/Service Catalogue
Off-site Payments	Off-site Payments (Not Compulsory)	Off-site Payments (Not Compulsory)	Off-site Payments (Not Compulsory)	Off-site Payments (Not Compulsory)
Contact Information	Contact Information	Contact Information	Contact Information	Contact Information
Company Information	Company Information	Company Information	Company Information	Company Information
Help Functions (Not Compulsory)	On-site Payments	On-site Payments	On-site Payments	On-site Payments
Flexible Pricing (Not Compulsory)	Online ordering, Shopping carts and tracking	Online ordering, Shopping carts and tracking	Online ordering, Shopping carts and tracking	Online ordering, Shopping carts and tracking

	Security	Security	Security	Security
	Help Functions	Help Functions	Help Functions	Help Functions
	Flexible Pricing (Not Compulsory)	Flexible Prices (Not compulsory)	Flexible Prices (Not Compulsory)	Flexible Prices (Not Compulsory)
		Customer Support	Customer Support	Customer Support
		Customisation and Personalization	Customisation and Personalization	Customisation and Personalization
		User Communities/Initiatives	User Communities/Initiatives	User Communities/Initiatives
		Notifications	Notifications	Notifications
		Assistive Technologies	Assistive Technologies	Assistive Technologies
		All platforms design	All platforms design.	All platforms design.
			Internal Integration	Internal Integration
				External Integration

And as shown in table 4.1 and 4.3 averages were taken for the availability of the listed functionalities.

Table 4.8 then shows side by side comparison of the averages for successful platforms and SMME platforms.

Table 4.8: Functionality availability comparison

	Successful Platforms	SMME Platforms
Product/Service Catalogue or specification	1	1
On-site Payments	1	0
Off-site Payments	1	1
Online ordering and tracking	1	0
Shopping carts	1	0
Security (login, Registration, Authentication)	1	0
Customer Support	1	1
Help Functions	1	1
Flexible Prices	1	0
Customisation and Personalization	1	0
User Communities/Initiatives	1	1
Internal Integration	1	1

External Integration	1	0
Notifications	1	1
Assistive Technologies	1	1
Company Information	1	1
Contact Information	1	1
Delivery and collection	1	1
All platform design	1	1

Set Based Jaccard similarity.

Through Set Based Jaccard similarity index, similarity between the interfaces in terms of functionality was applied. Using table 4.8 the similarity and dissimilarity coefficients were also computed. The Jaccard coefficient is expressed with the below equation.

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|} \quad [39]$$

Similar to table 4.8, table 4.9 shows side by side comparison of functionality variation for successful platforms and SMME platform through averages obtained from table 4.2 and 4.4.

Table 4.9: Functionality variation comparison

	Successful Platforms	SMME Platforms
Product/Service Catalogue or specification	1	1
On-site Payments	8	1
Off-site Payments	2	1
Online ordering and tracking	6	0
Shopping carts	1	0
Security (login, Registration, Authentication)	3	0
Customer Support	3	2
Help Functions	7	3
Flexible Prices	1	0
Customisation and Personalization	2	0
User Communities/Initiatives	3	1
Internal Integration	1	1
External Integration	1	0

Notifications	3	3
Assistive Technologies	1	1
Company Information	1	1
Contact Information	3	3
Delivery and collection	5	2
All platform design	1	1

Weighted Jaccard index

Using Weighted Jaccard index the variation of functionality in successful platforms compared to SMME platforms was measured. This utilized table 4.9 and measured through a generated similarity coefficient. The coefficient is expressed below.

$$J(A, B) = \sum_{k=1}^n \frac{\min(A_k, B_k)}{\max(A_k, B_k)} \quad [39]$$

4.2.2 Performance data

Table 4.10 below contains time averages in seconds computed in table 4.5 and 4.6, it shows the averages for successful platforms and SMME platforms per iteration for easy comparison.

Table 4.10: Performance Comparison

	Iteration				
	1	2	3	4	5
Successful Platforms	15,08429	17,95	17,01	14,93	15,65857
SMME Platforms	26,34	23,6	23,15	22,6235	22,712

T-Test

Through excel this can be obtained by using the data analysis feature by selecting t-test. The input box below is displayed when t-test is selected as shown below. This was used to measure if there is a significant difference in the time taken to buy a product (up to check out) and the steps taken, for successful platforms compared to SMME platforms, this check provided the performance difference or gap between the two sampled platforms. For the variable ranges, time and steps/clicks recorded in table 4.5 and 4.6 were used to populate these fields.

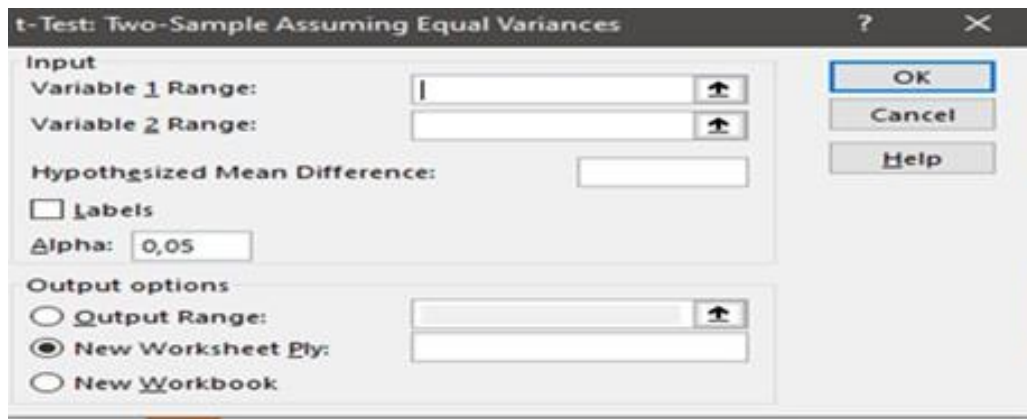


Figure 4.1: T-test on Excel.

The following tables 4.11 and 4.12 display time averages in seconds taken per steps/clicks needed for product take up measured in table 4.5 and 4.6, for the number of steps/clicks recurring amongst the sites, an average of averages for the step number.

Table 4.11: Successful platforms average time per step

Successful Companies		
Steps	Average	Average of Averages $2(\bar{\bar{x}}_2)$
1	12,69	12,69
2	13,406	13,406
3	16,826	19,50067
3	17,296	
3	24,38	
4	15,696	14,144
4	12,592	

Table 4.12: SMME platforms average time per step

SME		
Steps	Average	Average of Averages $1(\bar{\bar{x}}_1)$
1	27,988	27,988
2	12,004	12,004
3	13,088	22,08089
3	35,366	
3	36,25	

3	25,128	
3	25,718	
3	27,262	
3	13,08	
3	11,434	
3	11,402	
4	21,356	25,8424
4	46,616	
4	17,49	
4	19,074	
4	24,676	
5	22,466	26,4425
5	20,788	
5	32,962	
5	29,554	

Based on tables 4.11 and 4.12 above, the average of averages in seconds for both SMMEs and successful platforms are presented in the below table for common number of steps taken in product take up.

Table 4.13: Average time per step comparison

Steps	$\bar{x}1$	$\bar{x}2$
1	27,988	12,69
2	12,004	13,406
3	22,080889	19,50067
4	25,8424	14,144

ANOVA

For comparisons between means where there are more than two levels of data to a single factor, the single factor ANOVA was used. This tool was utilized to understand if the time averages vary per number of steps or clicks. And table 4.13 was used to provide input range values.

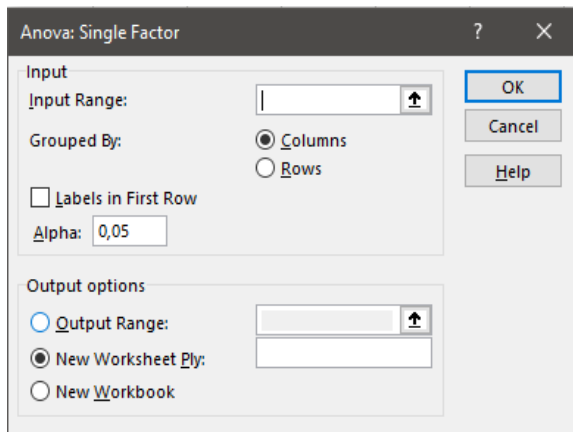


Figure 4.2: ANOVA Excel

4.3 Results

4.3.1 Functionality Assessment

Set Based Jaccard similarity.

The following shows the computation for the set based Jaccard similarity, assessing functionality similarity between the SMME Platforms and successful eCommerce platforms within the South African ecosystem. Table 4.14 below shows the intersection and union of the sets for a functionality where if a functionality is found in both successful platforms and SMME platforms the intersection for the functionality would be a one (1) and zero (0) if only found in one, then for the union of sets if any of the platform columns has the functionality then a one (1) is generated and zero (0) is none of the columns have the functionality.

Table 4.14: Intersection and union of the sets for functionalities

	Successful Platforms	SMME Platforms	$ A \cap B $	$ A \cup B $
Product/Service Catalogue or specification	1	1	1	1
On-site Payments	1	0	0	1
Off-site Payments	1	1	1	1
Online ordering and tracking	1	0	0	1
Shopping carts	1	0	0	1
Security (login, Registration, Authentication)	1	0	0	1
Customer Support	1	1	1	1
Help Functions	1	1	1	1
Flexible Prices	1	0	0	1
Customisation and Personalization	1	0	0	1
User Communities/Initiatives	1	1	1	1
Internal Integration	1	1	1	1
External Integration	1	0	0	1
Notifications	1	1	1	1
Assistive Technologies	1	1	1	1
Company Information	1	1	1	1
Contact Information	1	1	1	1
Delivery and collection	1	1	1	1
All platform design	1	1	1	1

Then the Jaccard similarity coefficient is computed from the division of the intersection of sets by the union of the set as shown below. Though the coefficient is greater than 0.5, it is still significantly lower than the 1 which infers complete similarity between the two sets.

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|} = 0.631579$$

Figure 4.3 below then explores the functionality differences between successful ecommerce platforms and SMME platforms with the x-axis showing the functionalities considered and y-axis the variation thereof.

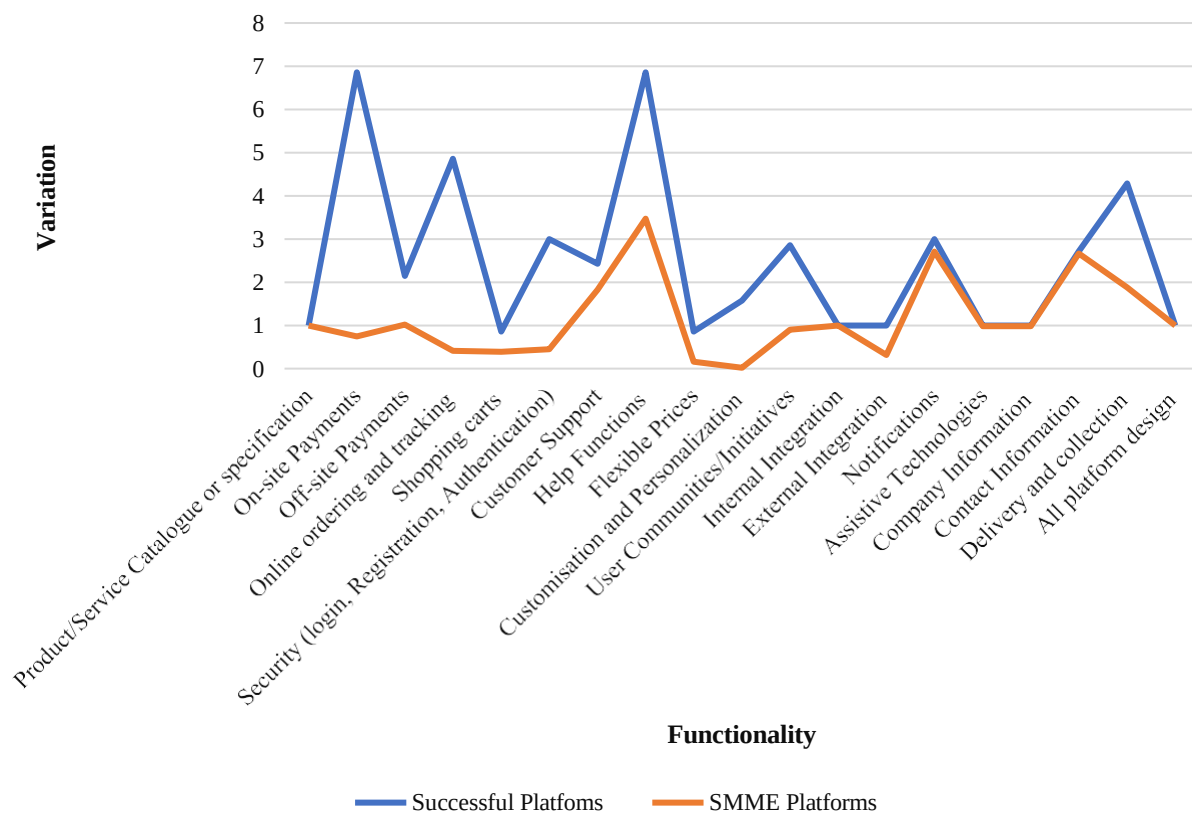


Figure 4.3: Functionality variation of SMMEs and Successful platforms

Weighted Jaccard index

To further explore the variation of functionality between the platforms the weighted Jaccard index was computed, assessing functionality variation between the SMME Platforms and successful eCommerce platforms within the South African ecosystem. Table 4.15 shows the minimum and maximum variation values in functionality for both successful eCommerce platforms and SMME platforms.

Table 4.15: Minimum and Maximum variation values for functionalities

	Successful Platforms	SMME Platforms	Min	Max
Product/Service Catalogue or specification	1	1	1	1
On-site Payments	7	1	1	7
Off-site Payments	2	1	1	2
Online ordering and tracking	5	0	0	5
Shopping carts	1	0	0	1
Security (login, Registration, Authentication)	3	0	0	3
Customer Support	2	2	2	2
Help Functions	7	3	3	7
Flexible Prices	1	0	0	1
Customisation and Personalization	2	0	0	2
User Communities/Initiatives	3	1	1	3
Internal Integration	1	1	1	1
External Integration	1	0	0	1
Notifications	3	3	3	3
Assistive Technologies	1	1	1	1
Company Information	1	1	1	1
Contact Information	3	3	3	3
Delivery and collection	4	2	2	4
All platform design	1	1	1	1

Using the minimum and maximum values computed above, the weighted Jaccard index is then calculated as below. The value computed below is lower than 0,5 which shows weak similarity.

$$J(A, B) = \sum_{k=1}^n \frac{\min(A_k, B_k)}{\max(A_k, B_k)} = 0,4538$$

Based on the functionality groupings in table 4.7, the below figure shows the number of successful platforms which qualify for each stage in the adoption levels, this is compared to the total number of platforms considered. The x-axis shows the stages of adoption, and the y-axis considers the number of platforms per stage.

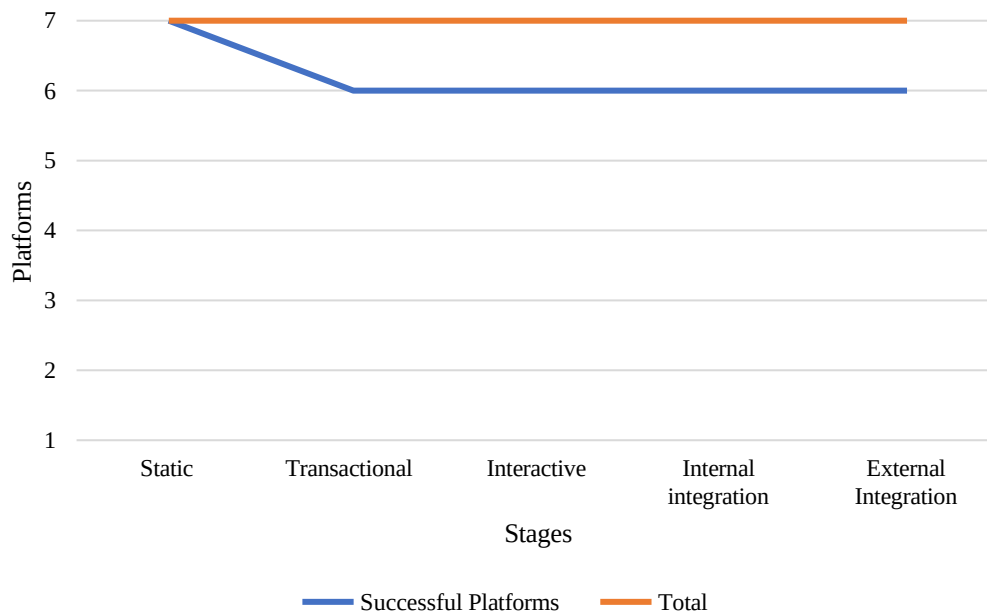


Figure 4.4: Adoption levels for successful platforms

Figure 4.5 then considers the number of SMMEs platforms which qualify for each stage in the adoption levels, this is compared to the total number of platforms considered. The x-axis shows the stages of adoption, and the y-axis considers the number of platforms per stage.

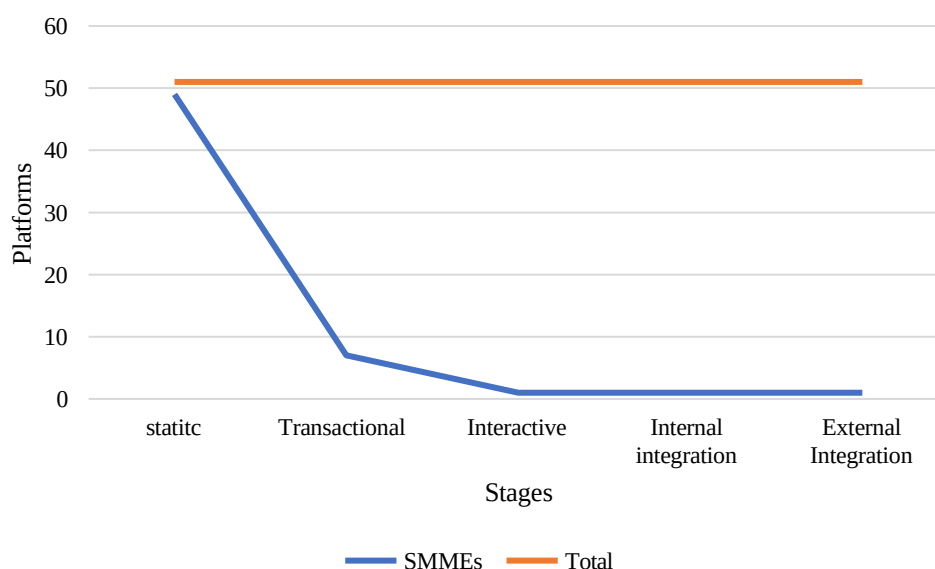


Figure 4.5: Adoption levels for SMME platforms

4.3.2 Performance Assessment

Figure 4.6 shows the time recorded in seconds for the process of product take up until check out for SMME Platforms and successful eCommerce platforms. The x-axis are the iterations, and the y-axis is the time recorded per iteration. In the figure, the correlation between time and the iterations was also computed through a linear regression line. From the diagram there are clear difference in time recorded per iteration between SMME Platforms and successful eCommerce platforms, this difference is further explored through a t-test below.

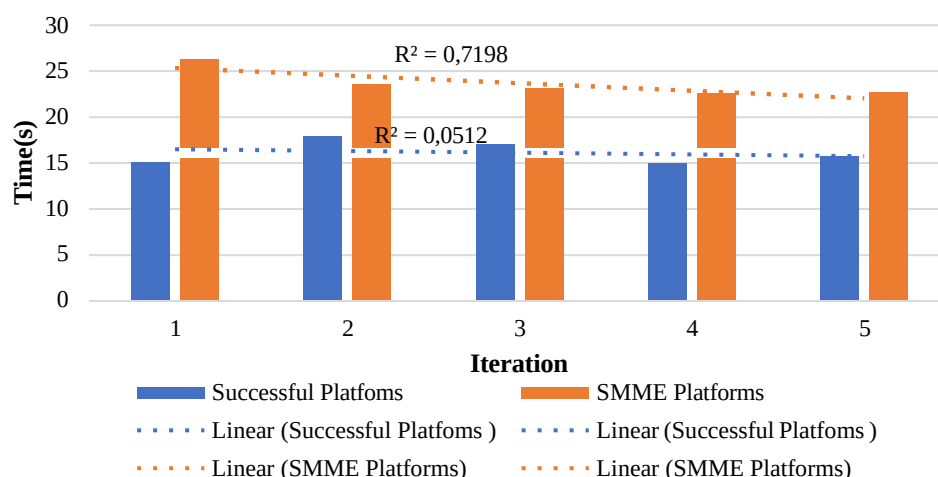


Figure 4.6: Time recorded per iteration.

As stated above the below table explores the difference in performance between SMME and successful eCommerce platforms through a t-test assuming equal variances. Through the data recorded in table 4.10, the t-stat was computed at a confidence level of 95% as shown below, and it can be seen from table that the t-stat is significantly greater than the t critical and the P-value is less than 0.05. Therefore, there is a significant difference in performance between SMMEs and Successful e-Commerce platforms.

Table 4.16: T-test for difference in performance between SMME and Successful platforms

	SMME Platforms	Successful eCommerce platforms
Mean	23,6851	16,12657
Variance	2,353997	1,710626
Observations	5	5
Pooled Variance	2,032311	
Hypothesized Mean Difference	0	
df	8	
t Stat	8,383245	
P(T<=t) one-tail	1,56E-05	
t Critical one-tail	1,859548	
P(T<=t) two-tail	3,11E-05	
t Critical two-tail	2,306004	

The figure below then shows the time spent per step from product take up to check out for both SMME Platforms and successful eCommerce platforms, this was normalized to consider up to four steps. The x-axis shows the steps considered and the y-axis is the time recorded per step.

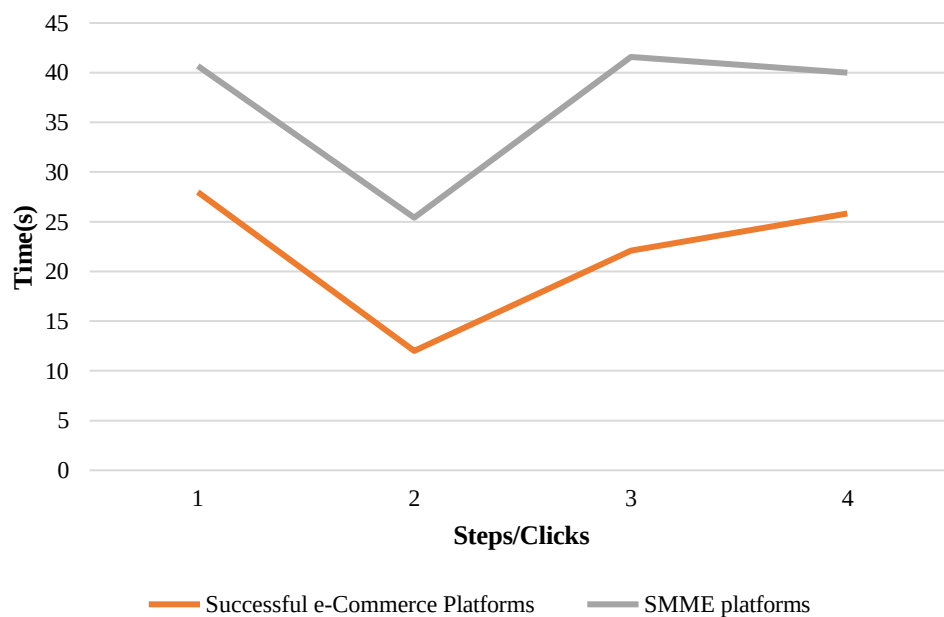


Figure 4.7: Time recorded per number of clicks/steps required.

A t test was conducted as shown below to explore the difference in number of steps required for product take up between SMME Platforms and successful eCommerce platforms. This was computed at a confidence level of 95%, and it can be seen from the table that the t-stat is less than the t critical and the P-value is greater than 0.05, meaning there is no significant difference in the number of steps required for product take up between SMME and Successful e-Commerce platforms.

Table 4.17: T-test for number of steps required for product take-up.

	SMME Platforms	Successful e-Commerce platforms
Mean	3,5	2,857143
Variance	1,105263	1,142857
Observations	20	7
Pooled Variance	1,114286	
Hypothesized Mean Difference	0	
df	25	
t Stat	1,38675	
P(T<=t) one-tail	0,08888	
t Critical one-tail	1,708141	
P(T<=t) two-tail	0,17776	
t Critical two-tail	2,059539	

In table 4.18 a single factor ANOVA analysis was conducted, to determine if there is a significant difference in time recorded per number of steps required for product take up for SMME platforms and successful platforms. And from the table below F is less than F critical, which means there is no significant difference in time recorded per number of steps required for product take up.

Table 4.18: ANOVA for time recorded per steps/clicks required.

ANOVA: Single Factor

SUMMARY				
Groups	Count	Sum	Average	Variance
Successful e-Commerce Platforms	4	87,91529	21,97882	50,18165
SMME platforms	4	59,74067	14,93517	9,616286

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	99,22617	1	99,22617	3,318715	0,118336	5,987378
Within Groups	179,3938	6	29,89897			
Total	278,62	7				

Chapter 5

5 Discussion

5.1 Functionality Assessment

Set Based Jaccard similarity.

Functionality plays an essential role in the determination of e-Commerce adoption for the application approach, and most of the theories are centred around capabilities in functionality with regards to the different platforms considered. Thus, it was imperative to consider differences in functionality for the sampled platforms to gauge adoption. So as seen in section 4.3 the Jaccard similarity index was applied to understand the differences between SMME Platforms and successful eCommerce platforms, and the computed value that determines this functionality differences equaled 0,631579, which is greater 0,5 but significantly lower than 1 which indicates complete similarity. Therefore, even though there is adequate similarity between the two groups of platforms, SMME platforms are still far behind large established organizations with regards to functionality in their e-Commerce platforms. And from table 4.3 it can be deduced that most of the functionalities in SMME platforms is more informational content instead of interactive content which can manage customer queries.

To further reinforce the understanding of the difference in functionality between the two groups of platforms, the variation in functionality was considered in figure 4.3. From the diagram there are major differences in functionality variation, mostly with functionality such as on-site payments, online ordering and tracking, help functions, customisation and personalisation, user communities and delivery and collection options. These functionalities are most essential for an interactive and transactional platform. And it further cements the point that SMME platforms have more informational content for customers to know about the business instead of being able to interact with the platform.

Most interactions in these platforms are performed off-site, as seen with the difference in online payments and off-site payments in figure 4.3. Orders in these platforms are handled and tracked off-site through channels such as email, social media (WhatsApp) and telephone. This can be seen with the considerably low value in online orderings and tracking. This is characteristic of static web server sites with static content that cannot handle interactions and track these interactions, and so as opposed to dynamic web servers most of these sites do not have databases to store transactional data recorded through the customers transactions on the platforms. Contrary to this, most of the successful sites have dynamic interfaces which transition based on the customers interaction with the site which shows that these have dynamic servers with databases to handle customer's transactional data through their interactions on the site. And through the analyses of this customer data, a user centered design can be

achieved through interfaces which consider customers data stored in their data warehouses and can analyse customers historical data to adjust the site to suit customer's shopping behaviour.

Most products in SMME platforms are also not upfront to the customers when visiting the sites instead some platforms have more texts in the first page than visual representation of the products they are offering which shows lack of consideration with regards to typography and colour theory. As seen with the low help functions available in these platforms, it is hard to filter through the content and browse through the site and the only relief in this regard being that there is less content to browse through in these sites making it bearable.

In addition to products not being upfront to the customers, the products in these platforms also do not become contextual to the customers use of the platform thus not having the ability to personalise or be customisable by the customer as opposed to successful sites which recommend products based on the individual's shopping habits. These successful platforms also allow for users to generate a list of their favourite items and prioritise the type of products they would like to view. This further proves that most of the SMME sites are static with no databases to support transactions and to introduce complex functionalities on the site, and so with no data to support the customer relationship management, the product content management is negatively impacted as the products presented to the customer are not contextual to their needs, which then affect sales. The relationship between these systems needs to be maintained as explained in literature above, this is to ensure that the customer needs are always considered which translates into an increase in sales for the organisation.

Weighted Jaccard index

These differences in functionality variation between the two groups of platforms are mostly accounted for by the weighted Jaccard index. From the computation, the value of the index was calculated to be 0,4538 which is lower than the set based Jaccard similarity meaning that there is greater difference in functionality variation between the two groups of platforms, than there is with regards to the presence of the functionality type. The weighted index value is also less than 0.5 which shows a significant difference in functionality. So, users in SMME's have less choices with regards to functionality they can use, which can impact the return visits by customers as the lack of options in services such as payment, can result in a transaction not being made and no return visit. Lack of functionality or the variation thereof also affects the convenience and flexibility of the site, and users can feel constrained to using functionality they are not familiar with as there are less options available for the user to find the best one that suits them. Though this lack of variation in SMMEs is an expected outcome as larger organisations have more resources and can thus offer more services.

So, taking into consideration the two metrics measured above through Jaccard similarity, the functionality assessment shows that there is a considerable difference in functionality between successful e-Commerce platforms and SMME platforms in South Africa, with successful e-

Commerce platforms having a richer interface in terms of functionality and functionality variation than SMME's. And as indicated this is an expected result as larger organisations have more resources both digitally and even in skilled human capital, supporting the inhibitors stated in section 2.4.5 of low levels of education, ICT and eCommerce knowledge and the complexity of the technology.

e-Commerce conceptual framework

The functionality differences enable the classification of the two groups of platforms into the different stages established with the conceptual model. This determination of where each group falls within the conceptual model is expressed in figure 4.4 and 4.5. In figure 4.4 which shows the classification of successful platforms within the south African landscape, it can be seen that most of the platforms sampled get to the external integration stage except for one platform, which was Gumtree which mainly acts as an intermediary to connect sellers to buyers. And so, there is less transactional activity on the platform itself. Taking this odd case out of consideration, then it is clear from a functionality perspective that the sampled large organisations platforms have advanced adoption of the e-Commerce strategy.

In figure 4.5, which depicts where the SMME platforms fall in the e-Commerce conceptual framework, most of the platforms are in the static stage meaning that they house static content with minimal ability to be interactive like the successful platforms considered above. And only a few platforms are in the transactional stage, with only one platform going through or qualifying for all the stages meaning successful adoption of the e-Commerce strategy. The high levels of platforms in the initial stages proves that content in SMME platforms is mostly static, with minimal consideration of typography and colour theory. The inability to have interactive platforms for these SMMEs further exposes that these platforms lack data managements systems to keep track of transactional data and manage interactions on the platform. And with lack of data management, it makes it difficult to have an effective product/content and customer management systems. And so, the content on the interface remains general and not specific to the customer as opposed to successful platforms which manage and facilitate customer interactions.

5.2 Performance Assessment

Time study

To supplement, the assessment in functionality differences, platform performance was also considered as outlined in section 3.4.3. Metrics in this regard being the time needed to perform transactions on the platform and the steps needed to perform these transactions. Through the time and method differences in the two groups of platforms, it can further reinforce the argument on the adoption of e-Commerce between the two groups. In figure 4.6 which highlights the time required by platforms for the process of product take up until check out, as stated in the figure there is a clear difference in the

time recorded per iteration for the two groups of platforms. From the diagram it can be seen that it takes longer for SMME platforms to execute the process of product take up than it is for successful platforms. This is a conflicting result as SMME platforms are smaller and have less content on the platform compared to successful platforms, and so the expected result would be for SMME to have lesser time for product take up than successful platforms. And so, this shows that successful platforms have a better streamlined process as compared to SMME platforms.

Looking at the correlation coefficients also explored in figure 4.6, we see a stronger correlation for SMME platforms than for successful platforms. This correlation is to indicate how the time taken to execute the process of product take up improves the more the iterations. For SMME platforms which have a correlation coefficient of $R=0,85$, this proves it to be true, the more the iterations the lesser the time taken to take up a product as the user becomes familiar with the process. And for successful platforms this is not the case as the correlation coefficient $R=0,23$ which shows weak correlation, meaning that the time taken for product take up is not affected by the number of iterations. The time recorded for these platforms is consistent throughout the iterations, showing that the process is comprehensible from the initial iteration as opposed to SMME's which needs multiple iterations for the user to understand and become more efficient in the process.

So, though it is a positive observation to have correlation between the number of iterations performed and the improvement in time recorded, it also has a negative implication as it implies that the process is not comprehensible from the first try and needs multiple iterations for the user to understand the flow. The detrimental effect of this, is new users finding the site difficult and no longer visiting the site and using competitor sites, and this is where the use of help functions is essential in facilitating customer's journey on the site, with SMME's having less help functionalities compared to successful eCommerce sites it makes it difficult to browse the sites on the first visit.

To further understand the difference in performance between the two groups of platforms, a t-test was conducted as seen in table 4.16, to see if there is a significant difference in product take up performance from the two groups of platforms. And from the table it is seen that there is a significant difference between the two groups in performance, as the t-statistic is considerably greater than t-critical, cementing the fact that successful platforms have better performance with regards to time taken to take up a product than SMME platforms. Also indicating that successful platforms have a better streamlined process as compared to SMME platforms.

And one observed difference between the two groups of platforms which makes the successful platforms better is the ability to save customer information and auto populate the relevant personal information as users go through the take up process. This is achieved through sites that require users to register and thus provide personal information that is saved up and can be used, or when a user goes through the process once and fills the required fields, this information is saved with the first

iteration and prefilled for the subsequent iterations or visits by the user. And this is not achievable in most of the SMME sites as they do not have login and registration functions, as customer data has nowhere to be stored and retrieved to validate customers provided information during login.

Method/Motion Study

As indicated in the research method, method study would be used to understand the difference in transactional methods in the two groups of platforms. In this paper steps were used for this exercise, and in figure 4.7 the number of steps required for product take up were plotted against the time required for the required steps. And from the diagram there is a difference in the time recorded for all the steps recorded for product take up between the two groups of functionalities. one notable anomaly in this visual, is that for sites that require only one step to complete product take up it has considerably higher time required than those requiring two steps and fails to correlate with the amount of effort that is expected for processes with lower number of steps required. Instead, these processes correlate with sites that require higher number of steps to complete the process which are three to four steps in this regard.

This observation reveals single page interfaces, with content that might have taken three to four steps being accommodated in one page, and though this exposes everything to the customer up front, the time required does not change significantly, as users still need to go through the same amount of content and provide similar amount of information, as they would have been required if the steps were three to four. So, increasing the efficiency is not only about reducing steps required but also the content that a user has to go through and the effort that is needed from the user. Here also help functions might need to be considered, with consideration of typography and customer experience, making the page more comprehensible and easier to navigate through.

In table 4.17, the difference in number of steps required for product take up was computed through a t-test to understand if there is a significant difference in the number of steps required for the two groups of platforms. And from the table the t-static is less than t critical which indicates that there is no significant difference between the two groups of platforms in the number of steps required to perform product take up. This further supports the fact that SMME websites contain a lot of content and steps without functionality to assist users filter through the contents, and this is proven with SMME not having any significant difference in steps required to successful platforms which are bigger and with more functionality. The number of steps required means more content that a customer has to go through and more effort, with less help functions to assist in SMME platforms.

Considering the number of steps required and time for the number of steps, table 4.18 assesses the difference in time required for product take up between the two groups of platforms given the number of steps required by these platforms, and this was measured using ANOVA. And from the table it can be deduced that there is no significant difference between the SMMEs and successful platforms with

regards to the time recorded subject to the number of steps required for product take up. The F value is less than F critical. This result further supports the fact that though there are functionality differences from the two groups of platforms, the amount of effort needed is not significantly different. This as mentioned above is not expected as SMME have smaller sites than successful platforms considered in this paper, so should require less effort and steps to browse through or perform transactions.

Chapter 6

6 Conclusion and Recommendations

6.1 Conclusion

It is evident from the information provided above and the study performed that there is a significant difference in e-Commerce adoption from a platform perspective between SMMEs and Successful e-Commerce sites in the South African context. The greatest determinant of this is the difference in functionality as expressed in the discussion. Not only is there a difference in the type of functionality that the two groups of platforms host, but there is also a difference in the variation of this functionality with SMME platforms having less functionality options compared to successful platforms in South Africa. Successful platforms as deduced from the results contain a richer interface, this is owing to their effective front-end and back-end infrastructures allowing them to have platforms which can interact with users through various functionalities on the site.

This difference in adoption was further re-enforced when the two groups of platforms were placed in the different stages of e-Commerce adoption based on the functionality they hosted, where most of the SMME platforms were in the static stage with static content lacking an interactive platform. Most of the essential capabilities for a site such as payment, ordering and order tracking are performed off-site. And with less security such as registration and login on the platforms customers might feel unsafe to perform any transactions on the platforms or in providing any personal information to complete a payment. And security is expressed in literature as one of the major concerns or inhibitors in performing financial transactions. So, unless these features are incorporated, users will always feel unsafe to use the platforms thus resulting less visits on the website and even lesser transactions being performed through the platform.

On the other hand, most of the successful e-Commerce sites are interactive and get to the stage of having internal and external integration connecting other divisions or operations of their business through the platforms which allows for complete visibility and connectivity across the enterprise.

Through their interactive platforms they are able to keep track of the customers interaction and be able to store customers interaction data that can be used to inform customer relationship management and product/content management. Some form of user centric design is achieved with interfaces that recommend products or services based on the customers shopping habits. This is essential as it makes it easier to browse through the site with assistance from the extensive help features hosted in successful platforms as opposed SMME platforms. These capabilities can influence repeat visits by the customer thus ensuring it is a successful platform for customers to perform their transactions.

In view of the performance analysis the difference in performance was also observed, where contrary to the amount of effort expected for the small SMME sites with their minimal content or functionality, these platforms recorded the highest time per product take up in comparison to the successful platforms sampled in this paper. This makes it clear that the successful platforms have advanced so much in their adoption, thus have streamlined all their process to increase efficiency in product take up and in the ability for the customer to browse through their site. Hence the time recorded per product take up iteration remains consistent no matter the number of iterations, including the first-time users go through the product take up process while SMME platforms require multiple tries in order for the customer to understand the process.

And through the analysis of the steps required, there is no significant difference between the steps required for SMME platforms and those for successful platforms, while there is a difference in the time recorded. Even when considering the time recorded per step required in the product take up, no significant difference was observed in the time recorded per step using ANOVA. Though this is the case, there is still a considerable gap in the time recorded per step, with SMMEs having higher time recorded for every number of steps required for product take up.

So, considering these assessments in time and number of steps required for product take up, it is conclusive that SMME platforms require more effort for the same amount of content that successful websites have but with minimal functionalities to assist users through this content. And from the discussion section above it is highlighted how poor typography, colour theory and consideration of the customers might have contributed to this conclusion. This further solidifies the evidence on the difference in e-Commerce adoption between SMMEs and the most visited platforms within the South African e-Commerce landscape, where based on the analyses presented SMME are far behind the successful platforms sampled in this paper.

Therefore, based on the analyses performed above, the objectives were achieved in the following ways.

Objective 1: To evaluate industry standards for e-Commerce implementation.

This was achieved through literature where best practices in eCommerce adoption from a platform perspective were considered which included platform design and development aspects and even new technologies within the e-Commerce landscape. The literature also comprised of analysing different frameworks to understand what they classify as successful implementation of e-Commerce, and this contributed to the second objective.

Objective 2: Develop a framework for the successful implementation of e-Commerce in South African SMME's.

Through the consideration of the different frameworks of e-Commerce adoption in literature and the

content on what should constitute a successful platform. A consolidated conceptual framework was established in 3.4.1.1 as a method to classify e-Commerce adoption into the various stages which progress in a sequence of developments with one stage acting as a pre-requisite for the subsequent stage, though elements from all the stages might be present for a platform throughout the adoption period. This framework was also applied to the sampled platforms to determine the e-Commerce adoption of these platforms, and where they fall in the sequence.

Objective 3: Investigate the current e-Commerce employed in South African SMME's.

The literature delved into e-Commerce within the South African industry, where the different online retailers were considered and the inhibitors or factors which affect the adoption of the e-Commerce strategy were also considered, the challenges for SMMEs were also highlighted. The study also sampled South African platforms and functionality, and performance differences between these platforms were considered including the examination of the platforms strong and weak areas with regards to functionality and performance. And through the established consolidated framework the current e-Commerce adoption in SMMEs was determined.

6.2 Recommendations

As discovered from the study most of the SMME platforms are within the static stage of adoption which comprises of a static interface with minimal functionality and acting to have web presence than a platform capable of performing trade. Therefore, the following recommendations are approaches to be taken to ensure that the platforms progress through the stages.

1. Though most of the SMME platforms have reached the static interface stage, improvements such as having products upfront to the customer as they visit the platform need to be made. Colour theory methods and typography best practices as outlined in the literature review needs to be considered.
2. To ensure that these platforms progress to the transactional stage where the platform is capable of performing transactions. Functionality to enable transactions need to be enabled this includes ordering, order tracking, and payment facilitations. With these activities an ability to process and save customer information is required, and so some level of security is mandatory to ensure that customer information is protected. Here depending on the capabilities of the organization, a platform offering as those outlined in literature can be outsourced. And in the nature of a CMS, plug ins can be established to ensure that the platform is capable of performing transactions. This includes plugging payment facilities such as PayPal into the CMS orchestration to enable payments. Since transactions are performed in this stage and customer information is required, a log in or registration option needs to be enabled for security. All these require a data management system to manage customer information, transactions and validate customer information upon login, so a cloud-based

database solution can be outsourced, instead of physical hardware and software packages which are needed to manage front end/interface applications, customer information and transactions.

3. To progress to the interactive stage, here the platform features need to be able to read customer's interaction with the platform and have channels to assist customers through their journey on the platform. So here there should be heightened focus on features which are customer centric and enable a two-way interaction between the platform and the user. Since in the previous stage, data structures would be established, this stage is to ensure that data collected is utilized to inform customer experience of the platform. Based on data acquired from customers interactions, data models need to be developed to inform product content managements, personalization and pricing optimization. These should be predictive models which predicts customers shopping habits, trends and seasons and adjusts the interface accordingly to ensure that the platform is relevant to the customer at all times. And besides these models, customer support on and off platform needs to be enabled where on platform includes features such as help functionality, chat bots etc, as outlined in the conceptual model. Off platform includes a certain level of internal integration, where there are consultants/advisors availed for the customer to contact if they have any queries.
4. Then to progress to the internal integrations, all the on-platform operations need to be integrated in the organisation's day to day operations, this includes having dedicated teams to handle on platform transactions. This stage is partially considered in the previous, as with the previous stage a data team needs to be formed to create predictive models explained and for off-site customer support, consultants need to be availed to handle customer queries.
5. For the external integration stage, the platform should enable partners and other divisions of the organisations to plug in to the interface and ensure visibility across the organisation. For platforms that offer delivery services, the tracking of customer products can be integrated on the platform to track the goods in transit. And like the previous stage, partial integration of this stage has been observed in the transactional stage with the use of outsourced payment facilities.
6. To ensure that the interface is up to date and for continuous improvement. Adherence to updated standards needs to be prioritised including new versions of certain functionality. This should be across the board from the way the interface looks on the front end, to the software and programmes that keep the applications running in the back end and from an organisational integration point of view.

6.3 Suggestions for further research

As stated in the delimitations section, this study focussed on the application approach in e-commerce adoptions, which is only one dimension to consider with e-Commerce adoption. So, there is still the organisational approach dimension of e-Commerce adoption that can be explored which includes the consideration of the organisational requirements and impact of e-Commerce adoption. Instead of the application approach which considers the platforms and the technology behind these applications, the organisational approach focusses on the impact on the resources of the organisations which includes human resources.

Another opportunity for further research includes the cost implication of adopting an e-Commerce strategy both from an organisational and application point of view. This opportunity and the one above can consider the consolidated model developed in this research and investigate the cost implications for each stage of adoption or consider the impact that each stage in the model has on the organisations. Further research can also be conducted on larger samples of platforms with an extended system boundary to re-enforce findings observed in this study.

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8. Appendices

Appendix A: SMME sectors

Table A1: SMME Sectors [12]

Sector or subsector in accordance with the Standard Industrial Classification	Size of Class	The total full-time equivalent of paid employees	Total Turnover	Total gross asset value (Fixed property excluded)
Agriculture	Medium	100	R5m	R5m
	Small	50	R3m	R3m
	Very Small	10	R0.50m	R0.50m
	Micro	5	R0.20m	R0.10m
Mining and Quarrying	Medium	200	R39m	R23m
	Small	50	R10m	R6m
	Very Small	20	R4m	R2m
	Micro	5	R0.20m	R0.10m
Manufacturing	Medium	200	R51m	R19m
	Small	50	R13m	R5m
	Very Small	20	R5m	R2m
	Micro	5	R0.20m	R0.10m
Electricity, Gas and Water	Medium	200	R51m	R19m
	Small	50	R13m	R5m
	Very Small	20	R5.10m	R1.90m
	Micro	5	R0.20m	R0.10m
Construction	Medium	200	R26m	R5m
	Small	50	R6m	R1m
	Very Small	20	R3m	R0.50m
	Micro	5	R0.20m	R0.10m
Retail and Motor Trade and Repair	Medium	200	R39m	R6m

Services				
	Small	50	R19m	R3m
	Very Small	20	R4m	R0.60m
	Micro	5	R0.20m	R0.10m
Wholesale trade, Commercial Agents and Allied Services	Medium	200	R64m	R10m
	Small	50	R32m	R5m
	Very Small	20	R6m	R0.60m
	Micro	5	R0.20m	R0.10m
Catering Accommodation and other trade	Medium	200	R13m	R3m
	Small	50	R6m	R1m
	Very Small	20	R5.10m	R1.90m
	Micro	5	R0.20m	R0.10m
Transport, Storage and Communication	Medium	200	R26m	R6m
	Small	50	R13m	R3m
	Very Small	20	R3m	R0.60m
	Micro	5	R0.20m	R0.10m
Finance and Business Services	Medium	200	R26m	R5m
	Small	50	R13m	R3m
	Very Small	20	R3m	R0.50m
	Micro	5	R0.20m	R0.10m
Community, Social and Personal Services	Medium	200	R13m	R6m
	Small	50	R6m	R3m
	Very Small	20	R1m	R0.60m
	Micro	5	R0.20m	R0.10m

Appendix B: CMS Feature Categories

Table B1: Feature categories [15]

Category	Description	'Standards'
User Management	Assigning a role to a user, providing access rights and perhaps the level of interaction with the system. This can often use existing authentication schemes.	LDAP, Active Directory, ACAP
User Interface	Preferably a browser-based application for both content provision and CMS and/or web site administration.	HTML, Javascript, Java, HTTP, FTP, WebDAV
Data Sources	These include the managed storage of created content, plus external data in so-called 'legacy systems' (Word or Excel files, for example, could come under this heading) or other CMSs. Storage methods can be file systems, flat file databases, relational databases, and more recently, object oriented databases and XML files. The key is in the flexibility of the system to cope with its intended use. Storage also requires that the data itself is described. This is known as metadata, and creating it should be a requirement of storing content.	SQL, XML, Dublin Core, RDF
Applications	These integrate the content with existing data and authentication systems, and perform specific software manipulations on the content to aid consistency, simplicity and management. The key application is usually a form of 'templating' allowing control of web site 'look and feel' to be centralised and making style and navigation changes simple to implement. It can also include the 'middleware' that connects database records to dynamically created web pages.	Perl, PHP, Java, Python, ASP, XML-RPC, SOAP, ODBC, JDBC
Deployment	Publishing the web site to the live web server(s). Some CMSs do not distinguish between development and production servers, running the web site itself from the same software as the development system, creating pages dynamically on demand. Popular pages can be built in this way and then 'cached' in memory or on disc, speeding up future retrieval. Other systems have a strict partitioning of 'staging' and 'public' environments requiring separate web servers, often residing on separate machines. In this case the entire structure may need to be replicated if all pages are dynamically created. In other cases, certain elements of pages are pre-rendered and published as static content, with only specific dynamic content being accessed via the public server. It can be said that there are almost as many different methods of live publication as there are products available.	HTML, CSS, XHTML, XSL, XSLT, RSS

Appendix C: CMS Types

Table C1: CMS types [15]

Type	Origin	Strengths	Examples
Document Management Systems	Software designed to manage the storage and internal publication of 'corporate' information	Document lifecycle workflow, metadata, document translation	Documentum, Panagon 2000, ChangingPages
Electronic news/magazine publishing	Tools developed to aid online publishing of magazines and news websites, and electronic discussion groups	Simple workflow, speedy publication of simple content, authoring tools, information management (structure), timed delivery	Eroom, Expressroom, Conversant, SlashDot, Frontier
E-business / E-commerce	Software underlying online shopping and electronic customer relationship management	Simple database management, website personalisation, built in transactional systems	Vignette, Broadvision, ATG Dynamo, Open Market
Source / versioning management control	Software engineering process control/source control among groups of programmers	Roles-based authoring and version control, workflow, templating systems.	Content Management Studio, Interwoven TeamSite
'Middleware on steroids'	Tools for dynamic web site creation from filesystem and database assets. E.g. PHP, ASP, ColdFusion, JSP. Products such as WebObjects, Cache Objects for the Web and Tango 2000	Asset management, dynamic delivery and simple authoring environments.	Enhydra, Midgard (PHP), Dmind DSM (ColdFusion), SiteGenesis, Obtree.
Web content management frameworks	'Second generation' tools, built from the ground up for dynamic website creation and management. Can have very diverse conceptual grounding.	Variable, most try to cover all functions.	ACS, eGrail, Engenda, Mediasurface, NetObjects Fusion, Spectra, Xpedio, Zope
XML processors	A 'third generation' of CMS products appearing based upon XML technology.	Granular control and reuse of content. Though many of the above systems can now utilise XML, these products are written specifically to create websites using XML to store data, and related technology (XSLT, RDF) to manage and deliver it.	Cocoon, Interwoven TeamSite Templating, Lylsee, Rhythmix, Tamino, POET

Appendix D: W3C Web Design Guidelines

Web Design Guidelines

Design of APIs

Put user needs first: Moon [29] states that when designing an API the user need that the API wants to satisfy needs to be understood.

It should be safe to visit a web page: The user should have the expectation of safety when visiting a webpage. There should not be any security risk exposed on the device of the user or any aspect of privacy compromised, an example of this is an API that allows any website to detect the utilization of assistive technologies which can make users feel uneasy about visiting the website as any other website can acquire their personal information. In [29] the following approaches are proposed for adding new features, these include.

- Improved user interface which makes it clear what to expect on the interface.
- Accommodating user's expectation of privacy through a change on the technical foundation of the website.
- Consider instances where users would be better off if the expectations were higher and accommodate this expectation in the technical foundation of the site.

The trusted User interface should be trustworthy: Always consider where functionality can impact the trusted user interfaces [29]. In [29] the trusted interfaces include address bar, security indicators and permission prompts. These in the paper should be designed in way that enables users to trust and verify that the information that they provided is accurate and genuine [29].

Ask users for consent: if a feature comes with the possibility of harm, then consent needs to be acquired from the user for the feature to be used [29]. To give consent the user must

- Understand the permission they choose to grant on the website [29].
- Be able to choose to give or refuse permission [29].

Support full range of devices and platforms: this aligns with the user experience best practices above and it is to ensure that designed features or platforms work across different devices, screen sizes, interaction modes, platforms, and media [29].

Leave webpage better than initially found: Upon the addition of new capabilities on the platform, this must be executed in such a way that improves the overall platform for example security or privacy vulnerabilities and accessibility characteristics must be improved, including fixing any defects that can impact other functionalities [29].

API Design across languages

Prefer simple solutions: this advocates for simple solutions to the user needs, this includes addressing simple solutions to user needs which are easier to implement and test, interoperable and easy to understand.

Considering trade-offs between high level and low-level APIs: Here the trade-off is between a high-level API which allows the ability to intervene in various ways on behalf of the user such as ensuring accessibility and privacy. And low-level API which enables creators room for experimentation, so that high level APIs can emerge from usage patterns [29]. A proper solution in this case being the one that ensures ease of use and power trade-off, and reducing the issue where a small increment can result in increased complexity [29].

Ensure Consistency: There should be internal consistency with the rest of the system and external consistency which is consistency with the rest of the world [29].

New features should be detectable: All features introduced on the interface should be detectable to ensure that the feature is available, and the web content can detect when the feature is not present and adjust to this.

Limit new features to a secure context: Features should always be limited to secure contexts if it would pose a risk to the user without the authentication, integrity and confidentiality that is present in the secure context [29].

Private browsing mode engaged: Never reveal when the private browsing mode is engaged and consider how the API should behave in this instance [29].

Assistive Technologies: Do not reveal when assistive technologies are being utilized, there should not be a way to detect that a user is using assistive technologies, unless consent is given [29].

Require User activation of powerful APIs: This includes designing powerful APIs such as those with intrusive user interfaces, exposing user data and performing background activity, to require user activation to function [29].

Non fully active backward/forward cached documents: this includes the consideration of how functionality should behave in non-fully active backward/Forward cached web pages which is when a user navigates away from a web page and the page is cached in a non-active state until user navigates back [29]. If non fully active web pages are not supported, this can make the experience of navigating back and forth less optimal [29].

Usability and compatibility: Prioritize usability over compatibility with third party tools, new functionality must be designed with usability as the main goal and compatibility with third party tooling as a secondary goal [29].

HTML

Avoid features that block rendering: Features that require resource loading or other operations before loading the page can result in a blank page which is poor user experience, and this should be avoided unless these features improve the overall user experience [29].

CSS

Content should be viewable and accessible by default: CSS properties and layout systems should be designed in such a way as to preserve the content as viewable, accessible, and usable by default [29]. This should result in content not being clipped, overlapping other content or content not reachable.

Appendix E: Sophistication Model Functionality Placement

Table E1: Functionality placement per framework level [30]

Item	Level 1 (%)	Level 2 (%)	Level 3 (%)	Level 4 (%)	Level 5 (%)	Don't know (%)
Graphics/Images	47	13	27		7	7
E-mail Marketing	27	27	20	13	13	
Customer support via Phone/Fax/Mail	27		27	27	13	7
Email contact	27	27	20	13	13	
Email	20	13	20	20	20	7
Simple demonstrations of buying process	13	47	12	20		7
Knowledgebase (FAQ)	20	40	13	27		
E-Newsletters	20	40	27	13		
Offline ordering		34	27	20	20	
Product Catalogue	34	40	20	7		
Search capabilities	13	27	13	27	13	7
Cookies	7	20	13	13	20	27
Instant Messaging		20	33	27	20	
Online Ordering with Shopping Cart		20	34	27	13	7
Order Tracking		7	33	33	13	13
Direct Bank Transfer payment option		20	60	13	7	
Shipping options		33	40	13	7	7
Encryption		13	33	13	20	20
Discussion Groups		13	40	27	20	
Security policies	7	7	33	27	27	
Multimedia demonstrations of Buying Process	7	20	40	20	13	
Money order payment option		20	40	27	13	
Trust mechanisms (third party)		13	47	13	7	20
One-Click payment option	7	7	54	20	13	
Offline credit card payment & authorization		20	34	34	13	
Multicurrency options	7	13	27	27	13	13
Return Policy	7	20	40	20		13
VbV and 3D Secure code	7	13	27	13		40

Blogs	7	7	27		20	40
SSL		13	27	7		54
COD Payment option		13	40	13		33
Online credit card payment & authorization		13	13	54	20	
P2P (e.g. PayPal) payment option		13	33	40	13	
Gift Vouchers payment option	7	20	27	40	7	
Cheque payment option		13	27	54		7
Customer Profile		7	27	67		
Loyalty Program		13	20	27	7	34
Customer Registration		20	27	40	13	
Customer Personalized Webpage		7	13	27	47	7
RSS		7	13	7	20	54
User Polls & Feedback	7	7	20	7	20	40

Appendix F: Frameworks Functionality Checklist

Table F1: Frameworks Functionality Checklist [32]

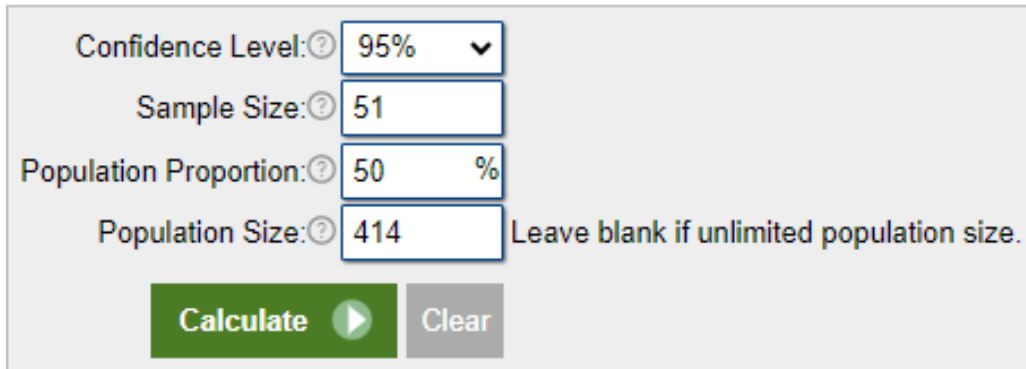
Functionality /Feature	CEC	MICA	eMICA	Ally <i>et al</i>	Doolin <i>et al</i>	Garcia-Borbolla <i>etal</i>
Advertising	X		X	X		
Order form			X		X	
Online payment	X	X		X	X	
Offline payment				X		
Email	X	X	X	X	X	X
Shopping cart				X		
Minimum security	X		X	X	X	
Customer registration and login				X		
Order tracking	X	X	X	X		
Advanced security				X		
Customizability	X		X	X		
Links		X				X
Enquiry	X	X	X		X	
Technical information		X				
Promotion	X	X	X			
Catalogue	X		X			X
Contact information	X		X			
Customer support (FAQs, sitemaps)	X	X	X			X
Chat room, discussion groups, blog	X		X	X		
Multimedia	X		X	X	X	
Feedback, Polls	X			X		
Database search	X			X		X
QuickLinks	X	X				

Pricing information	X					X
RSS feed	X					X
Company information	X	X				X
Customer policies	X					
Help function	X					
Links to distributors		X			X	
Graphic/Images				X	X	X
Cookies				X		
Instant Messaging				X		
History						X

Appendix G: Margin of Error Calculator

Margin of error: **12.87%**

This means, in this case, there is a 95% chance that the real value is within $\pm 12.87\%$ of the measured/surveyed value.

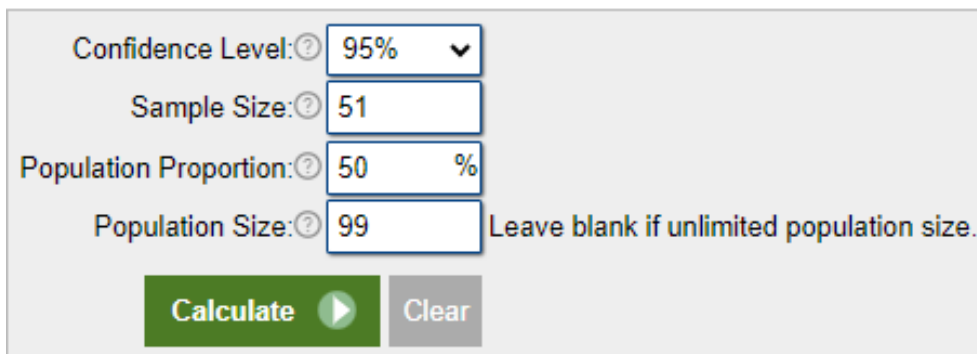


A screenshot of a web-based margin of error calculator. It features four input fields: 'Confidence Level' set to '95%' with a dropdown arrow, 'Sample Size' set to '51', 'Population Proportion' set to '50' with a '%' symbol, and 'Population Size' set to '414'. To the right of the 'Population Size' field is the text 'Leave blank if unlimited population size.' Below the input fields are two buttons: a green 'Calculate' button with a right-pointing arrow, and a grey 'Clear' button.

Figure G1: Margin of error calculation for accessible retail Sample vs small business population

Margin of error: **9.60%**

This means, in this case, there is a 95% chance that the real value is within $\pm 9.60\%$ of the measured/surveyed value.



A screenshot of a web-based margin of error calculator, similar to Figure G1 but with a different population size. The input fields are: 'Confidence Level' set to '95%' with a dropdown arrow, 'Sample Size' set to '51', 'Population Proportion' set to '50' with a '%' symbol, and 'Population Size' set to '99'. To the right of the 'Population Size' field is the text 'Leave blank if unlimited population size.' Below the input fields are two buttons: a green 'Calculate' button with a right-pointing arrow, and a grey 'Clear' button.

Figure G2: Margin of error calculation for accessible retail sample vs retail population

Appendix H: Sample calculation

Table H1: Sample Calculation

	Number of Businesses	Margin of error
SMALL		
BUSINESS	414	12.87%
Accessible	51	9.60%
Not Accessible	45	
Retail	96	

	Not Accessible	Accessible
Johannesburg		
193	23	26
Pietermaritzburg		
8	1	
Polokwane		
7	1	
Nelspruit		
12		1
Mafikeng		
0		
Bloemfontein		
15	1	3
Kimberly		
6	1	
Alexander Bay		
5		
Aliwal North		
1		
Cape Town		
167	18	21

Appendix I: SMMEs and Sectors

Table I1: SMMEs and Sectors

	Sector
Johannesburg	
Gmh Gift Box Packaging Manufacturer	Paper, pulp and lumber
Sinderella Costume Hire	Clothing
Miracle Textiles	Textile
Think Safety	Footwear
Baker Baynes (PTY) Ltd	Electrotechnical
THE PIANO PLACE	Electrotechnical
Piano Industry Specialists	Electrotechnical
EXTREME SHELVING	Metals fabrication
HSG Distributors	Electrotechnical
Beckers Heaters Cc	Electrotechnical
Nutape CC	Plastics, clothing
BELIMO ACTUATORS SA CC	Electrotechnical
Shenka Industries CC	Electrotechnical
Celstra Mobile	Electrotechnical
Window Sox	Textile
narayantextiles	Textile
AlterBliss	Electrotechnical
Environ Distribution SA (Pty) Ltd	beauty and personal care
Yashisa Yabanda	Electrotechnical
Delltra Solutions	Electrotechnical
Mobile Signal Boosters	Electrotechnical
Attamark	Paper, pulp and lumber, metal fabrication, textile
Aeroinsul Pty Ltd	Textile
Consultaire	Electrotechnical
MBI International Supplies Pty Ltd	Paper, Plastics
Nelspruit	
Bejane Space Solutions	Metals fabrication
Bloemfontein	
Vikings Vape	Tobacco, metal fabrication

Chemkor Chemical Supplies	chemicals
Vasilis Cleaning Supplies	chemical, Electrotechnical, clothing and footwear
Cape Town	
The Coffee Co	Beverages
The Papery	Paper, pulp and lumber
Cape tees - t-shirts Cape town	Clothing
Perfumes for Africa	Flavour & Fragrance
MC Appliances	Electrotechnical
MLM software will lift the business to the next phase	Electrotechnical
MTT Solutions (Pty) Ltd	Paper, pulp and lumber, metal fabrication
Shopfitting Depot	Paper, pulp and lumber, metals fabrication
BSC EV South Africa --- service@bscglobe.com	Electrotechnical
Holmes and Company	Food/Beverages
M-Photo (Pty) Ltd	Electrotechnical
Sunbird Perfumes	Flavour & Fragrance
Fridge Repair Cape Town	Electrotechnical
HAFRE TRADING	Food/Beverages
TCGZA (The Computer Guyz)	Electrotechnical
Beaudele	Food/Beverages
Roof Insulation Western Cape Pty Ltd	Textile
Styleline Projects	Paper, pulp and lumber
Welding Services Cape Town	Metals fabrication
SMARTEDGE Technologies	Electrotechnical
Rise SA Business Solutions	Electrotechnical

Appendix J: SMME platforms functionality

Table J1: SMME platforms functionality

	Gmh Gift Box Packagin g Manufac turer	Sinde rella Costu me Hire	Mira cle Text iles	Thi nk Saf ety	Bak er Bay nes (PT Y) Ltd	THE PIA NO PLA CE	Piano Indust ry Specia lists	EXTRE ME SHELV ING	HSG Distrib utors	Beck ers Heat ers Cc	Feat ures 1
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	10
On-site Payments	0	0	0	0	1	0	0	0	1	1	3
Off-site Payments	1	1	1	1	0	1	1	1	1	0	8
Online ordering and tracking	0	0	0	0	1	0	0	0	1	1	3
Shopping carts	0	0	0	0	1	0	0	0	1	1	3
Security (login, Registration, Authentication)	0	0	0	0	1	0	0	0	1	1	3
Customer Support	1	1	1	1	1	1	1	1	1	1	10
Help Functions	1	1	1	1	1	1	1	1	1	1	10
Flexible Prices	0	0	0	0	0	0	0	0	0	0	0
Customisation and Personalization	0	0	0	0	0	0	0	0	1	0	1
User Communities/Initiatives	0	0	0	0	1	1	1	0	1	1	5
Internal Integration	1	1	1	1	1	1	1	1	1	1	10

External Integration	0	0	0	1	1	0	1	0	1	0	4
Notifications	1	1	1	1	1	1	1	1	1	1	10
Assistive Technologies	1	1	1	1	1	1	1	1	1	1	10
Company Information	1	1	1	1	1	1	1	1	1	1	10
Contact Information	1	1	1	1	1	1	1	1	1	1	10
Delivery and collection	1	1	1	1	1	1	1	1	1	1	10
All platform design	1	1	1	1	1	1	1	1	1	1	10

	Nutape CC	BELIMO ACTUATORS SA CC	IT Paradise	Shenka Industries CC	Celstra Mobile	Window Sox	narayantextiles	Alter Bliss	Environ Distribution SA (Pty) Ltd	Yashisa Yabanda	Features 2
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	10
On-site Payments	0	0	1	0	0	1	0	0	0	0	2
Off-site Payments	1	1	1	1	1	1	1	1	1	1	10
Online ordering and tracking	0	0	0	0	0	0	0	0	0	0	0
Shopping carts	0	1	1	0	0	1	1	0	0	0	4
Security (login, Registration, Authentication)	0	1	1	0	0	0	0	0	0	0	2

Customer Support	1	1	1	1	1	1	1	1	1	1	10
Help Functions	1	1	1	1	1	1	1	1	1	1	10
Flexible Prices	0	0	1	0	0	0	1	0	0	0	2
Customisation and Personalization	0	0	0	0	0	0	0	0	0	0	0
User Communities/Initiatives	1	1	1	0	0	0	1	0	1	0	5
Internal Integration	1	1	1	1	1	1	1	1	1	1	10
External Integration	1	1	0	0	1	0	0	0	1	0	4
Notifications	1	1	1	1	1	1	1	1	1	1	10
Assistive Technologies	1	1	1	1	1	1	1	1	1	1	10
Company Information	1	1	1	1	1	0	1	1	1	1	9
Contact Information	1	1	1	1	1	1	1	1	1	1	10
Delivery and collection	1	1	1	1	0	1	1	0	1	0	7
All platform design	1	1	1	1	1	1	1	1	1	1	10

	Dell ra Solut ions	Mob ile Sign al Boos ters	Atta mark	Aeroi nsul Pty Ltd	Consul taire	MBI Intern ational Supplie s Pty Ltd	Beja ne Spac e Solut ions	Viki ngs Vap e	Che mkor Che mical Supp lies	Vasil is Clea ning Supp lies	Feat ures 3
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	10
On-site Payments	0	1	0	0	0	1	0	1	0	0	3
Off-site Payments	1	0	1	1	1	0	1	0	1	1	7
Online ordering and tracking	0	1	0	0	0	0	0	1	1	0	3
Shopping carts	0	1	0	0	0	1	0	1	1	1	5
Security (login, Registration, Authentication)	0	1	0	0	0	1	0	1	1	1	5
Customer Support	1	1	1	1	1	1	1	1	1	1	10
Help Functions	1	1	1	1	1	1	1	1	1	1	10
Flexible Prices	0	1	0	0	0	1	0	1	0	0	3
Customisation and Personalization	0	0	0	0	0	0	0	0	0	0	0
User Communities/Initiatives	0	1	0	1	0	1	0	1	0	1	5
Internal Integration	1	1	1	1	1	1	1	1	1	1	10
External Integration	0	1	0	0	1	0	0	1	0	0	3
Notifications	1	1	1	1	1	1	1	1	1	1	10
Assistive Technologies	1	1	1	1	1	0	1	1	1	1	9
Company Information	1	1	1	1	1	1	1	1	1	1	10
Contact Information	1	1	1	1	1	1	1	1	1	1	10
Delivery and collection	1	1	1	1	1	1	1	1	1	1	10
All platform design	1	1	1	1	1	1	1	1	1	1	10

	The Cof fee Co	The Pap ery	Ca pe tees - tshi rts Ca pe tow n	Perfu mes for Afric a	MC Applia nces	ML M softw are	MTT Soluti ons (Pty) Ltd	Shopfi tting Depot	BS C EV Sou th Afr ica	Holm es and Comp any	Feat ures 4
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	10
On-site Payments	1	1	0	0	0	0	0	0	0	1	3
Off-site Payments	1	1	1	1	1	1	1	1	1	0	9
Online ordering and tracking	1	1	0	0	0	0	0	0	0	0	2
Shopping carts	1	1	0	1	0	0	0	1	0	1	5
Security (login, Registration, Authentication)	0	1	0	0	0	0	0	0	0	1	2
Customer Support	1	1	1	1	1	1	1	1	1	1	10
Help Functions	1	1	1	1	1	1	1	1	1	1	10
Flexible Prices	1	1	0	0	0	0	0	0	0	0	2
Customisation and Personalization	0	0	0	0	0	0	0	0	0	0	0
User Communities/Initiatives	1	1	0	1	0	1	0	1	0	1	6
Internal Integration	1	1	1	1	1	1	1	1	1	1	10
External Integration	0	1	0	0	0	0	0	0	0	0	1
Notifications	1	1	1	1	1	1	1	1	1	1	10
Assistive Technologies(Some	1	1	1	1	1	1	1	1	1	1	10

icons hard to press on accessibility)											
Company Information	1	1	1	1	1	1	1	1	1	1	10
Contact Information	1	1	1	1	1	1	1	1	1	1	10
Delivery and collection	1	1	1	1	0	0	1	1	1	1	8
All platform design	1	1	1	1	1	1	1	1	1	1	10

	M-Photo (Pty Ltd	Sunbird Perfs	Fridge Repair Cap To wn	HAFRE TRADING	TCGZA	Beau dele	Roof Insulation West ern Cape Pty Ltd	Styl eline Proj ects	Wel ding Serv ices Cap e Tow n	SMART EDGE Technol ogies	Rise SA Busi ness Solut ions	Feat ures 5
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	1	11
On-site Payments	0	0	0	0	0	1	0	0	0	0	0	1
Off-site Payments	1	1	1	1	1	1	1	1	0	1	1	10
Online ordering and tracking	0	1	0	0	0	1	0	0	0	0	0	2
Shopping carts	0	0	0	1	0	1	0	0	0	0	0	2
Security (login, Registration, Authentication)	1	1	0	0	0	1	0	0	0	1	0	4
Customer Support	1	1	1	1	1	1	1	1	1	1	1	11
Help Functions	1	1	1	1	1	1	1	1	1	1	1	11
Flexible Prices	0	0	0	0	0	0	1	0	0	0	0	1
Customisation and Personalization	0	0	0	0	0	0	0	0	0	0	0	0

User Communities/Initiatives	0	1	1	0	1	1	1	0	0	1	1	7
Internal Integration	1	1	1	1	1	1	1	1	1	1	1	11
External Integration	1	1	0	1	0	0	0	0	0	1	0	4
Notifications	1	1	1	1	1	1	1	1	1	1	1	11
Assistive Technologies	1	1	1	1	1	1	1	1	1	1	1	11
Company Information	1	1	1	1	1	1	1	1	1	1	1	11
Contact Information	1	1	1	1	1	1	1	1	1	1	1	11
Delivery and collection	1	1	0	0	0	1	1	0	0	0	0	4
All platform design(/text collapse)	1	1	1	1	1	1	1	1	1	1	1	11

Appendix K: SMME platforms functionality Variation

Table K1: SMME platforms functionality variation

	Gmh Gift Box Packagi ng Manufa cturer	Sinde rella Costu me Hire	Mir acle Text iles	Thi nk Saf ety	Bak er Bay nes (PT Y) Ltd	THE PIA NO PLA CE	Piano Indust ry Specia lists	EXTR EME SHEL VING	HSG Distrib utors	Beck ers Heat ers Cc	Su m1
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	10
On-site Payments	0	0	0	0	4	0	0	0	2	1	7
Off-site Payments	1	1	1	1	0	1	1	1	3	0	10
Online ordering and tracking	0	0	0	0	3	0	0	0	3	3	9
Shopping carts	0	0	0	0	1	0	0	0	1	1	3
Security (login, Registration, Authentication)	0	0	0	0	2	0	0	0	2	2	6
Customer Support	1	2	2	2	2	2	2	2	2	2	19
Help Functions	6	3	2	3	3	4	1	2	5	3	32
Flexible Prices	0	0	0	0	0	0	0	0	0	0	0
Customisation and Personalization	0	0	0	0	0	0	0	0	1	0	1
User Communities/Initiat ives	0	0	0	0	2	1	1	0	2	1	7
Internal Integration	1	1	1	1	1	1	1	1	1	1	10
External Integration	0	0	0	1	1	0	1	0	1	0	4
Notifications	1	3	3	2	3	3	3	3	3	3	27
Assistive Technologies	1	1	1	1	1	1	1	1	1	1	10
Company Information	1	1	1	1	1	1	1	1	1	1	10

Contact Information	3	3	3	2	3	3	3	3	3	3	29
Delivery and collection	1	1	2	2	2	2	2	3	3	2	20
All platform design	1	1	1	1	1	1	1	1	1	1	10

	Nut ape CC	BELIM O ACTUA TORS SA CC	IT Para dise	Shen ka Indus tries CC	Cels tra Mo bile	Win dow Sox	narayan textiles	AlterBl iss(ux great)	Enviro n Distrib ution SA (Pty) Ltd	Yash isa Yab anda	Su m2
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	10
On-site Payments	0	0	1	0	0	2	0	0	0	0	3
Off-site Payments	1	1	1	1	1	1	1	1	1	1	10
Online ordering and tracking	0	0	0	0	0	0	0	0	0	0	0
Shopping carts	0	1	1	0	0	1	1	0	0	0	4
Security (login, Registration, Authentication)	0	2	1	0	0	0	0	0	0	0	3
Customer Support	2	1	2	2	2	1	2	2	1	2	17
Help Functions	6	7	5	3	2	4	3	3	5	1	39
Flexible Prices	0	0	1	0	0	0	1	0	0	0	2
Customisation and Personalization	0	0	0	0	0	0	0	0	0	0	0
User Communities/Initiatives	4	2	2	0	0	0	1	0	1	0	10
Internal Integration	1	1	1	1	1	1	1	1	1	1	10
External Integration	1	1	0	0	1	0	0	0	1	0	4
Notifications	3	3	3	3	3	3	3	3	3	2	29

Assistive Technologies	1	1	1	1	1	1	1	1	1	10
Company Information	1	1	1	1	0	1	1	1	1	9
Contact Information	3	3	3	3	2	3	3	2	3	28
Delivery and collection	2	1	1	2		2	2		1	11
All platform design	1	1	1	1	1	1	1	1	1	10

	Dell ra Solut ions	Mob ile Sign al Boos ters	Atta mark	Aeroi nsul Pty Ltd	Consul taire	MBI Intern ational Supplie s Pty Ltd	Beja ne Spac e Solut ions	Viki ngs Vap e	Che mkor Che mical Supp lies	Vasil is Clea ning Supp lies	Su m3
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	10
On-site Payments	0	2	0	0	0	2	0	3	0	0	7
Off-site Payments	1	0	1	1	1	0	1	0	1	1	7
Online ordering and tracking	0	2	0	0	0	0	0	2	1	0	5
Shopping carts	0	1	0	0	0	1	0	1	1	1	5
Security (login, Registration, Authentication)	0	1	0	0	0	1	0	2	1	1	6
Customer Support	2	2	1	2	2	1	2	2	2	2	18
Help Functions	2	6	4	4	2	3	3	4	3	4	35
Flexible Prices	0	1	0	0	0	1	0	1	0	0	3
Customisation and Personalization	0	0	0	0	0	0	0	0	0	0	0
User Communities/Initiatives	0	1	0	2	0	2	0	2	0	1	8

Internal Integration	1	1	1	1	1	1	1	1	1	1	10
External Integration	0	1	0	0	1	0	0	1	0	0	3
Notifications	2	2	2	3	3	2	2	3	3	3	25
Assistive Technologies	1	1	1	1	1		1	1	1	1	9
Company Information	1	1	1	1	1	1	1	1	1	1	10
Contact Information	2	2	2	3	3	2	2	3	3	3	25
Delivery and collection	2	2	2	2	2	2	2	3	2	2	21
All platform design	1	1	1	1	1	1	1	1	1	1	10

	The Coffee Co	The Paperery	Capetown - tshirts	Perfumers for Africa	MC Appliances	MLM software	MTT Solutions (Pty) Ltd	Shopfitting Depot	BSCEV South Africa	Holmes and Comp any	Sum4
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	10
On-site Payments	1	13	0	0	0	0	0	0	0	6	20
Off-site Payments	1	1	1	3	1	1	1	1	1	0	11
Online ordering and tracking	1	4	0	0	0	0	0	0	0	0	5
Shopping carts	1	1	0	1	0	0	0	2	0	1	6
Security (login, Registration, Authentication)	0	1	0	0	0	0	0	0	0	1	2
Customer Support	2	3	2	2	2	4	2	1	2	1	21
Help Functions	3	5	3	3	2	2	4	3	3	3	31
Flexible Prices	1	1	0	0	0	0	0	0	0	0	2

Customisation and Personalization	0	0	0	0	0	0	0	0	0	0	0
User Communities/Initiatives	2	3	0	1	0	3	0	1	0	1	11
Internal Integration	1	1	1	1	1	1	1	1	1	1	10
External Integration	0	1	0	0	0	0	0	0	0	0	1
Notifications	3	3	3	3	3	2	3	3	2	1	26
Assistive Technologies(Some icons hard to press on accessibility)	1	1	1	1	1	1	1	1	1	1	10
Company Information	1	1	1	1	1	1	1	1	1	1	10
Contact Information	3	3	3	3	3	2	3	3	2	1	26
Delivery and collection	2	4	1	2			2	2	1	2	16
All platform design	1	1	1	1	1	1	1	1	1	1	10

	M-Photo (Pty) Ltd	Sunbird Perfumes	Fridge Repair Company	HAFRE TRADING	TC AG	Beau dele	Roof Insulation West ern Cape Pty Ltd	Style line Projects	Wel ding Serv ices Cap e Town	SMART EDGE Technol ogies	Rise SA Busi ness Solut ions	Su m5
Product/Service Catalogue or specification	1	1	1	1	1	1	1	1	1	1	1	11
On-site Payments	0	0	0	0	0	1	0	0	0	0	0	1
Off-site Payments	1	5	1	1	1	1	1	1	0	1	1	14
Online ordering and tracking	0	1	0	0	0	1	0	0	0	0	0	2
Shopping carts	0	0	0	1	0	1	0	0	0	0	0	2

Security (login, Registration, Authentication)	1	3	0	0	0	1	0	0	0	1	0	6
Customer Support	2	2	2	2	2	1	2	2	1	1	1	18
Help Functions	7	7	2	3	2	5	4	2	1	4	3	40
Flexible Prices	0	0	0	0	0	0	1	0	0	0	0	1
Customisation and Personalization	0	0	0	0	0	0	0	0	0	0	0	0
User Communities/Initiatives	0	2	1	0	2	2	1	0	0	1	1	10
Internal Integration	1	1	1	1	1	1	1	1	1	1	1	11
External Integration	1	1	0	1	0	0	0	0	0	1	0	4
Notifications	3	3	3	3	3	3	3	3	2	2	3	31
Assistive Technologies	1	1	1	1	1	1	1	1	1	1	1	11
Company Information	1	1	1	1	1	1	1	1	1	1	1	11
Contact Information	3	3	2	3	3	3	2	3	1	2	3	28
Delivery and collection	2	2	0			2	1					7
All platform design(/text collapse)	1	1	1	1	1	1	1	1	1	1	1	11