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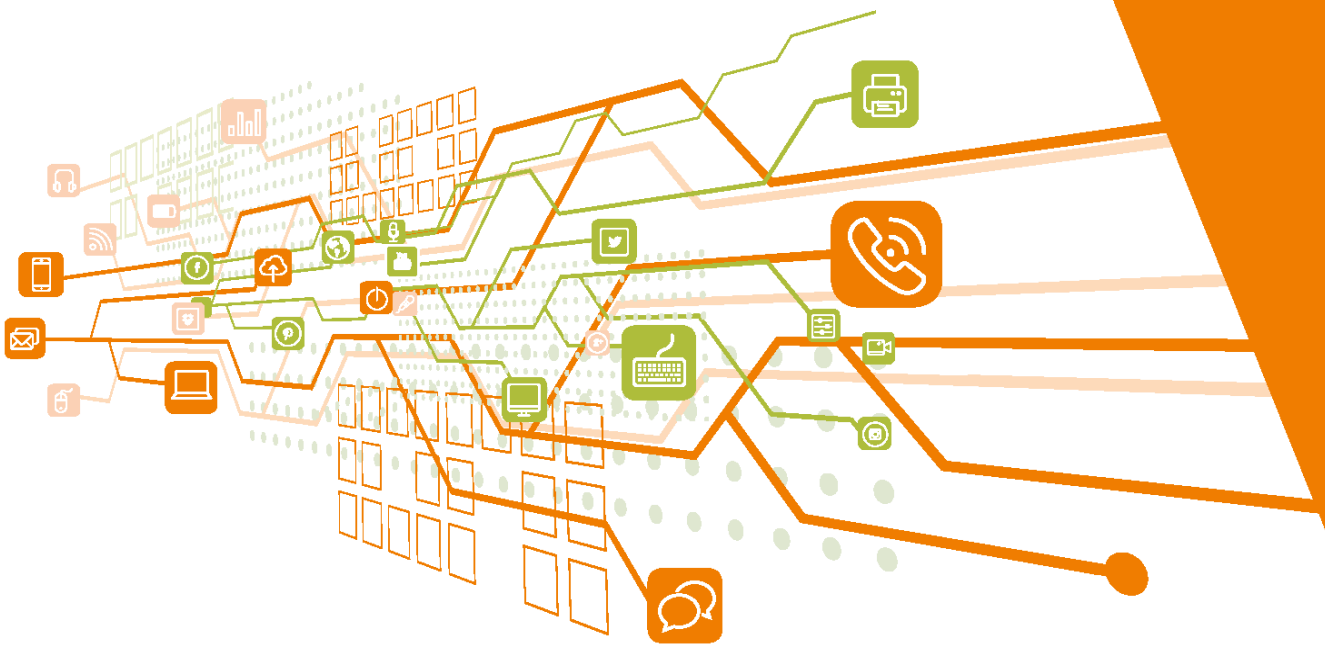

Digital Innovation and Transformation Conference: Digital Skills 2019

Shifting the digital skills discourse for the 4th industrial revolution

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Digital Innovation and Transformation Conference: Digital Skills 2019:

Shifting the digital skills discourse for the 4th industrial revolution

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Preface

The notion of digital skills, previously labelled e-skills, is not a new field of interest, research or study. The difference today is its increasingly complex nature that pervades succinct definition and domain. Each of the different digital skills frameworks approaches the concept of digital skills from its contextual setting, usually driven by national imperatives. In South Africa, the notion of digital skills is thus embedded in the triple need to increase employment, wealth and social cohesion.

This Digital Skills 2019 conference adopted the vision of a skilled and empowered digital citizenry in South Africa as a means of ensuring social and economic readiness for the 4th Industrial Revolution (4IR). We are congissant of the fact that prepared citizens are better equipped to take advantage of digital and economic opportunities. Citizens need a broad range of digital skills, ranging from digital literacy to digital leadership, in order to contribute to a modern economy and occupy their rightful place in the technological seat of the 21st century.

The 4IR represents the context in which we position digital skills. It is the 4IR inter-connectedness of things physical, biological and technological, which lends support to the complexity of defining digital skills. The 4IR represents an age that breaks from many traditions and calls for greater innovation that results in new forms of social and economic expressions. The 4IR makes a pressing call across all sectors (including government) to innovate and creating new ways of engaging with their clients (and the citizens).

The changing boundaries of organisations (both internal and external) requires these new ways of engaging with new types of clients that value individuality, flexibility, self-expression, meritocracy, openness and diversity. Highly skilled individuals, more than capital, are now the critical factor of organisational growth. It is therefore necessary to ensure that the changes brought about by the 4IR are integrated into every level of society - starting from policy - and must include all stakeholders.

The conference was postponed from the 13-14 March 2019 to the 29 August 2019 to bring alignment with the South Africa 4IR agenda. This is why it comes at the back of government plans on how to position digital skills within the context of the 4IR. We appreciate your patience while we waited for the new dates.

In total we received 27 papers with all papers representing studies in South Africa, except two from Malawi and Zimbabwe. A total of 16 unique institutions are represented by the authors.

There are 6 tracks including a Research-in-Progress and Postgraduate track (10 papers). These tracks were Teaching and Learning (3), Small and Medium Entreprises (5), Digital skills (3), Digital government (1), Data governance (1) and Technology solutions (2). An increased number of Research-in-Progress and Postgraduate papers bears testimony to the increased emphasis placed by NEMISA on human capacity development and investment in emerging knowledge.

Six of the papers have been fast-tracked for consideration into the African Journal of Information and Communication (AJIC), with two of these papers as thematic notes, and four as full papers.

In the Digital skills track, Mnoneleli Nogwina, Ndiyakholwa Ngqulu and Sibukele Gumbo in their short yet rich paper reveal emerging results about progress on digital skills mismatches in the Eastern Cape. They identify the realities of how automation in the Eastern Cape's primary automotive industry is resulting in job losses.

Zoran Mitrovic, Surendra Thakur and Phuti Phukubje develop a conceptual model for skills development in cybersecurity awareness for the public. The purpose of the course is to educate and sensitise internet users on the various cyber threats and the vulnerabilities of computers and data. The model was developed from literature and industry reports.

Daimon Malanda and Hossana Twinomurinzi performed a systematic literature review of digital skills in South Africa's public sector. The findings suggest an emerging efforts focused primarily on a national government perspective, and the slow rate of curriculum change. They also found that self-study and on-job-training are the main methods that are used by public sector employees to acquire their digital skills. It also emerged that local municipalities struggle to retain skilled ICT personnel.

In the Teaching and Learning track, Samwel Mwapwele, Mario Marais and Judy Van Biljon investigate the readiness of teachers in rural areas to adopt tablets in the context of South Africa's policy on broadband for all by 2030, and the rising digital literacy. They were pleasantly surprised that teachers are actually eager and more knowledgeable about using digital technologies in the classroom despite a number of challenges they face such as school policies that prohibit the use of such technologies in the classroom. An astounding 68% of the teachers that participated in their study were women.

Antoinette Young took a different view by looking at the perception of matric learners in the Winelands region of the Western Cape. She found that the students are not as prepared for e-Learning as would generally be expected or hoped. Interestingly, she also found some form a social stigma that is attached to e-learning.

Donald Flywell Malanga and Wallace Chigona considered the Digital Information Literacy (DIL) skills of first year university students in a private university in Malawi. They found that the students did not possess adequate DIL skills in identifying diverse sources of information which consequently led to its low usage. The students also lacked skills for searching, retrieving and evaluating these sources of information.

In the Technology solutions track, Maduvha Tshioloili, Zama Dlamini and Nobubele Shozi developed a prototype model that uses location tracking to better understand the customer needs and simultaneously reduce cyberattacks and pinpointing the source of the attacks.

Colin Thakur, Rishi Balkaran, Temitayo Matthew Fagbola Fagbola and John Maphephe Maphephe developed a model from literature for electioneering in South Africa. They identified how internet-based technologies (IBTs) are increasingly becoming a driver and enabler of election practices, while at the same time provide a useful tool for politicians to engage with the citizens. However, challenges relating to how to manage perceptions of citizen, overcoming archaic legislative frameworks and limited tools for monitoring and evaluating the IBTs still persist.

In the Digital government track, Nixon Ochara questions and brings to the fore how certain theoretical methods can influence the thrust of digital government efforts. In this Zimbabwean study, the use of Anaytical Hierarchical Process (AHP) and SWOT analysis resulted in an internal focus at the expense of the transformative need for digital government. The finding conflicts with the public value perspective which seeks to inspire public sector managers to view their work as contributing to satisfying the wishes of the public in much the same way that private sector managers seek to satisfy their shareholders.

In the Data governance track, Olutoyin Olaitan, Marlien Herselman and Ntombovuyo Wayi developed a Data Governance Maturity Evaluation Model for government departments to improve the governance and management of their data assets. The model was tested in government departments to reveal their lack of data governance.

In the Small and Medium Enterprises track, Osden Jokonya usied a meta-synthesis to identify the challenges associated with technical and managerial skills among SMEs as significant stumbling blocks preventing SMEs from being innovative. He also found that digital literacy, the threat of security and cost remain the significant technology adoption barriers for SMEs.

Tendani Thabela, Salah Kabanda, Wallace Chigona and Zinzi Villo used the Technology-Organisational-Environmental (TOE) framework to understand SME challenges when using ICT for development in a rural area context. In addition, the authors sought to identify whether SME owners in rural areas were aware of government support initiatives designed to assist their businesses. They found that while mobile technologies are the primary digital technology owned by the SMEs, they did not know how to leverage these technologies to access government support.

Osden Jokonya also looked at ICT factors that influence the business operations of SMEs in the thriving hospitality industry of the Western Cape Province of South Africa. He found a strong reliance on every day ICTs in the sub-sector particularly on social media, smartphones, laptops and free WiFi.

Muhammed A Osman, Wallace Chigona and Donald Flywell Malanga looked at how micro-enterprises interface with government websites in the Western Cape. They found that despite the sufficient digital skills prevalent in these micro-enterprises, they still struggle to access content from the government websites. The study supports emerging evidence of the need to improve digital government.

Osden Jokonya also considered SMEs and their adoption of m-commerce platforms. Over and above the common adoption barriers, he found that privacy and security of information (identity theft), trust (mistrust of m-commerce platforms), and a perceived risk of loss are further unique barriers to SME's adoption of m-commerce.

Hossana Twinomurinzi

Director | NEMISA Knowledge for Innovation | University of South Africa

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CHALLENGES OF USING ICTS FOR SMMES IN RURAL AREAS

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ABSTRACT

Aim/Purpose	The paper aims to revisit the challenges of using ICTs for SMMEs in rural areas in developing context. It also sought to identify whether SMME owners in rural areas were aware of government support initiatives designed to assist their businesses.
Background	With more disruptive open source technologies, the increase of cellphone ownership in rural areas and governments efforts to support SMMEs, it becomes imperative to study ICTs dynamics in SMMEs in rural areas.
Methodology	The Study employs both qualitative and quantitative techniques to study technology use by SMMEs in rural areas.
Contribution	The study uses Technological, organisational and environmental framework to study SMMEs and technology use.
Findings	Through quantitative data collection, the study found that most SMMEs use cellphones the primary technology. This technology was found to have prospects associated with proximity and cost. However, the qualitative study also revealed that the cost of technology (especially software), lack of government support and computer literacy discourages SMMEs from investing in better ICTs for their businesses.
Recommendations for Practitioners	SMME owners need to leverage the technologies in their cellphones such as instant messaging, email and cellphone payments to boost their business processes.
Recommendation for Researchers	A research in SMMEs needs to be purely qualitative to capture those societal complexities that hinder technology usage in rural areas.
Impact on Society	With the pamphlet used to show respondents, it was apparent that most of them were seeing government support initiatives.
Future Research	Future research must be an action research which trains SMME owners on how to use cellphones for business purposes.

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Keywords SMMEs, TOE, Rural development, ICTs, ICT4D

INTRODUCTION AND BACKGROUND

Small, Micro and Medium Enterprises (SMMEs), both formal and informal, play a crucial role in an economy. This is more so for developing countries where these enterprises are perceived to be the drivers of economic growth and job creation (Zee, 2018). They are 'a fundamental part of the economic fabric in developing countries, and they play a crucial role in furthering growth, innovation and prosperity (Chimucheka & Mandipaka, 2015). For example, it is estimated that in South Africa, SMMEs make up 91% of formalised businesses, provide employment to about 70% -80% of the labour force and total economic output accounts for roughly 36% of GDP (Topco, 2017). SMMEs are also seen to be vital actors for enhancing innovation, competitiveness, entrepreneurship and the establishment of an effective innovation system for developing countries' (Afolayan, 2014). The South Africa government sees SMMEs as one of the instrumental sectors which will aid in achieving their economic growth goals as stipulates on the National Development Plan vision 2030 (SA Government, 2011).

Whilst these benefits are known, SMMEs continue to face contextual challenges, such as restricted access to capital which enable their growth and expansion that make it very difficult for these enterprises to succeed and sustain themselves (Afolayan, 2014; Chimucheka & Mandipaka, 2015). In West African context, long-term financing for SMMEs is non-existent (Abor et al., 2014). For this reason, debt financing has become for the dominant channel through which most SMMEs access funds (Abor et al., 2014). Factors such as lack of collateral, difficulties in providing creditworthiness, small cash flows, inadequate credit history, high risk premiums, underdeveloped bank-borrower relationships and high transaction costs are some of the main challenges facing SMMEs in Sub Sahara Africa (Naicker et al., 2017).

To address some of these challenges, some governments turned to providing platforms in which SMMEs can seek business support and funding (Afolayan, 2014). For example, the South African has an entire ministry of small business development which provides funding and support for SMMEs. Moreover, institution such as National Youth Development Agency (NYDA), Land Bank, Small Enterprise Development Agency (SEDA) and Industrial Development Corporation (IDC) have been very instrumental in facilitating growth in South African SMMEs (Mahembe, 2011). Yet, SMEs still report the same challenges. It is not clear why after government's intervention SMMEs would persistently report the same challenges.

In this study, we adopt the Technological-Organisational-Environmental framework (TOE) as a sensitising lens to categorically demarcate the various challenges SMMEs face. This framework has traditionally been used to understand technology adoption activities (Awa, Ojiabo, & Emecheta, 2015). The current does not adopt it with the intent of explaining adoption, but with the goal of goal of capitalising on the framework's advantage of delineating the various factors that affect an organisation's operation when technology is involved. Most studies with regards to ICTs and SMME have mostly been concerned with adoption challenges, with little specifics about how they access government interventions to support SMMEs.

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The main research questions are:

- What are the prospects and challenges for ICTs in SMMEs in rural areas?
- Are SMMEs in rural areas aware of SMME government initiatives?
- Which ICT is mostly used by SMME owners in rural to support their businesses?

Essentially, the primary objective of the study is to examine the dynamics of ICT use for SMMEs in rural areas. It examines whether they are aware of the numerous business support interventions which are provided by the national, how they access information to support their business and the primary technologies they use in their day-to-day business operations.

RELATED WORK

SMMES IN RURAL SOUTH AFRICA

The South African government sees SMME as one of the solutions to the ever-increasing employment rate that mostly affects the youth (Zee, 2018). In addition to constraints with regards to obtaining capital, economic stagnation, South African SMMEs specifically in rural have challenges with regards to adopting and using ICTs for their businesses (Beyers & Molala, 2016; Rogerson, 2008; Zee, 2018). In a study conducted in rural Limpopo, South Africa, Beyers & Molala (2016) indicated that most SMME owners showed modest up-take for ICTs that could ensure their businesses sustainable growth. The low up-take of ICTs was attributed to modest campaigns by rural municipalities to inform SMME owners about the advantages of ICTs for competitiveness and sustainability. In addition, lack of infrastructure such as consistent network that characterless rural areas also discourages a satisfying up-take of SMMEs (Rambe et al., 2017).

Despite the assumption that all SMMEs in urban areas are using ICTs for their businesses because, most studies have shown that in developing nations, SMMMEs generally underestimate the potential of ICTs (Afolayan, 2014). A research that focused on IT adoption by Cape Town SMMEs found that, while there are few SMME owners who have adopted ICTs for marketing their trades, adoption is still not at satisfying levels compared to Kenya, Nigeria and India. However, with the advancements on social media technology young SMME owners have started using ICTs for marketing purpose. Nationally, Small Business Trend reported that women used social media for their small businesses more than their men (Small BusinessTrend, 2018). This is largely for businesses such as salon, event deco, catering etc. The use of ICTs especially social media can be useful for SMMEs to create virtual communities in which they can share information which can grow their business (Muwanga-Zake & Herselman, 2017).

USING TEO FRAMEWORK

The TOE has been used in most studies to examine how firm's size, consumer readiness, trading partners' readiness, competitive pressure, and scope of business operation to explain factors that affect IT adoption in organisations (Awa et al., 2015).Three important and inter-related aspects of technological, organizational and environmental are identified by the TOE framework; and these are perceived to be the main influencers of IT adoption and therefore suitable for 'predicting and explaining the adoption of technology as it is often strategic and affects the entire organization' [32]. The fact that it focuses on the organisation and its context and not the individual, makes it ideal to use as a basis of categorising and explaining both internal and external challenges faced by SMMEs. A summary of this categorisation of factors that affect

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SMMEs. These challenges, which are illustrated in **Table 1**, are perceived to hinder their progress and more specifically their sustainability.

Table 1. TEO Framework

Aspect of the theory	Findings	Author(s)
Technological	Appropriate technology Relative advantage Cost IT capability	Gono et al., (2016) Kongolo, (2010) (Anugwo et al., 2018)
Organisational	Poor financing	Awa et al., (2015)
	Top management support Lack of managerial skills Poor work ethics Lack of competitiveness Wrong pricing strategies implemented Location of the business Lack of accounting knowledge	Matiki et al., (2018) Gutierrez et al., (2015) de Bruin & Floridi (2017) Rambe et al., (2015)
Environmental	Inadequate social infrastructures Multiple taxation Inadequate government support Lack of or limited access to markets Long bureaucracy processes Crime and unemployment Lack of networking opportunities	Maduku et al., (2016) (Awa et al., 2015) Chimucheka & Mandipaka, (2015) Kongolo, (2010) (Awa et al., 2015) Maleka & Fatoki, (2016)

TECHNOLOGICAL FACTORS

The technological context refers to both internal technologies that are already in use and external technologies which are available in the marketplace but not currently in use and are applicable to the firm (Gangwar et al., 2015; Low et al., 2011). Adoption and access to appropriate technology was one of the main challenges identified by Kongolo (2010) in South African SMMEs. Cost and technological know-how have been identified as factors that affect SMMEs. Maduku et al., (2016) identified relative advantage, cost, top management support, employees' IT capability as important drivers of technology use intention. Evidence of a skills deficit in many SMMEs, specifically IT related skills has been noted, especially in the black-dominated logistics sector (Gono et al., 2016).

ORGANISATIONAL FACTORS

Organisational context refers to the resource availability and the characteristics of the firm such as firm size and scope, centralisation, formalisation, and complexity of managerial structure (Low

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et al., 2011). Chimucheka & Mandipaka (2015) examined SMMEs in the agricultural sector in South Africa and lack of access to finance was one of the major impediments to the establishment, survival and growth of SMMEs. Other organisational challenges identified by Kongolo (2010) include lack of management skills, finance, access to bank credit, low production capacity, recognition by big companies, lack of interest. In addition, the wrong pricing strategies implemented, and the location of the business are perceived to problems experienced by South African SMMEs (Cant & Wiid, 2013). Maleka & Fatoki (2016) document the obstacles to the growth of SMMEs in South Africa. They identify financial and management constraints as internal factors. A common theme across most authors is the lack of finance which is perceived to be a key element for them to succeed in their drive to build productive capacity, to compete, to create jobs and to contribute to poverty alleviation in developing countries (Abor et al., 2014). It is speculated that 'without finance, SMMEs cannot acquire or absorb new technologies nor can they expand to compete in global markets or even strike business linkages with larger firms (Afolayan, 2014).

ENVIRONMENTAL FACTORS

Environmental context refers to a firm's industry, the presence of technology service providers' competitors and government policy or intention. Kongolo, (2010) noted that SMMEs lacked networking opportunities, and inadequate government support. Olawale & Garwe (2010) identify three external factors of economic, market and infrastructural constraints. Olawale & Garwe (2010) also notes that SMMEs received minimal support from large organisations and institutions such as service providers or the banking institutions. For example, access to bank credit was perceived to be a cumbersome process and so was access to markets. Suppliers and customers influence on South African SMMEs that intended to adopt technology, weighed in relatively higher than competitor pressure (Anugwo et al., 2018). Cant & Wiid (2013) identified inflation and interest rates, crime and unemployment, low demand for products, and the location of the business to be the major problems experienced by South African SMMEs.

Gono et al., (2016) suggests that government's ICT support and SME policies should better address critical areas such as capacity building, skill upgrading and norm setting at the level of regional economies and industries. Naicker et al., (2017) reiterate the importance of SMEs having access to governmental financial aids, specifically for innovation purposes, and the need to build a strong social relationship in today's networked economy. [18] looked at Russia, where several government support programmes exist and funding is available for entrepreneurs. Their findings show that women did not actively use the programmes or support, because either they were not aware such programmes existed, or they perceive obtaining such support to be too complex and demanding. They conclude that while support was available for all stages of business development, for example, a grant offering during start – up, credit and funds for business development and financial assistance to support innovation; take-up remained low. It appears that lack of awareness of these programs or how to access them is not a peculiar problem to Russia alone. In Indonesia, despite the existence of various government-sponsored credit schemes, the majority of SMMEs, especially those located in rural areas, have never received any credit from banks or other financial institutions (Salemink et al., 2017).

Tax exemptions as a major form of government assistance has also been used by many governments to assist SMMEs. Beyers & Molala (2016) show that temporary tax exemptions in the form of direct government assistance during start-up had a positive influence on long-run growth for non-household SMMEs and initial credit support seems to benefit rural firms. Apart from tax exemptions, ICT specific government interventions, specifically grants have been awarded to some SMMEs to address some of their IT specific challenges. For example, Chile

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government provides SMMEs with financial aid that can be used to supplement technical and administrative assistance (Cancino et al., 2015). The Malaysian government had awarded e-commerce grants scheme to some SMMEs (Rahayu & Day, 2017). Although more than half of those that received an e-commerce grant claim that the ecommerce grant has either been important or very important to their business, many claimed that the e-commerce grant was insufficient to allow their companies to use their websites for complex activities'.

The role of government agency in providing technological and innovation related assistance could help 'SMMEs to connect, communicate and collaborate with independent inventors, marketing agencies and other parties to jumpstart innovation practices' (Mahembe, 2011). Government support can also be in the form of direct policy initiatives aimed at assisting SMMEs. For example, Doh & Kim, (2014) explored the impact of Korean governmental support policies on the innovation of SMMEs. They show that a positive relationship exists among the technological development assistance by the government and patent acquisitions and new design registrations of SMMEs. Yet, despite these interventions, most SMMEs still face the same challenges. Phillips et al., (2014) evaluation of government assistance programmes to SMMEs show (i) that government support programmes are poorly structured, fragmented and untargeted; (ii) the programmes do not meet the actual needs of the sector and, hence, are poorly used; (iii) the existence of liquidity gaps in financing the SME sector. Government support programs are insufficient and not delivering enough towards developing and strengthening local SMMEs (Phillips et al., 2014).

METHODOLOGY

Creswell (2016) suggests that mixed methods to data collection have a potential of producing rich data. Both qualitative and quantitative approaches were employed to collect data from three districts of Western Cape namely; Cape Winelands, Overberg and West Coast district respectively. More specifically, the sample of 65 respondents was obtained from six locations namely; Grabouw (4), Paarl (5), Emfuleni (11), Citrusdal (11), Hermanus (16) and Tousriver (18). A quantitative questionnaire was used to elicit information about access and awareness of government support initiatives from various local SMMEs. The quantitative questionnaires were administered to 47 SMME owners across six districts in the Western Cape. Whilst the SMME owners were randomly selected, the choice of the locations was driven by an attempt to visit a wide range of rural municipalities in the province and ease of access.

Finally, qualitative data was collected through interviews and focus groups of SMMEs to understand the factors influencing awareness of and access to government support. The qualitative part of the study was informed by the quantitative section. The qualitative sample consisted of 18 respondents (for the both interviews and focus groups). From this sample, 16 were SMME owners; one was a municipal manager (in the Enterprise Development portfolio) and one was an e-Centre Manager. The focus group discussion had eight participants, and eight individual interviews were conducted. A thematic analysis was employed to see the themes from the data which connected to the TEO framework.

FINDINGS

SMME have been identified by many studies as a solution to unemployment and other socioeconomic problems associated with developing countries (Afolayan, 2014). The main objectives of this study were to (i) examine the technological challenges experienced by SMME owners, and (ii) to identify prospects of using technologies for SMMEs in the Western Cape. Although the use of technology has been associated with prospects such as business success, it has equally presented numerous challenges. During the interviews, majority echoed the benefits of using technologies in growing their businesses. We use the TOE Framework to show

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these challenges. As a sensitizing lens, the study uses the constructs which specifically talk to the challenges of using technologies at the SMME environment.

THE PROSPECTS FOR USING TECHNOLOGY IN SMME

Affordability and open source technologies

Availability of open source technologies affords SMMEs an opportunity to use technologies for their businesses. Traditionally, SMME owners were expected to purchase licenses for the technologies they wish to use to run their businesses. From the few young SMME owners interviewed, we found that the youth are more inclined to use technology that their older counterparts. The youth can explore other technologies relevant for their businesses which they can use for free. This was more apparent with the fashion designer/tailor who used her phone and WhatsApp to communicate the design and measurements of her garments. In addition, a young graphics designer was able to creatively use Adobe InDesign for free and still achieve her business objectives through the trial options.

The word map in figure 3 is the quantitative data that confirms that majority of SMME owners use cellphones as the primary ICT to access information to support their business.

Figure 1: Most used ICTs

From the interviews, we were able to identify some characteristics which made them feel it was easier to use their cellphones rather than a PC. The respondents who preferred their cellphones highlighted that it was easy to use because its within their proximity and comfort, and also affordable compared to PCs or laptop.

> *…I access my phone at home. I must just have data to be able to read my emails and my WhatsApp messages… [Tailor, Textile Industry]*

CHALLENGES EXPERIENCED BY SMMES

Technological contexts

Technological contexts present the challenges associated with the technology itself. In this study, the availability construct pertains to the cost of using the technology while characteristic pertains to the appropriateness of the technology (Gono et al., 2016). The study found that businesses with a higher digital-dependency for operations are the ones affected by the challenge associated with cost. These are businesses which cannot operate in the absence of technology. These can

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range from payment systems to specific software for various functions of the business. Majority of the respondents highlighted the cost of owning software licenses is the biggest challenge. For example, a graphics design SMME uses free trials of Adobe InDesign to design invitation, corporate identity and websites for their clients.

"…I use adobe creative cloud, they have illustrator and Photoshop and you can make your website on it. I use their 7-day free trials and I renew it every week as the InDesign software is expensive for me …" [Entrepreneur: Graphics Designer, service sector]

One of the respondents from the catering sector highlighted that he decided to save up for Yoco, a point of sale card machine to cater for those clients who wish to pay with cards. Although he commended this technology for its efficiency as a payment system, he maintained that it was still expensive, and he could only afford it because he could see its value, and therefore saved for it. Other SMME, may not afford it. For example, the Yoco Wireless Pro costs R3000, or R198.06 per week for 16 weeks. The Yoco Wireless Lite costs R2000 and these amounts exclude the once off activation fee of R600. Most of the SMMEs interviewed run survivalist businesses and they could not afford these costs.

"…Yoco is, is also a point of sale, but it's a card machine. So, it helps me because sometimes customers would say they will EFT [Electronic Fund Trans-
fer] me, so I don't do that anymore, I let them use the card machine. The EFT situation was boring because I'd have to call the customers and ask them when they are going to pay me long after the purchase. So Yoco makes it easy because it works with apps and it works with Bluetooth. It got its own point of sale, and every month-end I get a breakdown of how I did in the month in the business. But it was expensive, and I had to save for it because it
[Yoco] made life easy…" [Entrepreneur: Caterer]

With regards to appropriate technology, the study found that most respondents are simply not aware of the appropriate technologies to assist in certain business functions. For example, there are various online platforms designed to assist business owners with online funding applications and other support initiatives such business registration. Most respondents knew only the Small Enterprise Development Agency (SEDA). SEDA has a website mandated by the government to assist SMMEs in all areas of their operations including the use of technology. For example, it has e-Services which aims to provide online access to a range of services for both entrepreneurs with business ideas and those that are in operation already (SEDA, 2018). From SEDA eService, SMMEs are supposed to enjoy the following benefits:

- Improved delivery of Seda services to citizens.
- Improved interactions with entrepreneurs and SMME's.
- Citizen empowerment through access to information.

However, respondents' sentiments about using SEDA and the National Youth Development Agency (NYDA) (also has online support) showed a sense of frustration. That is, lack of feedback from these platforms tend to discourage SMME owners from using them.

"…I feel that SEDA is very slow, but Eli goes all the way in making sure that your business is in order. He makes sure that the business is registered, you

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pay your money, and I already paid a R100 TO CIPC". [Entrepreneur: Security sector]

"… No, I don't think we will do SEDA, we waited for about seven weeks for an answer. They said they had to do the paper work, send it to Stellenbosch and Somerset West and then back here, it's a long process". [Entrepreneur: Catering sector]

During the first phase of collecting quantitative data, many respondents were completely unaware of the support initiative. The few who knew about them shared the same sentiments about the frustrating presence of red tape which affects the effectiveness of the support initiatives. On the second field trip, in realising that lack of awareness, a pamphlet with all initiatives was developed to be given to the respondents after the survey session. The respondents appreciated the pamphlet and confirmed they were not aware of the efforts of the governments to help with their business. Examples of comments:

…"I heard about FNB momentum UYF progress fund through a friend"…
…"IDC focuses on other industries"…

…"There is a lot of red tape with NYDA" …

…"I didn't even know government offers help for small business"…

One respondent indicated that it is easier to get things done in person with the assistance of the Enterprise Development Officer (EDO) from the municipality. After being frustrated by the online compliance system for a security company, the respondent turned to the EDO who became an infomediary to help them with online systems relevant for his business. In essence, because of the complexity associated with using these support platforms, it becomes difficult for SMME owners to use and trust them. They turn to the search engines which help them search directly for what they are looking for.

In addition to various socio-economic challenges, SMME owners in areas must overcome technological challenges associated with computer literacy (Gono et al., 2016). As the business world continues to be technologically driven, entrepreneurs in these areas tend to be left behind in terms of technology use. The sentiments from the interviews, focus group and surveys indicate a gap in computer literacy in the assessed areas. This means that entrepreneurs need basic training to guarantee the effectiveness of the portal.

ORGANISATIONAL CONTEXTS

This context is concerned with the organisation's resources and its characteristic with regards to the use of technology. Because of the size of these organization, they find it difficult to consistently manage and use technologies which are relevant for their sectors (Afolayan, 2014). For SMMEs in developing areas such as the Western Cape, making money takes precedence from acquiring new technology skills. The findings revealed the significance of an infomediary. Because of skills deficit of SMME owners, it became apparent that they would need someone to help them the use of technology. In addition to various socio-economic challenges, SMME owners in rural and semi-urban areas must overcome challenges associated with computer literacy. As the business world continues to be technologically driven, entrepreneurs in these areas tend to be left behind in terms of technology use. The sentiments from the interviews, focus

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group and surveys indicate a gap in computer literacy in the assessed areas. This means that entrepreneurs need basic training to guarantee the effectiveness certain technologies.
Language stood out as one of the most challenging aspect of obtaining information from the government websites and other support platforms such as SEDA. Throughout the interviews, respondents echoed their difficulty with completing online forms. This was attributed to absence of multilingualism of government portals specifically when completing forms. Therefore, whilst access for some was not a concern, the usage of online services was problematic due to language barriers. A manager at one of the municipalities, reiterated that community members are often discouraged to use government support service because of lack English language proficiency. The most common languages used by respondents in this case study were Afrikaans and IsiXhosa.

ENVIRONMENTAL CONTEXTS

Environmental context refers to a firm's industry, the presence of technology service providers' competitors and government policy or intention. The Western Cape and the national government have introduced various online platforms to support SMMEs. However, because of lack of capital for these entities, tend to neglect other areas of support and only focus on funding. Thus, the other technologies become less relevant. From 47 interviews, we found that majority of the owners would likely use a technology that gives them access to funding (grant or loan).

> *"…Sometimes I find it difficult to do my books because I don't know accounting. And when you go to town, the companies there don't have prices for small businesses. So, I operate a business and I don't know how much profit I make or loss. But the Minister for Small enterprises, the one with ginger hair…Lindiwe Zulu had said she will bring mobiles here for us to get those ac-*
> *counting services as we don't have the system to do it… [Entrepreneur: Textile industry]*

A respondent from the textile industry highlighted a commitment from the then Minister of Small Enterprises to bring mobile services with various technology support for SMMEs. These would include open source services for book keeping and human resources. However, they have not seen these mobile services since the announcement. Moreover, majority of the respondents alluded to the idea that there were long processes associated with obtaining support from the municipalities. This is parallel to (Maleka & Fatoki, 2016; Olawale & Garwe, 2010) who identified long bureaucratic processes as one of the factors affecting the use of technology. This can also be attributed to the lack of political will from the government to implement their SMME support strategies successfully. The Western Cape has numerous e-Centres or telecentres which are dedicated to facilitating access to technology for SMMEs. However, our interviews revealed that majority of community members were not aware of their existence and their function.

CONCLUSION

Our findings reveal a significant need for municipalities in rural areas to properly market the availability of SMME support initiatives as provided by the national government. One of the prevalent organisational challenges as proposed by the TOE framework is the bureaucratic of government processes ICT use. For example, while SMMEs wished to use the support from their municipalities, the absence of anyone to train them on various mobile phone capabilities indicates lack of support. The research finds that cellphones are most used ICTs for SMME, and

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they are used to access any information that supports the business. However, majority of the sample confirmed that they go the Google route instead of the government initiatives such as NYDA to look for funding. Future research in these areas must be in the form of action research which provides training on the use of mobile phones for SMMEs to grow their businesses. This is because, most rural SMMME owners use mobile phones and it will be easier for them to capitalize on technologies they already own.

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TOWARDS A FRAMEWORK FOR DISRUPTIVE INNOVATION CAPABILITY IN BASE-OF-THE-PYRAMID ENVIRONMENTS

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ABSTRACT

Aim/Purpose Literature suggests a disruptive innovation strategy holds distinct advantages for new entrants at the base-of-the-pyramid (BoP). Consequently, the aim is to develop a conceptual framework integrating the factors that facilitate disruptive innovation capability in BoP environments.

Background The paper investigates the organisation-specific and contextual factors that influence disruptive innovation capability in small new businesses operating in resource constrained BoP environments, and on the strength of these, a framework is developed.

Methodology The paper relies on an extensive integrative review of the literature on disruptive innovations, innovating in resource-constrained envi-ronments, resource-based theories and national systems of inno-vation literature to inductively develop a framework of disruptive innovation capability in BoP environments.

Contribution An integrated theoretical exploration is conducted of the factors likely to influence disruptive innovation capabilities of new technol-ogy-based companies (NTBCs) in resource-constrained BoP envi-ronments. On the strength of this, a conceptual framework that en-hances our understanding of the interaction of various internal and external factors that influence the disruptive innovation capability of NTBCs in BoP environments is developed.

Findings The major findings of the paper are:

- Disruption strategy could be a tool for improved survival of small new businesses in BoP environments.
- Current literature on disruptive innovations does not offer definitive conclusions in the areas of how contextual influences such as country-specific features, entrepreneurial environments, and organisational attributes affect disruptive innovation capability of new entrants in resource-constrained environments.
- Disruptive innovation capability of entrants at the BoP is enabled by the presence in the operating environment of essential drivers of disruptive capability and a conducive entrepreneurial ecosystem. Additionally, developing a disruptive capability requires purposeful strategising on the part of the entrepreneur.

Recommendations for Practitioners From a practitioner perspective, we found that developing a disruptive innovation capability is a purposeful endeavour. The framework proposed allows

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	entrepreneurs to assess and streamline their own resource bases to the business operating environment for disruptive capability.
Recommendation for Researchers	Our work extends the literature on the purposeful creation of disruptive innovations, in particular, under what contextual circumstances disruptive innovations are likely to emerge, and the entrepreneurial innovation processes in low-income domains. Scalability of the framework should be investigated.
Impact on Society	The proposed disruptive innovation framework could facilitate improved small business sustainability in a developing economy.
Future Research	An empirical study to enhance and validate the framework should follow, as well as investigating its scalability within new technology-based companies.
Keywords	Disruptive innovation, base/bottom of the Pyramid (BoP), emerging economies, constraint-based innovations, small business survival.

INTRODUCTION

For the majority of developing and emerging countries, increasing economic development and the welfare of citizens, as well as reducing income inequality and poverty are usually some of the most important policy goals. This is because in these economies the majority of citizens usually reside at the base-of-the-pyramid (BoP). The base-of-the-pyramid, also referred to as the bottom-of-the-pyramid in some text, is a term that was conceptualised by Prahalad & Hart (2002) in reference to the over 4 billion people who make up the global low-income consumer market. To accomplish the goals of poverty alleviation, inclusive development and social transformation, many governments have looked to mass entrepreneurship as a possible solution to lift the poor from the fringes into mainstream economic markets through the provision of quality and cost-effective goods and services, and the provision of employment opportunities (Alvarez & Barney, 2014; Prahalad & Mashelkar, 2010).

While entrepreneurship is lauded as an engine for economic growth in developing and emerging economies, scholars point out that not all entrepreneurship is created equal with regards to growth outcomes and poverty alleviation (Alvarez & Barney, 2014; Karnani, 2009). Policy emphasis is shifting towards fast-growing, innovative and technology-based entrepreneurs (Buckley & Davis, 2016), who develop, use, diffuse, or market new technologies as part of their product development, production or marketing strategies (Park, 2005). It is argued that these types of innovative entrepreneurial companies lead to better economic outcomes as opposed to subsistence entrepreneurship (Alvarez & Barney, 2014). Consequently, innovation capability and the sustainability of small and medium-sized enterprises (SMEs) are closely related concepts.
According to the Global Entrepreneurship Monitor (GEM Report, 2016), South African entrepreneurs are struggling to succeed beyond the 3 ½ year mark. The global average for new businesses succeeding beyond the 3 ½ year mark is at 7.6%. In contrast, only 2.1% of South African business start-ups succeed past this milestone. The data shows consistently low levels of entrepreneurial activity in South Africa compared to other emerging economies such as China, Brazil and India. Kumalo & van der Poll (2015) also found that small business failure rates in South Africa are as high as 63% in the first year of operation, with most failing to survive beyond the two-year milestone. These dismal figures, taken together with the fact that the majority of South Africa's population are low-income consumers, and that developing and emerging economies suffer from many and varied resource constraints, raises questions regarding the ideal strategies small entrant businesses can employ for survival in these types of operating environments.

Literature suggests that the disruptive innovation framework offers an inherent advantage to young entrant companies operating in BoP environments (Hang, Chen & Subramian, 2010; Christensen, Ojomo & van Bever, 2017). The mid-income and high-income segments in

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developing countries are small, already well served and extremely competitive. A small entrant trying to enter an established market is, therefore; better off targeting the low-income market first (Christensen et al., 2017). The resource constraints and high unemployment conditions prevailing in low-income environments favour the successful creation of disruptive innovations by alert entrepreneurs (Skarzynski & Rufat-Latre, 2011).

Disruption has been suggested as the reason for Japan's exceptional economic growth after World War II (Markides, 2013; Hart & Christensen, 2002). More recently, scholars have noted how Chinese and Indian companies by crafting strategies that target the vast low-income populations within their markets have eventually disrupted Western companies within their borders and on the global stage (Prahalad, 2010; Yu and Hang, 2011; Rao, 2013). South Africa, with its large population of low-income consumers and a relatively advanced entrepreneurial ecosystem, has the right catalytic ingredients to produce disruptive innovations. It is thus not clear why South Africa seemingly lags behind its emerging economy counterparts in producing commercially viable disruptive innovations. We found it worth exploring the company-specific and contextual factors that influence disruptive innovation capability in BoP environments, particularly from the South African perspective.

In the next section, we present a brief review of the literature on disruptive innovations and innovating in resource-constrained BoP environments, as well as the theoretical foundation of the study. This is followed by a conceptual framework with propositions gleaned from our extensive review of the literature. The paper concludes with a discussion of our findings and opportunities for application.

LITERATURE REVIEW

Disruptive innovation has been defined as a strategy whereby a smaller company with fewer resources is able to successfully challenge established incumbent business and eventually overthrow the status quo of an industry (Christensen, 1997). This occurs specifically, as existing businesses in an industry focus on improving their products or services to cater to their most demanding and profitable customers with sustaining innovations (Christensen, Raynor & McDonald, 2015). The main reason why disruptive innovations typically succeed is that they almost always start out as being financially unattractive to incumbents in a market (Ansari, Garud & Kumaraswamy, 2016). Incumbents in a market lack the financial motivation to compete with entrants in these financially unattractive low-end or fringe markets. This affords smaller entrants the advantages of low competitive visibility (Carayannoupoulos, 2009; Markman & Waldron, 2014) and time, time to grow and perfect their business processes before larger and better-resourced incumbents become interested in the same markets they are operating in (Christensen et al., 2015).

According to the seminal work by Christensen (1997), 37% of disruptive entrants into the disk drive industry between 1956-1990 succeeded, compared with only 6% of entrants who entered the industry with sustaining innovations that had a similar value proposition to those offered by incumbents. A disruptive strategy has consequently been seen as a tool for improved entrant business survival and competitive advantage (Wan, Williamson & Yin, 2015). Disruptive entrants typically target markets that are different from those being served by incumbents and offer a different product/service proposition to those of incumbents (they target fringe markets or wholly new markets). The disruptive innovation framework has as a result been hailed as a powerful tool for crafting competitive strategy, improving new business survival rates, creating high growth businesses and expanding new markets (Christensen, McDonald, Altman & Palmer, 2018; Ahlstrom, 2010; Raynor, 2011).

In BoP environments, in addition to competitive pressure from existing businesses, small entrants have to contend with a myriad of resource constraints in the form of poor access to funding, lagging technology, knowledge gaps and institutional voids (Simanis and Duke, 2014; Govindarajan and Trimble, 2012; Prashantham and Yip, 2017). Also, small entrants have low survival rates in general (Löfsten, 2016). It is, therefore, useful to investigate strategies that confer competitive and survival advantages to smaller entrants operating in BoP environments.

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Low-income or BoP consumers make up the majority of the populace in emerging and developing countries. BoP is a term conceptualised by Prahalad & Hart (2002) in reference to the more than four billion people who constitute the global low-income consumer market. Li (2013) defines the BoP as the individuals who survive on less than US$ 3000 in local purchasing power parity. Using this definition, at least 75% of South African consumers can be categorised as residing at the BoP (Danish International Business Development Institute, 2010), while 80% of China's population and 98% of India's population can be classified as BoP consumers (Li, 2013).

Owing to the unique resource constraints inherent in emerging and developing countries, such as masses of low-income consumers, skills and materials shortages, large income disparities, high unemployment levels and institutional and regulatory voids (Rao, 2013; Simanis and Duke, 2014; Adegbile and Sarpong, 2018), scholars suggest that these unique environments require specific innovation frameworks suited to these environments (Prahalad, 2012).

The term frugal innovation has become an umbrella term for innovative processes in resource-constrained environments. Different kinds of resource-constrained innovations have been suggested in the literature to cater to the BoP mass market. These include frugal engineering (Soni & Krishnan, 2014); cost innovations (Zeschky, Winterhalter & Gassman, 2014); bricolage and jugaad innovations (Agnihotri, 2015); Gandhian and indigenous innovations (Brem & Wolfram, 2014; von Zedtwitz, Corsi & Frega, 2015); and disruptive innovations (Hart & Christensen, 2002; Christensen et al., 2017; Li, 2013). Our study focuses on disruptive innovations as a practical strategy for new entrepreneurs to employ for successfully innovating in BoP environments. Frugal engineering involves technological re-engineering that may require costly investments in research and development. This calls for increased financial resources that startups in emerging economy environments do not usually have access to. Cost innovations often gain market share through price competitiveness but are often dependent on lower factor costs, such as cheap labour, that can be eroded over time. Furthermore, competing on price alone is a source of advantage that can be easily imitated by competitors. Bricolage and Gandhian innovations bring to mind a chaotic effectuation type process of doing business which is typical of subsistence entrepreneurs. As Karnani (2009) and Agnihotri (2015) point out, these types of micro-entrepreneurs may help their own families out of poverty but they usually never become fully competitive and do not grow the economy or create meaningful employment.

Existing literature on disruptive innovations in emerging economies contends that the large populations of low-income consumers and large income gaps in these environments make disruption an ideal strategy to follow at the BoP (Markides, 2013; Li, 2013). There are several documented successful examples of disruptive innovations at the BoP, among them the Luyuan electronic bikes, GE Logiq Book ultrasound machine, Tata Nano car, Suzlon wind turbines (Yu and Hang, 2011), Media-Tek (Zhou, Li & Tong. 2013), M-Pesa and Tolaram Noodles (Christensen et al., 2017), and M-Kopa solar products (Adegbile and Sarpong (2018).

What is missing in the literature reviewed are the specific contextual features in the various emerging economy BoP environments that enable disruptive innovation capability as different emerging economies are exhibiting varying levels of success with commercialising successful disruptive innovations in their BoP environments. Literature on disruptive innovations at the BoP, and innovating in resource-constrained environments in general, has tended to focus on analyses of India and China (Li, 2013; Prahalad, 2012; Markides, 2013; Hang, Chen & Yu, 2011; Hang, Garnsey & Ruan, 2015; Yu and Hang, 2011; Prahalad and Mashelkar, 2010). Consequently, there is a lack of understanding as to why small entrants in South Africa seemingly lag behind their emerging economy counterparts in developing and commercialising successful disruptive concepts.

Furthermore, existing literature on disruptive innovations does not adequately deal with the opportunities and threats that small entrant entrepreneurs confront in developing disruptive innovations. Most existing research conducted on disruption theory to date has been focused on its impact on incumbent businesses; how incumbents can cope with attacks from disruptive entrants (Christensen, 1997; Christensen et al., 2015; Habtay, 2012) or how they can successfully introduce their own disruptions (Christensen & Raynor, 2003; Habtay & Holmén, 2014; Raynor, 2011; Evans, Ralston & Broderick, 2009; Thurston & Singh, 2010). Scholars such as Yu & Hang (2010) and Habtay (2012) point out that disruptive innovation literature is missing the resource-constrained entrant business' perspective.

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When the literature on disruptive innovations and innovating in resource-constrained BoP environments are taken together it highlights the following research problem: there is a lack of understanding with regards to the organisation-specific and contextual factors that influence disruptive innovation capability of small businesses operating in South Africa's BoP environment.

DEFINING DISRUPTIVE CAPABILITY

Disruptive innovation has been defined as a strategy whereby a smaller company with fewer resources is able to successfully challenge established incumbent business and eventually overthrow the status quo of an industry (Christensen, 1997). This occurs specifically, as existing businesses in an industry focus on improving their products or services to cater to their most demanding and profitable customers with sustaining innovations (Christensen, Raynor & McDonald, 2015). The main reason why disruptive innovations typically succeed is that they almost always start out as being financially unattractive to incumbents in a market (Ansari, Garud & Kumaraswamy, 2016). Incumbents in a market lack the financial motivation to compete with entrants in these financially unattractive low-end or fringe markets. This affords smaller entrants the advantages of low competitive visibility (Carayannoupoulos, 2009; Markman & Waldron, 2014) and time, time to grow and perfect their business processes before larger and better-resourced incumbents become interested in the same markets they are operating in (Christensen et al., 2015).

According to the seminal work by Christensen (1997), 37% of disruptive entrants into the disk drive industry between 1956-1990 succeeded, compared with only 6% of entrants who entered the industry with sustaining innovations that had a similar value proposition to those offered by incumbents. A disruptive strategy has consequently been seen as a tool for improved entrant business survival and competitive advantage (Wan, Williamson & Yin, 2015). Disruptive entrants typically target markets that are different from those being served by incumbents and offer a different product/service proposition to those of incumbents (they target fringe markets or wholly new markets). The disruptive innovation framework has as a result been hailed as a powerful tool for crafting competitive strategy, improving new business survival rates, creating high growth businesses and expanding new markets (Christensen, McDonald, Altman & Palmer, 2018; Ahlstrom, 2010; Raynor, 2011).

In BoP environments, in addition to competitive pressure from existing businesses, small entrants have to contend with a myriad of resource constraints in the form of poor access to funding, lagging technology, knowledge gaps and institutional voids (Simanis and Duke, 2014; Govindarajan and Trimble, 2012; Prashantham and Yip, 2017). Also, small entrants have low survival rates in general (Löfsten, 2016). It is, therefore, useful to investigate strategies that confer competitive and survival advantages to smaller entrants operating in BoP environments. Low-income or BoP consumers make up the majority of the populace in emerging and developing countries. BoP is a term conceptualised by Prahalad & Hart (2002) in reference to the more than four billion people who constitute the global low-income consumer market. Li (2013) defines the BoP as the individuals who survive on less than US$ 3000 in local purchasing power parity. Using this definition, at least 75% of South African consumers can be categorised as residing at the BoP (Danish International Business Development Institute, 2010), while 80% of China's population and 98% of India's population can be classified as BoP consumers (Li, 2013).

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When the literature on disruptive innovations and innovating in resource-constrained BoP environments are taken together it highlights the following research problem: there is a lack of understanding with regards to the organisation-specific and contextual factors that influence disruptive innovation capability of small businesses operating in South Africa's BoP environment.

CONCEPTUAL FRAMEWORK

We posit that disruptive innovation capability, like any innovation capability, is affected by factors

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both external and internal to the organisation attempting a disruption strategy. Fol-lowing is a conceptual framework with proposed contextual and organisation-specific influencers of disruptive innovation capability in South Africa's BoP environment.

CONTEXTUAL FACTORS

Disruptive innovations are influenced by specific drivers in the external environment that influence the pace and fate of how a potentially disruptive innovation penetrates the mar-ket and how it evolves in the market. Hang, Chen & Yu (2011) have identified lifestyle changes, changing demographics, legislation (both governmental and regulatory), tech-nological shifts and availability of a large enough foothold market for an entrant to intro-duce their product, as the specific drivers that influence disruptive capability. Nogami & Veloso (2017) also include aspects of consumer behaviour such as low incomes and poor of access to information that leads to poor adoption and diffusion rates that is spe-cific to the BoP populace. Any changes in the business or consumer environment will create new dominant drivers (Paap & Katz, 2004).

Existing literature notes that disruptive innovations require enabling technologies for successful implementation. The enabling technology allows for the combination of a dis-ruptive idea or strategy with a technology that can propel the innovation forward (Yu & Hang, 2011; Shaughnessy, 2016). The speed with which the disruptive innovation diffus-es and is adopted in the foothold, and eventually into the mainstream markets, has been found to be dependent on how quickly the enabling technology improves over time (Christensen et al., 2015). For example, the speed with which mobile banking is adopted in BoP markets will greatly depend on internet access in remote areas as well as smartphone penetration rates. Most documented cases of disruptive innovations have been as a result of enabling technologies as they allow small businesses to scale up quickly without a corresponding increase in costs (Christensen & Raynor, 2003; Markides, 2008). This leads to the following propositions:

> *P1a: Technological, social and demographic changes; as well as consumer behaviour in BoP environments influence the ability of NTBCs to develop a disruptive innovation capability*
>
> *P1b: The availability and progression of enabling technologies facilitate disruptive innovation capability of NTBCs in BoP environments.*

Our review of the literature revealed that the entrepreneurial ecosystem in which SMEs conduct business has an impact on how they create and exploit entrepreneurial opportu-nities (Lamotte & Colovic, 2015; Acs et al., 2017). The entrepreneurial ecosystem has been defined by Autio & Levie (2017) as a dynamic and institutionally embedded collec-tion of various public and private actors that interact to create and sustain the success of new entrepreneurial businesses. For example, SMEs with greater access to funding and financial resources through venture capitalists, financial institutions and other forms of investment and financing have been found to perform better in the long term (Omri, Frikha & Bouraoui, 2015). Governmental agencies, policymakers, and public administra-tors play a crucial role in fostering a sustaining environment for small business develop-ment through various macro- and micro-economic interventions (Buckley & Davis, 2016). In addition, policies around business creation and contract enforcement can either inhibit or encourage innovativeness of small businesses or their ability to survive the business environment (Lamotte & Colovic, 2015; Prashantham & Yip, 2017). This leads to the following proposition:

P_2: A robust entrepreneurial ecosystem in terms of enabling policies, funding, supporting institutions and knowledge transfers facilitates disruptive innovation capability of NTBCs in BoP environments.

ORGNISATION SPECIFIC FACTORS

We propose that an organisation's strategic orientation affects its disruptive innovation capability.

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As per the resource-based perspective, an organisation's unique internal resources and how they are employed to provide customer value influence its strategic posture or orientation (Zhou et al., 2005).

When exploring new markets, entrants are faced with a strategic choice between either, taking a disruptive path or taking a sustaining path to market (Christensen et al., 2015; Hang, Garnsey & Ruan, 2015). The notion that entrepreneurs have the power of choice between competing options echoes Lumpkin and Dess' (1996) concept of entrepreneuri-al orientation which theorises that entry into new markets can be successfully undertaken by active and effortful enactment on the part of the entrepreneur, given the various choices and options available to them. Christensen et al. (2018) point out that an innovation is not innately disruptive. It is up to the entrepreneur to situate the innovation in a strategically disruptive way. A review of the literature suggests that the types of stra-tegic orientations that support a potentially disruptive entrant include its entrepreneurial orientation and an emerging market orientation.

An entrepreneurial mindset is essential when operating at the BoP as the unique envi-ronmental conditions call for new ways of doing things (Wanasika, 2013). It is important to assess the impact of different entrepreneurial orientation markers such as innovative-ness and proactiveness, on the probability that a small entrant will develop a disruptive innovation capability.

In the business environment, innovation includes any new approach to conducting busi-ness along its entire value chain (Grant, 2008), including new technologies, products, processes, and business models (Taneja, Golden-Pryor & Hayek, 2016). Current schol-arship on disruptive innovations deemphasises the role of technological innovativeness in enabling disruptive capability and emphasises the importance of business model innovativeness as a more decisive factor (Habtay & Holmėn, 2014; Christensen, Bartman & van Bever, 2016). This leads to the following proposition:

> *P_{3a}: Innovativeness, especially along the business model dimensions, is likely to facilitate disruptive innovation capability of NTBCs in BoP environments.*

Proactive entrepreneurs, who take initiatives as shown by anticipating and pursuing new opportunities as well as participating in emerging markets, have been shown to perform better in the nascent stages of an industry's development as well as in dynamic environments characterised by rapid change and uncertainty (Lumpkin & Dess, 1996). Skarzynski & Rufat-Latre (2011) used various case studies of successful disruptive innovators to posit that a critical capability for would-be disruptors is the ability to proactively anticipate and act on market discontinuities and unmet customer needs. The ability to sense and shape threats and opportunities, and seize opportunities presenting in the market is a dynamic capability that leads to competitive advantage (Teece, 2018). This leads to the following proposition:

> *P_{3b}: Market and innovation proactiveness have a positive effect on the disruptive capability of NTBCs in BoP environments.*

Literature also indicates that successful disruptors always enter the market by develop-ing solutions for the low-end and fringe markets first while reserving entry into estab-lished markets for later (Hang et al., 2015; Christensen et al., 2015). Focusing on the mainstream and high-end markets in predominantly BoP environments has been found to severely restrict the potential market size and growth opportunities of local entrepre-neurs in developing and emerging economies (Prahalad & Mashelkar, 2010). An emerg-ing market orientation, which is a search for new and fringe sectors of the customer en-vironment (Govindarajan, Kopalle & Daneels, 2011), is essential for success with a dis-ruptive strategy. Therefore:

> *P_4: An emerging market orientation is positively related to the likelihood of developing a disruptive innovation capability by small businesses in BoP environments.*

The human capital controlled by an organisation deserves specific mention. The charac-

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teristics of the founder, founding team, and other employees tend to facilitate the devel-opment of a strategic orientation which eventually enables or inhibits disruptive capability. Sargut & Gunther-McGrath (2011) posit that a disruptive innovation capability is influ-enced by the mindset, cumulative experience and collective capital of the entrepreneurial team in terms of past affiliations, relationships, and financial capital as these affect or-ganisational strategy.

Scholars agree that founder/founder team level of formal education, prior experience, and training play a critical facilitating role in innovation success and business perfor-mance of new enterprises (Spender, Corvello, Grimaldi & Rippa, 2017; Omri et al., 2015). The intellectual base for a startup's initial strategies in the formative stages of the business can be attributed to the mindset of the founder/founder team. Prior knowledge and experience shape these formative strategies (Saemundsson & Candi, 2014). This suggests the following proposition:

> *P_5: The human capital controlled by the new enterprise's founding team in terms of col-lective knowledge, networks, relationships, and experience influences the relationship between strategic orientation and disruptive innovation capability of NTBCs in BoP environments.*

In his seminal work, Christensen (1997) found that of the new entrants who entered the disk drive industry in the period under investigation (1956-1990), only 6% of entrants who entered with sustaining innovations flourished compared to 37% of entrants who launched disruptive innovations. Other studies by Carayannoupoulos (2009), Raynor (2011) and Thurston and Singh (2010) also echo these findings concluding that the dis-ruptive innovation framework enhances the survival of smaller entrants into an existing market. This is because the perceived lack of legitimacy of small businesses that initially target fringe markets offers them the advantage of low competitive visibility (Markman and Waldron, 2014) allowing them to survive market entry better. This leads to the follow-ing proposition:

> *P_6: Developing a disruptive innovation capability is positively related to improved NTBC survival prospects in BoP environments.*

Current literature on disruptive innovations does not offer definitive conclusions in the area of how contextual influences such as specific country features, entrepreneurial en-vironments, and organisational attributes affect disruptive innovation capability of NTBCs in resource-constrained environments. We propose that clusters of internal and external factors influence the disruptive innovation capability of NTBCs in BoP environments.

Figure 1 represents our proposed new framework which provides for an analysis of how organisation-specific and contextual influences affect disruptive innovation capability in BoP environments.

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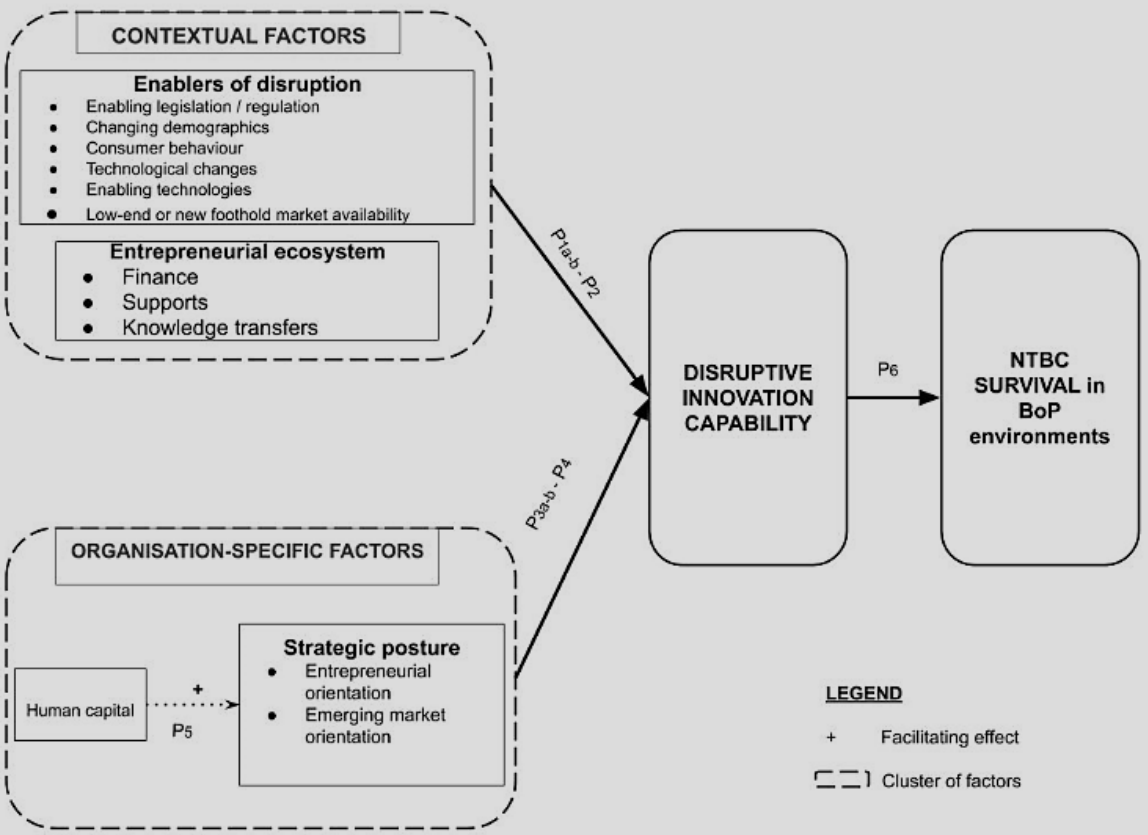

Figure 1: Conceptual framework of determinants of disruptive innovation capability in BoP environments

CONCLUSIONS AND FUTURE WORK

Several resource-constrained innovations are suggested in literature under the term fru-gal innovations. This paper investigated disruptive innovation capability of small entrant technology-based businesses in the resource-constrained environments of the BoP. An extensive literature review elicited a number of important findings. Among these are that a disruptive strategy may be seen as a strategic tool for improved small business sur-vival; and developing a disruptive innovation capability requires an enabling external en-vironment in the form of a conducive entrepreneurial ecosystem, enabling technologies and opportune consumer behaviours. Developing a disruptive capability also requires purposeful action on the part of the entrepreneur with regards to their strategic posture.

An analysis of the literature led us to develop a number of propositions, and on the strength of these, a preliminary conceptual framework of determinants of disruptive inno-vation capability in BoP environments has been developed. It is hoped that our frame-work will assist new entrants in BoP environments to strategically position themselves to develop a disruptive capability for enhanced business survival. Our paper contributes to the existing body of literature by offering an integrated theoretical exploration of the fac-tors that are likely to influence the disruptive innovation capability of NTBCs in resource-constrained BoP environments. The framework may further enable policymakers or oth-er actors such as venture capitalists and incubators to assess the types of small entrant businesses that are likely to succeed given the contextual environments they operate in.

Limitations: the framework we have proposed might not be applicable to all small busi-nesses operating in BoP environments. It is more consistent with small businesses that operate in

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industries with a technology focus or that can benefit from an enabling tech-nology. Also, the nascent framework is still very general in its focus and will need to be tested on new technology-based companies for it to better address the SME context.

Future work in this area may be pursued along a number of avenues: A comprehensive survey among stakeholders may reveal additional propositions to enhance the frame-work. The scalability of the resultant framework among BoP entrants should thereafter be investigated at a larger scale. All these could be followed by the development of a ma-turity model for the disruptive innovation framework proposed.

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MEASURING DIGITAL INFORMATION LITERACY SKILLS OF FIRST YEAR STUDENTS AT THE UNIVERSITY OF LIVINGSTONIA, MALAWI

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ABSTRACT

Aim/Purpose The purpose of the study was to investigate the Digital Information Literacy (DIL) skills of first year students at the University of Livingstonia (UNILIA) in Malawi.

Background Low effective DIL programs is one of the challenges to university students' effective utilization of print and digital information resources and services in higher education institutions in developing countries.

Methodology The study adopted a survey design. Survey questionnaires were used to collect data from 123 first year undergraduate students.

Contribution Using SCONUL's Seven Pillars of Information Literacy model, this study has provided the assessment challenges and opportunities for promoting digital literacy skills programs in higher education institutions in a developing country. The study also provided the status of DIL skills of first year students at UNILIA.

Findings

- The sampled students showed high levels of awareness of types of information sources. However, they had challenges in identifying diverse information resources and their usage.
- They showed deficient knowledge in various basic Information and Communication Technology (ICT) skills such as the computer software packages and the internet.
- Besides, participants demonstrated lack of skills in information search and web retrieval techniques.
- The sampled students did not know the various methods of evaluating information sources.
- Participants cited four challenges: Inadequacy of ICTs' infrastructure, classroom congestion, lack of enough time for practical sessions and lack of interest since delivery of the DIL course was voluntary.

Recommendations for Practitioners The study recommends improving ICT infrastructure, designing formal DIL curriculum; advocating for DIL programs, developing DIL policies and promoting effective collaboration between academics and librarians in delivering DIL programs.

Recommendation for Researchers There is a need to develop DIL assessment methodologies that are applicable to local contexts.

Impact on Society As articulated in both Malawi's ICT Policy (2013) and Malawi Growth and Development Strategy III (2017), adoption of ICTs in tertiary institutions is a major priority. Therefore, this study provides evidence on students' DIL skills challenges that hamper effective utilisation of information resources and ICT services

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available in a university environment. The study has also unearthed potential solutions to address the challenges.

Future Research Further research is required to assess the capacity of academic libraries in development of digital information literacy programs in Malawi. There is a need to carry out similar investigation in other universities targeting students of different study levels.

Keywords Digital skills, Digital Information Literacy Skills (DIL), SCONUL's Seven Pillars of Information Literacy; University of Livingstonia, undergraduate Students.

INTRODUCTION

Digital Information Literacy (DIL) skills, defined as set of abilities to recognise when information is needed and to have the ability to locate, evaluate, and use the needed information effectively (American Library Association, 2000), are essential skills for the 21st century. This is due to the rapid advancement in Information and Communication Technologies (ICTs) (Oware, 2010; Baro & Keboh, 2012). Students are faced with diverse and abundant information choices in their academic studies. This is because information is available in unfiltered formats, raising question about its authenticity, validity, and reliability (Baro, 2011). Therefore, the effective use of information by students has become a necessity. Information has become a factor that enables students at all levels to achieve better results in their academic undertaking and even at work after graduation (Mertes, 2014).

The current information overload requires students to validate and assess information to verify its reliability (Mertes, 2014). Besides, information is available through various multimedia formats, including graphical, video and textual; these pose new challenges for students in evaluating and understanding it (Baro, 2011; Okiki& Mabawonku, 2013). Yet, literature indicates that information by itself does not make students information literate (Mertes, 2014).

Despite the availability of studies in DIL, there seems to be a gap in literature related to assessment of students' DIL skills in universities. DIL assessments among the first year students have been overlooked by many scholars (Malanga, 2018; Omar, Haji & Mwitunge, 2014). King (2007) opines that in imparting DIL instruction to the students whether formally or informally, there is need to conduct an assessment. Such assessments help to determine students' mastery of skills and knowledge associated with such DIL programs. It also serves as a tool for determining the efficiency of DIL programmes (King, 2007; Dadzie,2007; Foo et al., 2013). In addition, studies have shown that lack of DIL skills among first year students is partly the cause of underutilisation of existing ICTs and information resources available in the university libraries [Baro, 2011; Mutula, 2004; Baro &Fyneman, 2009). This is posing big challenges to universities in trying to achieve quality and excellent output in their graduates as they enter the job market (Aholony & Broneisten, 2013).

From the few extant studies on DIL skills in Malawi (Malanga & Jorosi, 2018; Chipeta, 2009; Stima-Ndau, 2010), it is clear that DIL programs in higher education institutions are still at their infant stage. DIL programs are hampered by inadequate facilities, absence of DIL policies and lack of qualified librarians to teach DIL.

STUDY CONTEXT: UNIVERSITY OF LIVINGSTONIA

The University of Livingstonia (UNILIA) was established on 27August, 2003 in Malawi as a Christian private university under the Church of Central African Presbyterian (CCAP) Synod of Livingstonia (UNILIA. 2018). The mission statement of the university is "*To educate and inspire learners, guided by Christian values, to become principled leaders who will transform society*

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*through excellence in teaching, research, consultancy, and learning environment for the glory of God" (*UNILIA, 2017).The university has four faculties offering various certificates, diplomas and degree programmes in Education Sciences, Education Humanities, Social Sciences and Applied Sciences. The university has a student population of 3500 (UNILIA, 2018).

As with other universities, the primary function of the University of Livingstonia Library is to provide support for the university's approved programmes of teaching, learning and research, with the view to serve the needs of the students, staff and researchers accredited or affiliated to the University of Livingstonia.

PROBLEM STATEMENT

In today's academic environment students are faced with the daunting task of identifying, locating, searching and synthesizing various sources of information in order to meet their information needs. This is due to the over-abundance of information which is generated at a fast rate by internet and ICTs (Baro & Keboh, 2012; Wema, 2006; Al-Issa, 2013). Underscoring this challenge, the University Library introduced a DIL course for first year students.

Despite the availability of such a DIL program, DIL skills among the students were not assessed. Consequently, little was known about whether the students possessed adequate DIL skills to identify, search, locate and evaluate the quality of information sources. Such assessment of DIL skills is critical since it helps to determine whether the students have mastered the skills or not, and to identify gaps for further improvement. Besides, it also serves as a tool for determining the efficacy of DIL programs (Oakleaf & Karke, 2009). It was against this background that this study sought to investigate the first year students' DIL skills to inform strategies and policies for implementing DIL program.at the university.

The specific objectives of the study were to: establish knowledge of students on types of digital information sources; determine whether students possessed basic ICT skills to effectively locate and access digital information sources; examine the ability of students to search digital information sources; examine the criteria the students use to evaluate information; to identify the challenges students face in the acquisition of DIL course.

LITERATURE REVIEW

AWARENESS, FORMAT AND TYPE OF INFORMATION SOURCES

The information sources for first year students are available in libraries in different types. These include primary, secondary and tertiary sources. Examples of primary sources include journal articles, monographs, patents, theses, poems, and others (Kimani, 2014). Secondary sources are sources of information that have been modified, selected and rearranged to cater for a specific audience or purpose. Examples include histories, review articles, bibliographies, text books and others. Indexing and abstracting tools are considered as examples of tertiary sources (Kimani, 2014). Therefore, the use and access of different types of information among students depend on the knowledge of sources.

Kimani (2014) notes that information sources are no longer confined to print. Students are no longer relying on traditional sources of information. Consequently, most academic libraries the world over are now acquiring digital information sources in different formats such as DVD, CD-ROM, e-dictionaries, e-books, online databases and electronic journals. A study by Wilkes and Gurney (2009) at University of New England reported that the majority of students (95%) indicated electronic resources as their sources of information. A similar study reported that at Kuwait University, 99% of the students indicated that they used electronic resources for personal

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shopping, downloading movies and e-books, checking encyclopedias, and quick reference (Algudsi & Ali-Dousar, 2014). Singh and Singh (2014) on "Assessing Indian Agricultural Sciences Graduates' Knowledge and Information Literacy skills" revealed that a large proportion of students (81%) ranked Google and Yahoo as their main sources of information.

The results above contradict those of Kimani (2014) in Kenya who reported that 40.1% of the students were aware of different types such as primary, secondary and tertiary sources while 45% were not aware of these types of information sources. Thirty percent (30.7%) of the students also indicated that they preferred both electronic and print sources.

USE OF BASIC ICT SKILLS

The 21st century society demands that first year students possess ICT skills for exploiting available electronic resources for various reasons (Sasikala & Dhanraju, 2010). The majority of libraries are incorporating electronic resources to complement print resources in their collection. It is necessary for students to have basic ICT skills in computer packages, internet and other emerging technologies in order to navigate these resources (Sasikala&Dhanraju, 2010; Kimani, 2014). A study on digital literacy among students in the social sciences in Nigeria found that 75% of students had some skills in using computer packages such as Microsoft Word and Power Point (Baro & Fyeman, 2009. A similar study conducted at Andhra University in India revealed that 34% of the students were familiar with the use of computer programmes such as Microsoft Word (Sasikala & Dhanraju, 2010). Further, 59.5% of the students were familiar with the internet, followed by 31.9% who were familiar with the use of electronic mails. The study also revealed that the students were using these ICTs for communication, for searching information for their academic work and entertainment.

Kimanii (2014) also conducted a similar study on DIL skills of freshmen at the Catholic University of Eastern Africa in Kenya in which a survey questionnaire was used to collect data from 150 students. The results revealed that the majority of the students possessed some ICT skills in which 90 % were able to use Microsoft Word, 88% were competent in using Internet, whereas 50% reported to have been competent in Microsoft Excel. A small proportion of the students reported to have been competent in Statistical Packages for Social Sciences (SPSS), a statistical software program.

The study further revealed that the majority of students acknowledged that ICT skills were important to them for various reasons. A large proportion of students (71.5%), reported that ICT skills helped them in searching for information, for communication such as e-mails (40.9%), networking with friends through Facebook (40.9%) and for playing games (11.7%).

INFORMATION SEARCHING STRATEGIES AND RETRIEVAL TOOLS

Information gathering remains a challenging task for many students today (Malanga & Jorosi, 2018). The course assignments that lecturers give to students to work on require several key skills and techniques to perform information search queries to competently meet the demands of such assignments. Some of the strategies that can be used in searching for information include Boolean operators, keyword searching and phrase searches, truncation and many others (Porter, 2011 cited in Kimanii, 2014). Literature indicates that students are given many course assignments that require them to search for information on their own in an environment that is academically unfriendly due to limited resources (Tella, 2009). Information searching strategies and retrieval tools are necessary skills for any information search to be executed successfully by the students.

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Kimanii (2014) found that 82% of the students expressed ignorance of different strategies that could be used to search both print and online information. In addition, the study found that 82.2% did not know an information search strategy.

It was further, noted that 32.2 % of students used Google as a retrieval tool to locate online information, while 53.3% indicated using a keyword as a technique for searching information and 25.5% of the students used author or title as access points to search the library catalogue. The author concluded that students lacked knowledge in understanding the various information searching strategies and techniques. A similar study at the University of Barrat discovered that only 50% of students were able to use a keyword and 25% of students had the knowledge to use a phrase search (Hartman, 2013).

EVALUATION OF INFORMATION SOURCES

The rapid developments in ICT have made information available in different formats. This exposure to information means that it can be published easily and manipulated with little effort (Eshet-Alkalai, 2004). Therefore, the ability to evaluate information properly before use has become a survival skill for first year students and other information consumers (Kimanii, 2014). Pillar 5 of the SCONUL Model (2011) emphasises that an information literate person should have the ability to review the research process and compare and evaluate information and data sources by looking at the relevance, credibility, reputation, scope, quality, bias, authority and accuracy of the information. Yet, studies reveal that first-year students are incapable of determining the quality of information. As a result, they find it difficult to assess the quality and authenticity of information sources (Zhao &Rabbat, 2013). A recent study reported that the majority of students at the University of Lagos in Nigeria evaluated information sources based on, authority (65%), relevance (50%), accuracy (48%) and currency (48%) (Okiki, 2013). A study by Salisbury and Karasmanis (2011) also reported that 73% of the students evaluated information based on qualification and 27% of them evaluated information based on accessibility.

CHALLENGES STUDENTS FACE IN ACQUISITION OF DIGITAL INFORMATION LITERACY COURSE

University students experience a low level of DIL skills due to a number of challenges. Studies by Baro and Zuokemefa (2011) as well as Amunga (2011) reported that these challenges include lack of interest by students, lecturers, librarians and management; inadequate human resources to handle DIL training; lack of facilities; and absence of DIL policies. A similar study at Mzuzu University in Malawi found that inadequate time, inadequate venues and equipment for teaching and students' practical lack of cooperation between librarians and faculty members in teaching DIL were some of the challenges militating against effective delivery of information literacy instruction to first year students (Chipeta, 2009).

THEORETICAL FRAMEWORK

This study adopted the SCONUL's Seven Pillars of Information Literacy as its theoretical framework. Developed in 1999, the model was recently revised and updated in 2011 by the SCONUL Working Group (SCONUL, 2011). The model was chosen for this study because it is closer to what the students' experience in their daily digital information search processes and it is closer to reality (Chipeta, 2009). Besides, the model has redefined DIL by positioning the individual as an active participant in information interactions in line with the emerging technologies (SCONUL, 2011). The repositioning enhances the holistic view of DIL by placing the individual in the role of user, manager, evaluator, creator and disseminator of information (SCONUL, 2011). The key concepts of the model are described as follows:

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- **Pillar 1: Identify-**Ability to recognise a need for information. This is the stage where a user is considered to be blank in terms of one's information needs. Mostert (2004, cited in Chipeta, 2009) describes the term “information need” as a fact of or feeling of the lack of information. It can also be seen as that which a human being should have to function effectively.
- **Pillar 2: Scope -** Ability to distinguish ways in which the information gap may be addressed. This pillar recognises a student or a user as being knowledgeable about both print and non-print information resources, selecting the information resources which would go towards accomplishing a user's research task and an ability to understand issues affecting accessibility of sources (SCONUL, 2011).
- **Pillar 3: Plan -** Ability to construct strategies for locating both print and digital information sources. The model implies that the student articulates information needs to match against information sources, developing a systematic method appropriate for the information need and understanding of the principles of construction and generation of databases (Chipeta, 2009).
- **Pillar 4: Gather -** Ability to locate and access information needed. The model implies that the student should be able to develop appropriate searching techniques. Examples may include the use of the Boolean Operators, communication and information technologies, appropriate indexing and abstracting services, citations indexes and databases (SCONUL, 2011). The student may also construct a search strategy using appropriate commands for the information access tool selected such as the use of Boolean operators “AND”, “OR” and “NOT”, truncation, and proximity operators for databases, search engines and the use of online public access catalogue (OPAC), indexes and abstracts (SCONUL, 2011).
- **Pillar 5: Evaluate -** Ability to compare and evaluate information obtained from various sources. The model entails that the student or researcher should be aware of bias and authority issues, the peer review process of scholarly publishing and appropriate extraction of information matching the information need (SCONUL, 2011). When a student has gathered information sources, he has to examine and compare these sources to evaluate the reliability, validity, accuracy, relevance, reputation, authority, timeliness and point of view or bias (Chipeta, 2009).
- **Pillar 6: Manage** - Ability to organise, apply and communicate information to others in ways appropriate to the situation. In this pillar, the student or researcher cites bibliographic references in their academic works, constructs a personal bibliographic system, applies information to the problem at hand, communicates information effectively using the appropriate medium and understands issues pertaining to copyright and plagiarism (SCONUL, 2011). To avoid plagiarism, the student should acknowledge the use of information sources by selecting an appropriate citation style in project reports and theses.
- **Pillar 7: Present -** Ability to synthesise and build upon the existing information that contributes to the creation of new knowledge. In this pillar, the students bring information together and relate it to what they already know. Then, they choose a communication medium and format that best supports the purposes of the product and the intended audience (Eisenberg & Berkowitz, 1990 cited in Chipeta, 2009).

The Seven Pillars of Information Literacy model depicts the DIL skills that first year students at the University of Livingstonia ought to possess to utilise the available information and become lifelong learners.

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METHODOLOGY

The study adopted a cross-sectional survey design. The reasons for employing a survey design were that it is popular and allows the collection of a large amount of data from sizeable population in a highly economical way (Gulati, 2009).

STUDY POPULATION AND SAMPLING STRATEGY

This study targeted first year undergraduate students registered in the 2017/2018 cohort at the University of Livingstonia. The enrolment was 267 students (UNILIA Registry, 2018). The questionnaire consisted of closed-ended questions. The questionnaire was pre-tested on 10 students. The pre-testing questionnaires were administered by the researchers themselves. This enabled the researchers to correct all ambiguities that were found in the research instruments. It ensured that data collection tools were reliable and valid, before they were finally administered to the sampled population of the students. Altogether, 160 questionnaires were randomly distributed to respondents and 123 were returned successfully with a response rate of 76.9 %.

RESEARCH ETHICS, PRIVACY AND CONFIDENTIALITY

We obtained permission to conduct the study from the University of Livingstonia Research Ethics Committee. All participants were informed in advance before the exercise of administering the questionnaire started. The participants were also not allowed to indicate their names on the questionnaire to ensure maximum privacy and confidentiality. Most importantly, participation was voluntary such that each participant was free to take part or withdraw. The study did not include procedures or questions that were likely to cause harm or damage the reputation of the participants.

DATA COLLECTION PROCEDURE AND ANALYSIS

The researchers personally collected the data from the field. The collection of data from the survey questionnaire started on 4-18 January 2018. Questionnaires were administered to the sampled student population just before or after class. Completed questionnaires were collected immediately afterwards. This was helpful to ensure high retention rate. Statistical Package for Social Sciences (SPSS) Version 16 was used to analyse quantitative data collected through the survey questionnaire. Descriptive statistics such as tables, graphs, pie charts were used to analyze, present and interpret data. The package was preferred over others because it has been widely used for a period of over thirty years and hence it was deemed to be reliable (Ary, *et al.,* 2014).

RESEARCH FINDINGS

DEMOGRAPHIC PROFILE OF RESPONDENTS

Preliminary questions in the survey sought to gather respondents' demographics. Fifty-Four (43.8%) of the respondents' age ranged between 21 and 25, followed by 29 (24.1%) of those who were between 16-20, and 21 (16.5%) of respondents whose ages ranged above 31. Only a small proportion of 19 (15.3%) had ages ranging 26 and 30.

Sixty-Five (52.9%) of respondents were males and 58 (47.4%) of the respondents were females. In terms of programmes of study, respondents were pursuing the following first year degree programmes: Bachelor of Science in Public Health 30 (24.2 %), Bachelor of Education 25 (20.3 %), Bachelor of Social Science in Development Studies 17 (13.8%), Bachelor of Science in Environmental Management 15 (11.6%) and Bachelor of Science in Computer Engineering 12 (10.4%). Programmes with fewer respondents were pursuing Bachelor of Science in Food

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Security and Nutrition 11 (9.0%) and Bachelor of Social Science in Human Rights 8 (7.1%). However, Bachelor of Education (ICT) had the least number of respondents (5 or 3.9%).

This implied that the largest number of students who participated in the survey questionnaires were from Public Health while Education (ICT) had the least participants. The age range of 21-25 years had a large number of participants, while the age range of 31 years and above had the least number of participants. Similarly, the majority of the participants were males.

TYPES OF INFORMATION SOURCES AND THEIR FORMATS

Awareness of types of information sources

Though awareness is one of the important issues in DIL Skills, literature indicates that awareness alone does not translate to actual usage of information. The respondents were asked to indicate whether they were aware of different types of information sources. A total of 123 students responded to this question. Of the respondents, 106 (85.7%) were aware of different types of information sources and 17 (14.4%) indicated that they were not aware of types of information sources. For those student respondents who indicated **YES**, a follow-up question was asked to fit examples of information materials into primary, secondary and tertiary sources. To this question, 116 students responded to this question. The results are presented in **Table 1**.

Table 1: Awareness of Information Sources and their Examples

Types of Information Sources and their Examples	Responses	
	Frequency (N)	Percentage (%)
A textbook is a secondary source	52	45.3
A dictionary is a tertiary source	14	12.4
A peer-reviewed journal article is a secondary source	30	25.7
A manuscript is a primary source	20	17.1
Total	**116**	**100**

As evident in **Table 1**, 52 (45.3%) of the respondents correctly indicated that a textbook is a secondary source, followed by 30 (25.7%) respondents who indicated that a peer-reviewed journal articles is a secondary source, and 20 (17.1%) of the respondents said a manuscript is a primary source. However, only a small proportion of the respondents (14 or12.4%) indicated correctly that a dictionary is a tertiary source. This was an indication that the majority of the respondents interacted frequently with textbooks.

Preferred formats to access information

In order to further ascertain awareness and use of various information sources by students, respondents were asked a follow-up question to find out the formats they preferred to access and use information. As shown in **Figure 1**, the results show that majority of respondents (60 or 48.8%) preferred to access information sources in both print and electronic formats, 36 (29.3%) of respondents preferred to access in electronic format and 26 (21.2%) indicated print format.

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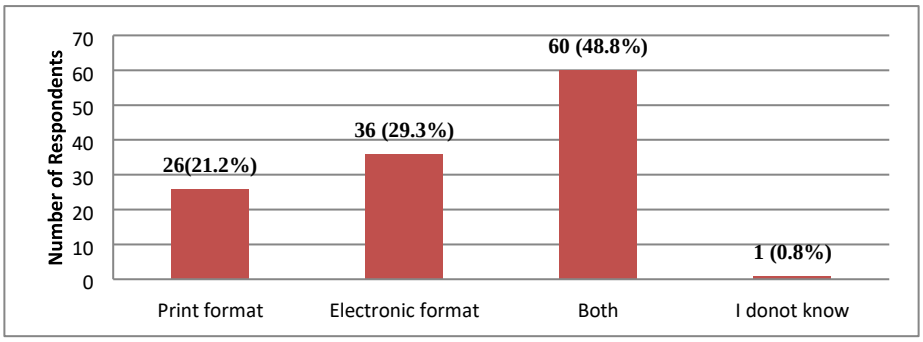

Figure 1: Preferred Format of Information Sources

This implied that respondents accessed both print and electronic information sources. The reason could be due to a high level of awareness.

Use of electronic information sources

The respondents were asked to indicate the electronic information sources they used frequently in the library and elsewhere. The results are summarised in **Table 2**. The results found respondents did not use electronic resources. This could be because the high use of electronic resources requires stability of electricity which may not always be available. Another challenge could be that respondents lacked search skills.

Table 2: Types of Electronic Information Sources Used by Respondents Frequently

Electronic Infoamtion Sources	Multiple Responses	
	Frequency	Percentage (%)
Electronic journals	58	39.8
Electronic books	61	42.4
Online databases	28	13.1
Socail media	41	31.6
CD-ROMs	8	4.2
Others	2	0.5

REASON FOR ACCESSING VARIETY OF INFORMATION SOURCES

The participants were also asked to state the main reasons for accessing and using variety of information sources in the library. The results are presented in **Figure 2**.

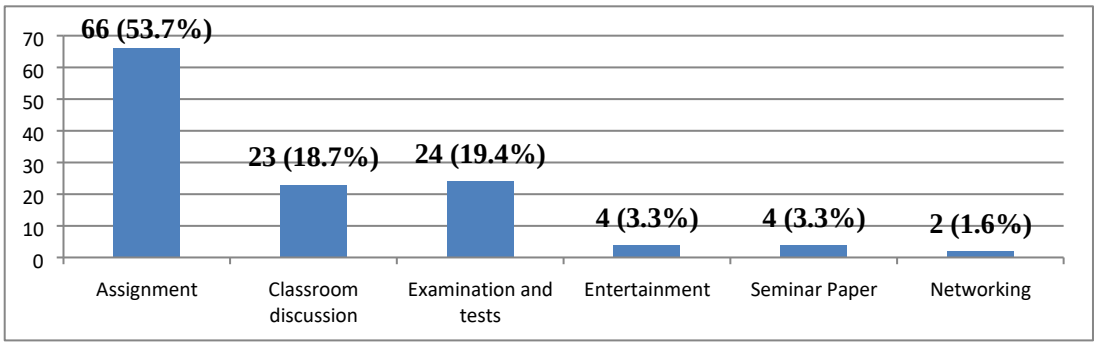

Figure 2: Main Reason for Consulting a Variety of Information Sources

Figure 2 revealed that 66 (53.7%) of the respondents indicated that they accessed a variety of information for course assignment, 24 (19.4%) for preparing for examinations and tests, while

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23 (18.7%) accessed information for preparing for classroom discussion. Only 4 (3.3%) of respondents accessed information for writing a seminar and entertainment, whereas 2 (1.6%) stated they accessed information for networking.

Based on the foregoing, the sampled students showed a high level of awareness of types of information sources. However, the findings have demonstrated low usage of information sources among the students, which is an indication that they possess moderate DIL skills to be in a position to fully utilise the different types of information sources. This confirms the study by Ilogho and Nkiko (2014), who reported that the majority of the students in five Nigerian universities showed a high deficiency in identifying diverse information sources including their usage. The authors concluded that DIL programmes might have failed to provide the students with hands-on experience. Over and above the knowledge of types of information sources, the first year students are also required to possess ICT skills for effective utilisation of both print and online information resources.

USE OF BASIC ICT SKILLS

Competence in use of basic ICTs

Respondents were asked to indicate the type of ICT tools they were comfortable to use competently. The participants were given seven options from which they were allowed to choose more than one answer. 119 participants responded to this question. **Table 3** shows that 107 (45.6%) of the respondents indicated that they used the internet comptently, 89 (36.5%) used Microsft Word competently and 73 (29.8%) used electronic mails competently.

Table 3: Competence in Use of ICT Tools by Respondents

Competence in Usage of ICT tools	Multiple Responses	
	Frequency (N)	Percent (%)
I use the internet competently	107	45.6
I use SPSS competently	23	5.3
I use e-mails competently	73	29.8
I use PowerPoint presentation competently	62	25.0
I use Microsoft Word competently	89	36.5
I use social media competently	62	25.0
I use Microsoft Excel competently	43	12.8
Others	5	2.9

This meant that large number of participants were not competent enough in using the variety of ICT tools they had mentioned. This could be attributed to inadequate computers and other equipment in the laboratories or the DIL programme did not cover such ICT tools. Another reason could be that respondents did not have enough time for practical sessions.

Reasons for possessing basic ICT skills

The respondents were asked why they thought that having basic ICT skills in the areas they stated was important to them. The results are summarised in **Table 4**.

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Table 4: Reason for Possessing ICT Skills

Major reasons for possessing Basic ICT Skills	Frequency (N)	Percentage (%)
Helps in presenting and communicating information	35	29.4
Helps in searching information for assignments	51	41.9
Helps in searching information for research	24	19.5
Helps in networking with friends	6	5.3
Helps in storing information	7	5.4
Total	**123**	**100**

The study showed that a substantial number of respondents used ICT skills for searching information for course assignments and communications, while the least number of respondents used ICT skills for networking with friends and storing information.

ICT SKILLS RATING

The researchers asked respondents to self-rate their overall ICT skills on a 5-point Likert scale ranging from excellent, very good, good, average, to need support. The study revealed that 53(43.1%) of the respondents indicated that their ICT competence level was an average, 36 (29.3%) needed support, and 15 (12.2%) their ICT competence level was very good. Only 14 (11.4%) of the respondents indicated that their ICT competence level was good, while 5 (4.1%) indicated that their ICT competence level was excellent. This meant that though respondents appreciated the importance of ICT skills, only a few were excellent in using them. The reason could that the DIL program might have lacked adequate time for practical sessions in the ICT laboratories. The amount of time allocated for teaching and practical sessions affect the degree of ICT delivered to students (Chipeta, 2009).

INFORMATION SEARCHING STRATEGIES

An understanding of different information searching techniques and retrieval tools is a critical skill required for students to effectively utilise various information resources available to them, both in print and digital formats (Tella, 2009. The third objective of this study was also to identify different information searching strategies that the students use to locate and retrieve information.

Information search strategy

The respondents were asked if they knew the term “an information search strategy”. Of the respondents, 67 (54.5%) did know an information search strategy and 56 (45.5%) indicated that they know an information strategy. This showed that half of the respondents did know an information strategy. The respondents who knew an “Information Search Strategy” were further asked to describe the meaning of an “information search strategy.” Four options were given to them to choose one which was correct. Fifty-Six students responded to this question. However, among the four options given, only one was correct. The results are summarised in **Table 5**.

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Table 5: Description of an Information Strategy by Respondents

	Responses	
Description of an information search strategy	**Frequency (N)**	**Percentage (%)**
A list of information resources in a specific topic.	16	28.5
A manual explaining proper format for a research topic.	9	16.1
A plan of action that gives direction to your search for information.	12	21.4
I do not know.	19	33.9
Total	**56**	100

As it can be seen in **Table 5**, only 12 (21.4 %) of the respondents got the correct answer to the question in which an information search strategy was described as a "plan of action that gives direction to your search for information," This meant a large number of respondents did not know the description of an information search strategy.

Strategies for searching electronic information

The respondents were also asked to indicate the search strategies or techniques they used in searching for electronic information. **Table 6** shows that the majority 75 (55.4%) of the respondents used keyword searching, 61 (48.3%) used phase searching and 19 (22.7%) used proximate searching. Only a small proportion of respondents (6 or 5.9 %) used advanced searching techniques.

Table 6: Strategies Respondents Used for Searching Electronic Information

	Multiple Responses	
Search Strategies/techniques	**Frequency (N)**	**Percentage (%)**
Keyword searching	75	55.4
Phrase searching	61	48.3
Proximate searching	19	22.7
Boolean Operators (AND, OR and NOT)	13	12.0
Truncation	4	3.4
Advanced Searching	6	5.9
None of the above	5	4.2

Web Retrieval Tools (Search Engines)

Access to the Internet or World Wide Web (WWW) requires students to understand various tools in order to retrieve reliable online information sources. The respondents were asked to indicate the web retrieval tools they used to access reliable and quality online information from the internet. The results are summarised in **Figure 4**. The majority of respondents 71 (53.2%) used Google to retrieve online information from the internet, 57 (41.4%) used Wikipedia..

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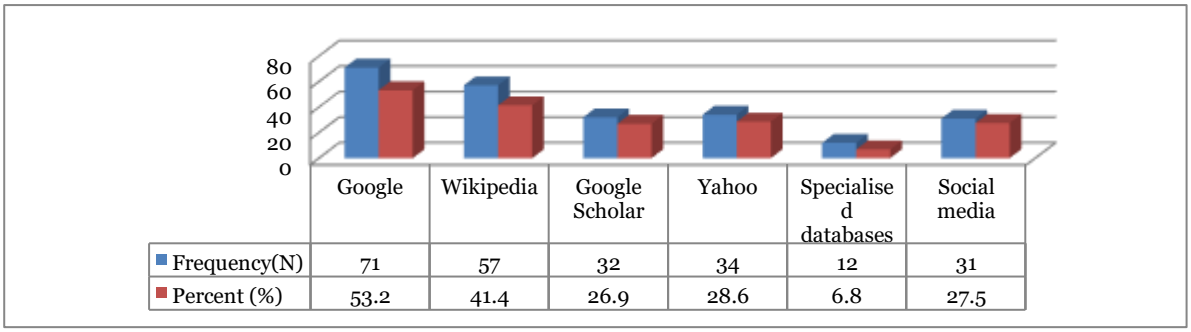

	Google	Wikipedia	Google Scholar	Yahoo	Specialised databases	Social media
Frequency(N)	71	57	32	34	12	31
Percent (%)	53.2	41.4	26.9	28.6	6.8	27.5

Figure 1: Web Retrieval Tools (Search Engines) Used by Respondents

All in all, the study found that the sampled students demonstrated deficiency in search strategies/techniques and web retrieval tools. The students did not know how to use the Boolean Operators and Truncation which are also important techniques for broadening and narrowing an information search query. The students also lacked knowledge of important web retrieval tools such as Google Scholar and Online databases which are rich in scholarly information resources compared to Google and Wikipedia. This point concurs with Singh and Singh (2014) who noted that less than 14% of the students did not use online databases and Google Scholar which are more enhanced for retrieving scholarly information resources. The authors further concluded that students might have lacked training in these areas. Apart from knowledge of search strategies, students are also required to possess adequate skills for evaluating various information sources.

EVALUATION OF INFORMATION SOURCES

Since information is now available in a variety of formats such as multimedia, electronic, sound, audio, text, and others, its reliability and authoritativeness remain a challenge to many first-year students. Therefore, another objective of this study was to examine the criteria the students used to evaluate information sources.

Criteria for evaluating information sources

The respondents were asked the main criteria/characteristics they used to evaluate various information sources whether available in print or electronic formats. The results are summarised in **Table7**.

Table 7: Criteria Used by Respondents to Evaluate Information

Criteria for evaluating electronic information	Multiple Responses	
	Frequency (N)	Percentage (%)
Reputation of the publisher	31	27.5
Qualification of the author(s)	98	53
Format of the information source	15	10.1
Scope/Coverage of the information source	54	41.0
Currency of an information Source	45	32.6
Accuracy of an information source	32	29.2

Table 7 shows that 98 (54.3%) of the respondents indicated that qualifications of the author was their main criterion for evaluating information sources, 54 (41.0%) indicated that the scope/coverage of the information source was their main criterion, 45 (32.6%) indicated the

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currency of information sources was their main criterion, while 32 (29.2%) claimed that accuracy of information sources. This implied that the sampled students used qualification as the main criterion for evaluating online information sources

Purpose of evaluating electronic information Sources

The students were asked to state the main reasons for evaluating information before using it. Respondents were asked to choose one option. The findings are presented in **Table 8**.

Table 8: Participants' Responses Evaluating Information Sources

Importance of evaluating information	**Frequency (N)**	**Percentage (%)**
Establish credibility of information	66	53.9
Establish authenticity of information	27	21.5
Establish objectivity of information	22	18.3
Establish authoritativeness of information	6	4.7
Others	2	2.0
Total	**123**	**100**

Table 8 shows that 66 (53.9%) of the respondents stated that establishing credibility of information was their main reason for evaluating information sources, 27 (21.5%) that authenticity of information was their main reason, while 22 (18.3%) claimed the main reason was objectivity of information. Only a small proportion of respondents (6 or 4.7%) said authoritativeness was the main reason for evaluating information sources and 2 (2.0%) indicated other reasons such as to establish timeliness and originality of information. Almost half of the respondents appreciated that evaluating online information with credibility was important. The findings showed that the students did not possess adequate DIL skills for evaluating information. The reasons could be that the students did not have adequate training on evaluating information sources (Kimani, 2014; Ekenna &Iyabo, 2013).

CHALLENGES STUDENTS FACE IN ACQUISITION OF DIL INSTRUCTION

The final objective of the study sought to uncover the challenges faced by the students in acquisition of the DIL program. From the options that were provided, respondents were asked to choose only one option. The results are presented in **Table 9**.

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Table 9: Participants' responses on the challenges they face in acquisition of IL instruction

Challenges	Frequency (N)	Percentage (%)
Time is not enough	30	23.7
The course is boring	17	14.4
ICT facilities are inadequate	51	41.9
There is classroom congestion	9	7.1
The course is taught theoretically	16	12.6
Total	**123**	**100**

According to **Table 9**, a substantial proportion of respondents (51 or 41.9%) stated that inadequate ICT facilities was their major challenge, 30 (23.7%) stated that the time factor was the major problem, 17 (14.4%) said the course was boring, meaning that the students had no interest in it, while 16 (12.6%) indicated that the course was being taught theoretically. Only 9 (7.1%) stated that congestion in classrooms was the major problem.

The findings are in agreement with Chipeta (2009) who found that inadequate time, inadequate venues and equipment for teaching, and lack of cooperation between librarians and faculty members were major barriers to effective delivery of DIL programs at Mzuzu University in Malawi. The studies by Baro and Zuokemefa (2011) and Amunga (2011) also reported that university students fail to acquire necessary skills in information literacy due to lack of interest by students, lecturers, librarians and management; inadequate human resources to handle information literacy training; lack of facilities; and absence of digital information literacy policies.

CONCLUSION AND RECOMMENDATIONS

This study has demonstrated the importance of DIL skills to undergraduate students in a private university. Previous studies have focused much on assessing DIL skills of students in public or state universities with little attention paid to private universities. Using SCONUL's Seven Pillars of Information Literacy as a theoretical lens, the study found that the sampled first year students did not possess adequate DIL skills in identifying diverse sources of information which led to low usage. The sampled students were also deficient in various ICT skills as well as search techniques and web retrieval tools. The study further established that participants did not possess adequate skills for evaluating information. In addition, the study established that students faced number of problems that impacted negatively on the effectiveness of DIL course acquisition. These included among others, poor ICT infrastructure, classroom congestion, inadequate time for practical sessions and slow internet connections. The study recommends the following for policy direction:

- The university administration should procure more computers and projectors to facilitate effective delivery of DIL instructions. The university should also improve the network connectivity by increasing its bandwidth. The availability of such facilities will ensure a conducive environment for teaching and learning and enable the students to have more time to conduct practical sessions and eventually improves their DIL skills.
- The study also found that the DIL course is taught as a free course in which the majority of the participants stressed the need to convert it into a credit-earning course. The absence of an effective formal DIL curriculum has an overarching implication to the achievement of adequate DIL skills among students. Based on such evidence, there is

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need to design a formal DIL curriculum that should be integrated into the university overall curriculum. This will ensure that the course becomes a mandatory, compulsory and credit-earning to all the students.

- The results from the study established that the majority of the sampled students were not aware of various web retrieval tools, search techniques, referencing styles, ICT software tools such as SPSS, reference management software tools, let alone the knowledge to use them. Therefore, librarians as custodians of knowledge should conduct advocacy and awareness campaigns on emerging technologies and incorporate them into DIL programs.

The study had some limitations. This study was conducted as a baseline survey to assess the DIL skills for first year students. It was a survey design and descriptive in nature. The sample size for the study was also small and limited to first year students. Based on such limitations, future studies should use longitudinal approach with a bigger sample size covering university students of different levels (years) of study. A further study is also recommended to investigate the impact of DIL skills of first year students on academic performance. There is also need to assess the capacity of University Libraries towards digital information literacy development in Malawi and beyond.

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AN INTELLIGENT PC LOCATION TRACKING SYSTEM FOR IMPROVED DECISION MAKING

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ABSTRACT

Aim/Purpose	This study proposes the use of IP location tracking on online businesses, allowing them to not only locate customers, but also to reduce cyberattacks and take improved business decisions.
Background	Currently, competition amongst businesses continues to grow rapidly, as such it is important for organizations to know their customer base. Intelligent Internet Protocol (IP) location tracking systems are gaining ground and are already playing an important role in assisting organizations locate their customers in order to take improved business decisions.
Methodology	Prototype is the chosen methodology that is going to be followed when developing the proposed system. Prototype methodology consists of several variants of software prototype. These software prototype variants are classified into two main types namely: throw-away and evolutionary. The selected software prototype is evolutionary, and it is based on the "do-it-twice" principle.
Contribution	Some of the current location tracking systems either show less information or information that is not useful. The IP location tracking system presents content and develops concepts at a level comprehensible, for business organizations to use.
Findings	If anything is to happen to the systems it is important to be able to trace who and what happened but to e-commerce systems it is important to know customer base in order to take better decisions with regards to the business, these decisions are not limited but include marketing decisions an strategies. This study proposed a system that locates customers as they access an organizations e-commerce site, giving their specific location coordinates. This helps the organizations take better marketing decisions with regards to their customers.
Recommendations for Practitioners	This study proposes the use of IP location tracking on online businesses, allowing them to not only locate customers, but also to reduce cyberattacks and take improved business decisions.

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Impact on Society The system has the following benefits:

- The system will help reduce cyber-attacks because of its au-thentication process; it will help quickly find the location of at- tackers.
- The system will help in taking better decisions by organizations with regards to their customers such decisions include better marketing strategies.
- The system enables the organizations to be able to know their customer exact locations, this will help organization on whether to expand their businesses in certain areas or not.

Future Research Future work based on this research work includes:

- Improving the suggested system.
- Extending the system beyond the prototype stage by adding more functionality and making it accessible to businesses.
- Improving the application to run on any smart device using any operating systems.

Keywords Location Tracking, E-commerce, IP-Address

INTRODUCTION

Location-Based Services (LBS) is a branch of m-Commerce that has revolutionized the way people communicate with others or gather timely information based on a given geographic location [1]. Location tracking ensures a thorough detailed picture of who we are, where we go and even who we spend our time with [2]. Just like children playing hide and seek, it seems like there are many places where we can hide and not be found. However, with the world becoming smaller through technology, hiding is increasingly difficult. We are constantly surrounded by cameras and our locations, cars, cellphones, and even the products that we purchase can be tracked. Location tracking however is not just a stand-alone technology, but a mixture of several technologies that can be combined to create systems that deliver location based services.

Knowing the exact location of where customers are based helps businesses to take better decisions. Current technologies that are being used to create location-tracking and location-based services include Geographic Information Systems (GIS), Global Positioning Systems (GPS), Radio Frequency Identification (RFI) and Wireless Local Area Net- work (WLAN) [3]. Location tracking or location-based service systems make use of a combination of these technologies. The system requires that a node or tag be placed on the object, animal or person being tracked. The concept of location-based services possesses the following advantages within organizations: The use of location-based services has been found to be improve decision-making processes; LBS also improves security and helps in expanding the ability of an organization to have proper methods of enhancing security in their online businesses. According to [4], LBS are critical to many businesses as well as government organizations to drive real insight from data tied to a specific location where activities take place.

OBJECTIVES

This paper therefore presents a system that fills that need to know the geographical location of online customers within a business. This paper considers proposing and designing a generic framework for helping organizations to know the geographical locations of their clients and taking

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better managerial decisions using a location tracking system. The main aim of this study was to develop a web-based system prototype that might be used to locate customers.

METHODOLOGY

The development of a system requires protocols to be followed. There are a number of software development methodologies (SDM) that can be followed during the development of a system. Some of the SDM are Waterfall, Prototype, Incremental, Spiral and Rapid Application Development (RAD) methodology [5].

Prototype is the chosen methodology that is going to be followed when developing the proposed system. Prototype methodology consists of several variants of software prototype. These software prototype variants are classified into two main types namely: throw-away and evolutionary. The selected software prototype is evolutionary, and it is based on the "do-it-twice" principle. The reasons behind selecting evolutionary instead of throw-away are:

- It is a series of repetitive iterations;
- It has the ability to address risk early in the project;
- Early feedback on system being accepted;
- Visible progress throughout the project.

Figure 1 depicts a prototype methodology that will be followed when developing the proposed system.

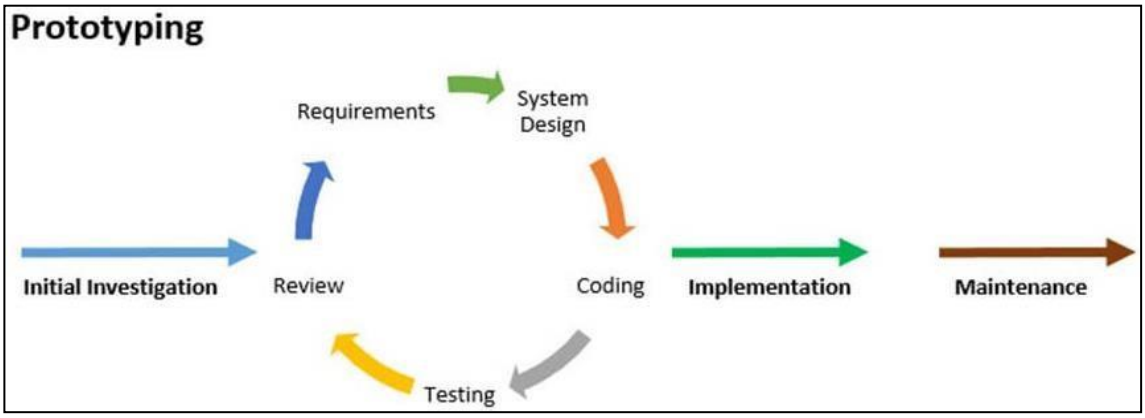

Figure 1: Prototype Methodology Model

REQUIREMENTS SPECIFICATIONS

System requirements specifications detail the descriptions of the constraints, behaviour, and services of the system. Requirements specifications of a system may be functional or non-functional requirements. In short, functional requirements define what the system does and non-functional requirements define how it should be done. In this case, the non-functional requirements define how the system should perform particular task Functional requirements

Functional requirements describe an interaction between the system and its environment through the use of functions which are implemented on that system (Sommerville, 2004). Functional requirements of the proposed system are:

- **Registration** – it must enable the register button if the customer does not already own an account on the system;

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- **Login** – allow authorized customers and administrators to login;
- **Purchasing goods** - Customers should be able to purchase goods only if they are registered;
- **Changing password** – allow customers or administrators to change passwords if it has been compromised;
- **Logout** – logout if the account is not being used;
- **Sending notifications** – Customer details must be sent to the systems administrator in order to be able to view customer log details.

Non-Functional Requirements

Non-functional requirements describe all the constraints and behaviour which are not required by the users. These requirements are required by the system to perform a particular task. Non-functional requirements of the proposed system are:

- **Reliability** – The system will provide consistent and accurate performance based on its intended functions;
- **Authentication** – Only authorized customers and system administrators are allowed to interact with the system. Authorization is done based on the user roles assigned to them;
- **Flexibility** – The system will be developed in a manner it will be easy to enhance and change as the requirements changes or increase;
- **Usability** – Proposed system will be development in such that the interfaces are easy to use when users interact with the system;
- **Efficiency** – The efficiency lies on the response time and data storage. The system data will be stored in a database.

RELATED CONCEPTS

There are a number of location tracking systems that currently exist. This section identifies their components, effectiveness and some of their challenges. This in-depth analysis gives background information to understand the currently existing systems to enable a better solution to be proposed.

WHATISMYIPADDRESS

WhatIsMyIPAddress comprises seven (7) components: the IP, map, Internet Service Provider (ISP), services, city, region and country. It is accurate and also shows a map to give the user the exact location of where they are. It does not address security in any way. It also gives a user a bit of information on what IP location is. It allows a user to search a certain IP address, which decreases security. Hackers therefore can search a certain IP and find it (See **Figure 2** below).

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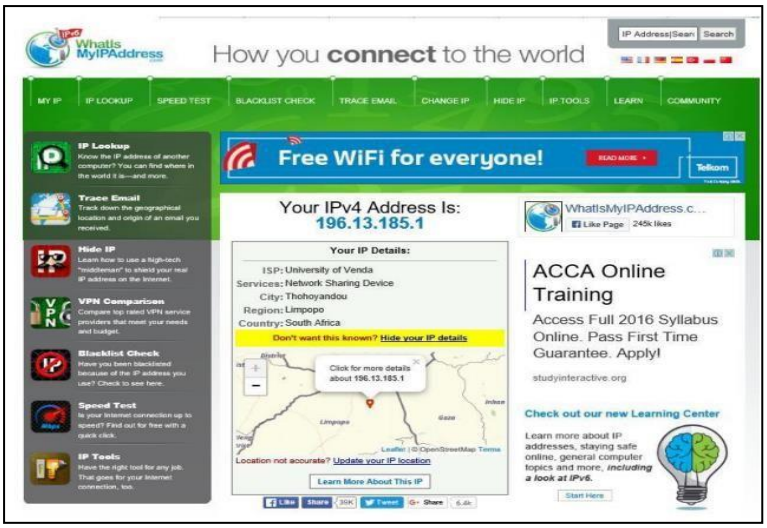

Figure 2: WhatIsMyIPAddress [6]

WHOIS

WHOIS does not automatically locate the IP, but instead, requires users to enter the IP and then it give the details of the IP owner. It has a document that details its use and also gives users an idea of what IP location is. It does provide any detail on security, so a person might be able to find a user's IP and hack them. It allows users to register themselves, but users do not want things that consume their time but rather straight forward things that will make things easier for them (See **Figure 3** below).

Figure 3: WHOIS [7]

TRACEMYIP.ORG

TraceMyIP is considered to be one of the most advanced tracking systems as it constitutes most of the characteristics that IP locators should constitute. It details the IP, country, state, city, Internet Service Provider (ISP), time zone, browser, Operating System (OS), IP user agent and the screen resolution. Developed by TraceMyIP.Org, it is a spam free service and it automatically generates the IP Address. It is advantageous in that the user is able to create an account by means of user's password. It is secure and addresses security issues. It is efficient in that it also shows a map of the exact location of the IP address (See **Figure 4** below).

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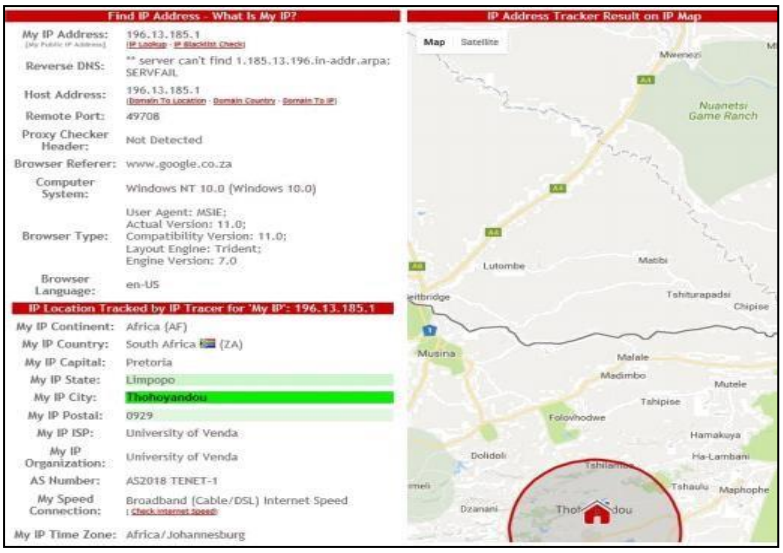

Figure 4: TraceMyIP.Org [8]

AN INTELLIGENT PC LOCATION TRACKING SYSTEM

The proposed system was presented to a local business, a business analyst and a web designer (both from University of Venda) in Thohoyandou for reviews. The feedback was acknowledged and is being considered to be included on the future work. The reviews can be categorized into two categories, namely: 'technical' and 'additional features'. Technical relates to the design and usability of the system. Additional features relates to the enhancing of the proposed system. The proposed system is different from the above mentioned because of its functionalities. It is embedded onto the e-commerce site compared to the above sites wherein an admin has to copy each and every IP in order to track whom it belongs to.

TECHNICAL: SYSTEM ARCHITECTURE

The system architecture (see **Figure 5**) is a representation of the conceptual model defining the structure and the behaviour of the system. The following tools/technologies were used to develop the systems:

- The system was developed using two development languages: JavaScript and PHP. JavaScript was used to develop xxx. PHP was used to develop the controller.
- XAMMP was used as the DBMS (database storage) to store data. XAMPP uses a Structured Query Language (SQL), querying data through the use of MYSQL.

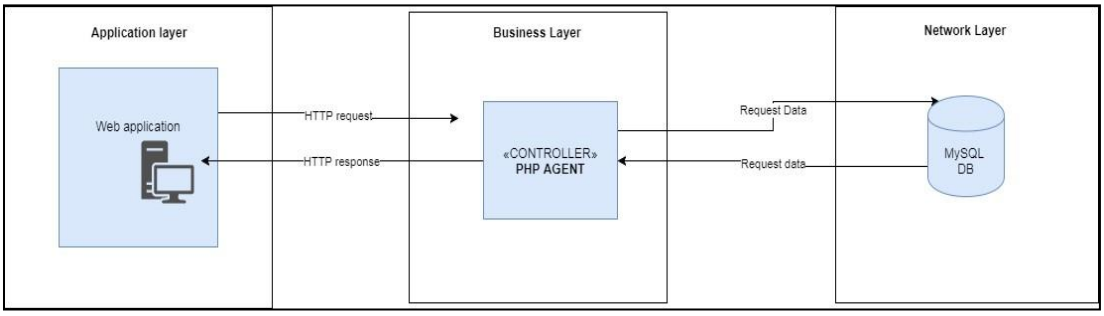

Figure 5: System Architecture

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PROPOSED SYSTEM - USER-INTERFACE DESIGN

The proposed system is an e-commerce site dummy created for the location tracking source code to be able to have a platform wherein the source code is plugged upon the header or footer of the website code. The user-interface design in this section shows the actual presentation of the system and high-level interaction between the users and the system. **Figure 6** below gives an overview of the system.

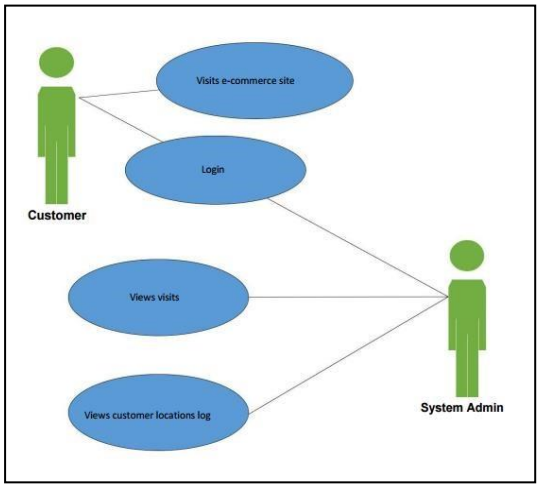

Figure 6: Overview of Proposed System

In today's business world, we have witnessed the importance of customer location. Not only does it help locate customers, but it also helps in decision-making. The rapid technology growth allows a lot of improvements in the day to day running of certain businesses. In this regard the suggested system has the following benefits:

- The system will help reduce cyber-attacks because of its authentication process; it will help quickly find the location of attackers.
- The system will help in taking better decisions by organizations with regards to their customers such decisions include better marketing strategies.
- The system enables the organizations to be able to know their customer exact locations, this will help organization on whether to expand their businesses in certain areas or not.

Landing Page for e-Commerce Site

The first interface both customer and admin start with is shown in **Figure 7**. All the authorized users are then classified based on the roles they have been assigned during the account creation process.

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Figure 7: E-Commerce Site Interface

Customer and Administrator Login or Registration

In order for a customer to be able to make a purchase, they first need to create an account if they do not have one and proceed to login. To login or register, an email address and password are required. To login as an administrator, there is a login button at the top right of the e-commerce site. This login button is not for the customers but for the administrator. Once the administrator clicks on the login button, they are requested to enter their credentials (email and password). The users of the system are managed by the admin. **Figure 8** below shows the login and registration interface.

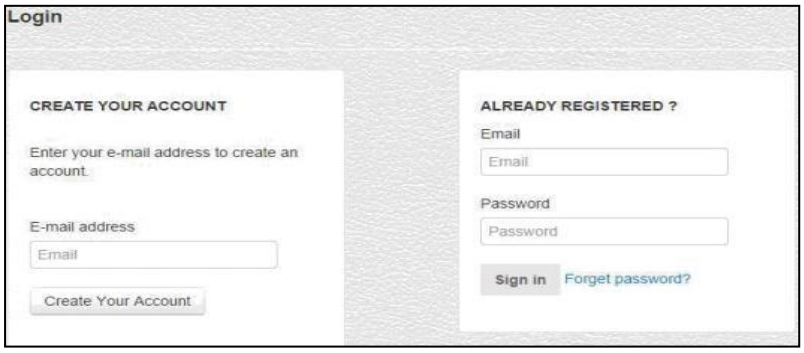

Figure 8: Customer Login or Registration Interface

Customer Locations Log Interface

Once the administrator's credentials are verified, the interface shown in **Figure 9** is displayed. This interface shows the customer's locations log and displays the below information:

- **Id**. This is the ID that a customer gets on the website that uniquely identifies them Address of the customer;
- **Latitude and longitude**. These are the geographical coordinates of where the customer logged in;
- **Date** and **time** as too when the customer accessed the site;
- **Action**. When the administrator clicks on 'show in map', a map appears that shows the province, the town and the exact place in which the customer is situated.

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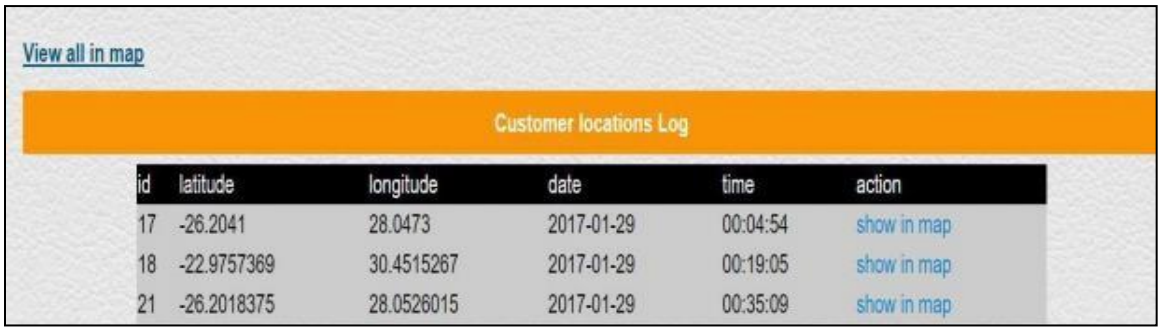

Figure 9: Customer Locations Log Interface Cycle

This map view in **Figure 10** assists businesses to take better decisions with regards to their customer. For the protection of customers this information is not held or stored onto the database. It is only displayed and then deleted after certain times.

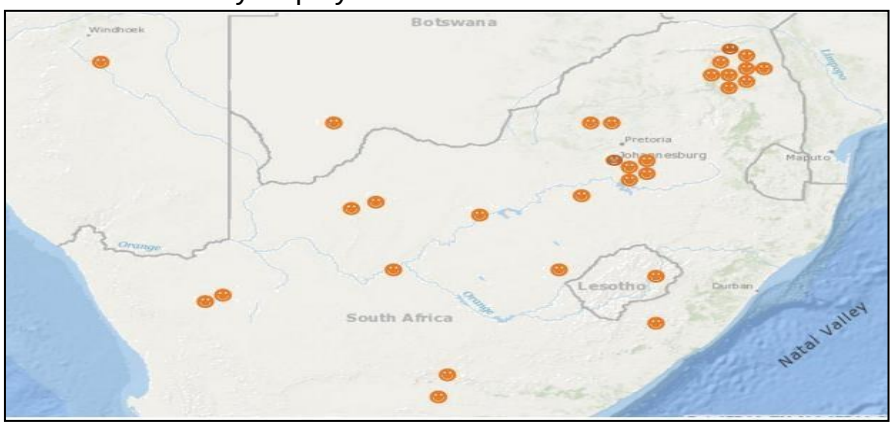

Figure 10: Customer Locations Log Interface Cycle

CONCLUSIONS

Customer location has always been an important aspect to businesses hence the traditional way of the business or organization having ones address and contact details, this was so they know where to find their customers should they need them. The location of customers accessing online systems is important to all businesses, regardless of the systems being e-commerce or just normal systems. If anything is to happen to the systems it is important to be able to trace who and what happened but to e-commerce systems it is important to know customer base in order to take better decisions with regards to the business, this decision are not limited but include marketing decisions an strategies.

This study proposed a system that locates customers as they access an organizations e-commerce site, giving their specific location coordinates. This helps the organizations take better marketing decisions with regards to their customers.

Future work based on this research work includes:

- Improving the suggested system.
- Extending the system beyond the prototype stage by adding more functionality and making it accessible to businesses.
- Improving the application to run on any smart device using any operating systems.

The result of this work is a work in-progress prototype that will continuously be improved.

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IMPLEMENTATION OF E-LEARNING IN RURAL LIMPOPO SECONDARY SCHOOLS: ARE TEACHERS AND SCHOOLS READY FOR A NEW PEDAGOGY?

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ABSTRACT

South Africa like other developing countries advocates for the use of technology for teaching, learning, management and administration. The Education Ministry formulated e-Education policy in 2004. This initiative was informed by the influence technology has on collaborative pedagogical and student learning. However, the readiness of the implementers has impact on the success of such programmes. This study investigated the readiness of rural secondary schools' teachers in Limpopo Province to implement e-Learning. This study aimed at answering two research question, namely: 'what are the perceptions of teachers in e-Learning implementation? To what extent do teachers find e-Learning programmes important?

Mixed methods research design was adopted in this study. The population of the research study is composed of 147 teachers, School Management Team (SMT) members included. The research participants for the qualitative research approach were purposively sampled from Malegale Circuit secondary schools. Interviews were conducted with 10 (2 principals, 4 Deputy Principals and 4 Head of Departments (HODs) SMTs and questionnaires were distributed and retrieved from 137 teachers in all Malegale Circuit 8 secondary schools. The findings confirm the crucial part played by technology in collaborative learning and improving students learning and engagement. However, lack and insufficient training on the use of school adopted technology, and lack of competencies on technology related teaching and learning strategies were identified as challenges to use of technology for teaching and learning. This study concludes that technology and e-Learning are important in enhancing collaborative learning and student learning and engagement. This study recommends that pre-service and practicing teachers should be adequately trained to venture in digital technologies for teaching and learning.

Key words: e-Learning, rural secondary school, ICT equipment, student learning, teachers'readiness

INTRODUCTION

Technological invasion necessitates drastic transformation in the education systems. Technological invasion has caused both the developed and developing countries including South Africa to start with the implementation of e-Learning in their institutions. The implementation of e-Learning was made possible through the availability and accessibility of Information Communication Technology (ICT). ICT provides institutional platform on achieving the provision of quality education [1]; accessibility; flexibility; adaptability; convenience; enhancement of learning; ease speed; improvement of teachers and school performance; cost effectiveness and easy management and administration [2]. However, the successful implementation of e-Learning is informed by a number of factors which include amongst others, the readiness of the implementers; the implementers' willingness to learn and adapt to new classroom technological innovations; and skills in ICT usage.

e-Learning refers to the use of technological tools used in education through using internet [3].

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e- Learning is “an approach that facilitate and enhance learning by means of personal computers, CD-ROMS, audio visual aids and the Internet which includes e-mail, discussion forums and collaborative software” [2]. E-Learning uses ICT in the teaching and learning and that it encourages learner-centred learning, is active, is exploratory, is enquiry-based learning, encourages collaborative work among teachers and learners, encourages creativity; analytical skills; critical thinking and informed decision- making [4]. In recognition of the benefits brought along by e-Learning, South African Government has taken a bold stand to ensure that its employees in the Department of Basic Education (DBE), particularly the teachers; managers and administrators in General and Further Education and Training are adequately trained and developed [4]. Despite vast benefits that can be brought along by, institutional e-learning, there are setbacks that can hinder e-Learning implementation, namely, a need to intensive training, conducting of awareness and workshops, bandwidth limitation, effect of teachers and access to budget [2].

The study was underpinned by a theory of Connectivism. The theory of Connectivism was adopted in this study to inform and guide understanding of learning process; that learning is a process of connecting specialised information resources; learning may reside in non-human appliances; and nurturing and maintaining connections is needed to facilitate continual learning [5], [6] and [7]. The focus of this study was to investigate the perceptions and reflections of teachers on their readiness with the implementation of e-learning that was regarded as specialised information resources that was non-human appliances in nature. The study further established how connections were nurtured and maintained in the facilitation of continual learning. This theory was used in guiding the formulation of research purpose and question. This study sought to investigate perceptions and reflections of teachers' readiness on the implementation of e-Learning in rural secondary schools in Limpopo Province. The study aimed at answering three questions, namely:

- What is your understanding about the concept e-Learning?
- Do your school promote or implement e-learning? Motivate”
- How do you value traditional teaching against technology-based teaching methods?
- How do you think teachers could be developed in e-Learning”?
- How do you think schools can be made ready for the implementation of e-Learning?

METHODOLOGY

This study was premised within interpretivism paradigm. The adoption of interpretivism is informed by the core idea of interpretivism which include acknowledgement of the existing knowledge, reconstruction of knowledge and using knowledge as building blocks to theory [12] and its position that knowledge of reality is a social construction by human actors [13]. The relevancy of interpretivism in this study is found in that the re-construction of teachers’ old knowledge to new knowledge in e- Learning can assist them in perform better. Qualitative case study and individual interviews were adopted. The choice of research paradigm and design was to obtain in-depth understanding of individual experiences [8]. Furthermore, the researchers sought to obtain more elaborative approach to the research problem and therefore produce deeper understanding [8]. The approach was found to be viable because the researchers were able to gain new insights about a particular phenomenon [8]. In the context of this study the researchers wanted to obtain the teachers' readiness on the implantation of e-Leaning in rural secondary schools in Limpopo Province, South Africa.

In addition, the researchers found purposive sampling for the qualitative approach to be relevant to the study. As the population of the study is small, ten principals of secondary schools formed the sample of the study. The study was conducted in ten secondary schools in Malegale Circuit,

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Limpopo Province, South Africa. Face-to-face interviews were conducted on ten school principals. The researchers used face-to-face interviews because of its potential on enabling the researcher to establish rapport with participants and yielding of high responds rates [10].

RESULTS

The study emerged with five themes emanating from the research questions, namely, understanding the concept e-Learning; promotion and implementation of e-Learning; teachers' value of traditional teaching against technology-based teaching methods; comments on teachers' developments in e-Learning; and school readiness in implementing e-Learning. A detailed discussion of each theme follows.

Understanding the concept e-Learning

This finding arises from the research question "what is your understanding about the concept e- Learning?" The study revealed that most participants have an understanding of what e-Learning is and they indicated its value and contribution to quality teaching and learning. One participant demonstrated his understanding by saying "e-Learning is when teaching and learning is conducted electronically through using electronic resources" Surprisingly, there was one participant who confessed that she knows nothing about e-Learning and has never heard about it. She had this to say "Oh! Sir, this new things, I have never heard about e-Learning in my life" This study, therefore concludes that the majority of the teachers understand what e-Learning is. Despite having one person without a glue on what e-learning is, majority are well conversant with e-learning and its impact on teaching and learning.

Promotion and implementation of e-learning

The research participants' responses on the research question "do your school promote or implement e-learning? Motivate" shows that the promotion and implementation of e-Learning was understood differently by participants. Most of the participants indicated that the implementation requires computer labs, well trained teachers and the availability of ICT resources which the schools do not have. However, the study revealed that teachers are aware of e-Learning, and they find computers contributing maximally to teaching and learning, and they believe that pedagogical technologies enhance interactive and collaborative learning as well as learners' engagement. This was highlighted by one Principal when he said that "The success of e-Learning implementation requires willingness, readiness and trained teachers" One Principal complained about the Department of Basic Education when she said "The Department of Basic Education hinders the implementation by not issuing enough resources as well as not training teachers on ITC and e-Learning".

Teachers value of traditional teaching against technology-based teaching methods

In responding to the research question 'how do you value traditional teaching against technology- based teaching methods?" majority of participants (80%) indicate that they value technology-based teaching to traditional teaching except 2 participants who strongly believe in traditional teaching methods. One of those who favours traditional teaching methods highlights that: "traditional teaching always never disappoints me because I make sure that tasks are ready in advance for learners" while the other one said "I am only conversant with traditional teaching and I know nothing about technology-based teaching".

Comments on teachers' developments in e-Learning

When participants were asked a question on "how do you think teachers could be developed in e- Learning" their response is that it can be done through workshops, in-service training and registration with technological institutions. A follow-up question was asked to the participants about whose responsibility was it for teachers' development in e-Learning and them all said it is the government's responsibility. Participants did not deem it fit to develop themselves in e-

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Learning. One participant has this to say: “the new technological changes in education are brought by the government and therefore we need not spent our hard-earned little money to develop ourselves”.

School readiness in implementing e-Learning

The research question, ‘how do you think schools can be made ready for the implementation of e-Learning” and participants reiterated that schools should be provided with sufficient technological resources for the implementation of e-Learning. Emphasis was put on the availability of computers, laptops, multi-purpose centres, and ICT software and hardware. One participant stresses that: “the Department of Basic Education should provide schools with ICT resources, technology facilities, infrastructures, computers, TVs, etc. that will make it easier for the implementation of e-Learning”.

CONCLUSION

From this study one can conclude that schools resourcing is the hindrance to implementation of e-Learning in schools. The study reveals that schools do not have computer laboratories/classrooms. This indicates that the Limpopo Department of Education is not ready to implement e-Learning. Furthermore, the study revealed that teachers are aware of e-Learning, because they find computers contribute maximally to teaching and learning and enhance interactive and collaborative learning as well as learners’ engagement. In addition, the study revealed that teachers are unable to use computers in teaching and learning, and that they do not have access to computers, schools do not have computer. Techers are aware of the role of e-Learning in teaching and learning, and many of them embrace such technologies and are ready to be trained on technological pedagogies required for successful e-Learning. The study concludes by recommending that the Department of Basic Education provides sufficient technological facilities and infrastructure in schools as per [4]. The study further recommends that pre-service and practicing teachers be adequately trained in e-Learning.

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IS THE EASTERN CAPE PROVINCE READY FOR THE TECHNOLOGICAL TRANSFORMATIONS THAT ARE TAKING PLACE?

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CONCLUSION

Aim/Purpose The aim of this paper is to evaluate the progress made by the Eastern Cape Socio Economic Consultative Council (ECSECC) in developing the provincial digital skills framework and a five (5) year digital skills plan. It also gives an overview of the state of readiness of the Eastern Cape province in response to the technological changes that are taking place in the world today. This is a work in progress paper.

Background The Eastern Cape eSkills CoLab (EC CoLab) in ICT for Rural Development commissioned ECSECC to develop a provincial digital skills framework and a five year digital skills plan. The framework and plan focused on three priority sectors in the Eastern Cape, namely, Agricultural, Renewable energy and Manufacturing. These sectors are a subset of priority sectors in the Eastern Cape province.

Methodology This research work is ongoing; it investigates what employers working in the aforementioned sectors require from potential and current employees, what type of skills employees currently possess and how the industries within these sectors are bridging the skills gap in relation to the fourth industrial revolution (4IR). Also, the study documents how the sector's day-to-day operations have been affected by the technological transformations that are taking place. A workshop was conducted in order to give people an opportunity to share the progress in their respective sectors and what are the current changes they are witnessing in terms of any technological transformations and solutions taking place.

Contribution This paper documents how the aforementioned sectors are responding to the 4IR. It also helps us to keep track of 4IR skills required in the Eastern Cape province and how these skills can be transferred to peo-ple so that they can keep up with the changes which technology has brought. It also assists sectors in drafting their short, medium and long term goals. Industries have the opportunity to state their expectations from academia since academia is a major contributor in skilling and up-skilling people. The paper also highlights the importance of in-house training and how industries can make this training beneficial to their la-bour force.

Findings A lot of digital skills awareness and training is still required to educate people in order to help them improve the skills they currently have. In-dustries can have in-house training and also inform the education sector on what sorts of skills are required or what courses should be offered to students.

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Future Research ECSECC will be finalizing the digital skills framework and plan in 2019. This will assist the provincial government, industry, academia and society with an outline of digital skills that will be needed in the future. The provincial digital skills plan must also be integrated into educational curriculum and content.

Keywords Digital skills, Technological transformations, Fourth Industrial Revolu-tion, Eastern Cape

INTRODUCTION AND BACKGROUND

Professor Klaus Schwab, the founder and the executive chairman of the World Economic Forum (WEF), introduced the Fourth Industrial Revolution (4IR) to uncover the current technological revolution we live in and also, to explore how the world is witnessing a transformation that is affecting the way we live, work and communicate (Schwab, 2016). The 4IR is driven by a confluence of technologies that include Artificial Intelligence (AI), Machine Learning, Internet of Things (IoT) and Robotics. These technologies have a great influence on production methods, especially in the manufacturing sector (Senge et al., 2001). Previous industrial revolutions made mass production possible and brought about digital capabilities to the world. However the 4IR is different. The power of the 4IR means that production efficiency is improved drastically and human error is minimized. Some jobs that were previously performed by humans are being taken over by robots (Cappelli, 2012). This transformation means people need to be reskilled and upskilled so that they can effectively use computers and other intelligent devices to control the machinery on company production floors.

Technology plays a key role in production because it influences the output. Technology also improves labor productivity and therefore influences the rate of growth of the economy. In the long term, the South African economy as well as that of the Eastern Cape is currently showing a downward trend (Statistics SA, 2016). Therefore when developing a provincial digital skills plan and digital skills framework, we envisage technology as a driver of an upward change (Cappelli, 2012). Another important aspect to consider when developing the digital skills plan is the structural makeup of the economy. This means that the skills demand depends on the performance of the economy and the rate of growth of various sectors. With 4IR as the driver of technology, production is changing and shaping the world of work and of skills in demand. From the skills perspective, we list the following features of the 4IR and its impact on the future of work.

AUTOMATION OF PRODUCTION

Artificial Intelligence affects and changes the methods of production especially when connected devices are able to communicate with one another on factory floors. Ideally, in the future, factory production machinery will require minimum human intervention to communicate. With automation, robots will carry out tasks that were previously undertaken by humans. Robots will perform these tasks more efficiently and economically than humans. Currently, most industries have redundancy because there are robots and humans that perform overlapping tasks. In the future, there could be job losses as there is less human labor required (Mutula, Van Brakel, 2007).

ARTIFICIAL INTELLIGENCE IS SKILLS-BIASED

The digitalization of production has caused disruptions in the factory floors because it requires high levels of skills. Therefore, some previously acquired skills may become obsolete. With the use of technologies, an employee may be required to efficiently operate a computer and this means they must be reskilled or upskilled (Merkofer, Murphy, 2009).

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ARTIFICIAL INTELLIGENCE CAUSES A STRUCTURAL AND OCCUPATIONAL SHIFT IN THE ECONOMY

With the advent of the 4IR, the nature of occupations are changing. This may mean that new occupations will surface in the market while some become obsolete (Scott et al., 2002).

ARTIFICIAL INTELLIGENCE LEADS TO RE-ALLOCATION OF RESOURCES OF PRODUCTION

In the era of 4IR re-allocation of resources is very common because workers lose their jobs and find jobs somewhere else or in a different sector. This change means that a worker must be retrained in order to perform new jobs and tasks (Van D In the era of 4IR, re-allocation of resources is very common because workers lose their jobs and find jobs somewhere else or in a different sector. This change means that a worker must be re-skilled or upskilled in order to perform new jobs and tasks (Van Deursen, Van Dijk, 2011).eursen, Van Dijk, 2011).

DIGITAL SKILLS FRAMEWORK

THE ROLE THAT EASTERN CAPE IS PLAYING IN DIGITAL SKILLS DEVELOPMENT

1) The EC CoLab commissioned ECSECC to develop the province's Digital Skills Framework and a five year provincial digital skills plan aligned to the National Electronic Media Institute of South Africa (NEMISA) framework. The objectives of formulating the provincial digital skills plan are as follows:

2) To look at the industries in Eastern Cape Province, study how they perform their day-to-day operations, evaluate the technological skills that are in place and also the skills that are needed;

3) To establish a multi-stakeholder partnership with organizations that deliver eSkills training and interact with these industries so that they can let their employees attend the training;

4) To conduct research across the industries and produce evidence about the skills shortages so that industries can make necessary investments to upskill their labourforce and to get suitable infrastructure;

5) To establish a framework that could be used by all industries in the province to analyze the skills shortages and the precautions to be taken;

6) To provide capacity for stimulating rural development through the use of technology.

THE METHODOLOGICAL FRAMEWORK

In today's world, where automation has become so popular, there is a growing need to skill, up-skill or reskill the labour force. This has an impact on the economy because some skills remain unused because of lack of relevance. Most people feel that a technical certificate will grant them easy access into the labour market. Unfortunately this is not always the case in most industries as these industries require certain skills that the labour force may sometimes lack (Senge, et al., 2001). The education sector plays a vital role in skills training. Therefore the role that education plays must try to accommodate the skills that the industries require from their labour force. Some people leave school and go straight into the job market while most jobs require skills that a recent graduate may not possess. When skills that are demanded by labour market do not match the skills that are supplied, there is a skills mismatch. If skills supplied and skills demand-ed do not

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match, we get the skills gap (Mutula, Van Brakel, 2007). One of the objectives of de-veloping the skills plan is to address skills mismatch and provide recommendations for the prov-ince to close this skills gap. Policies addressing mismatch can mitigate the economic and social cost linked to the waste of skills and human potential it entails. **Figure 1** illustrates the methodo-logical framework for skills planning which is relevant to this work.

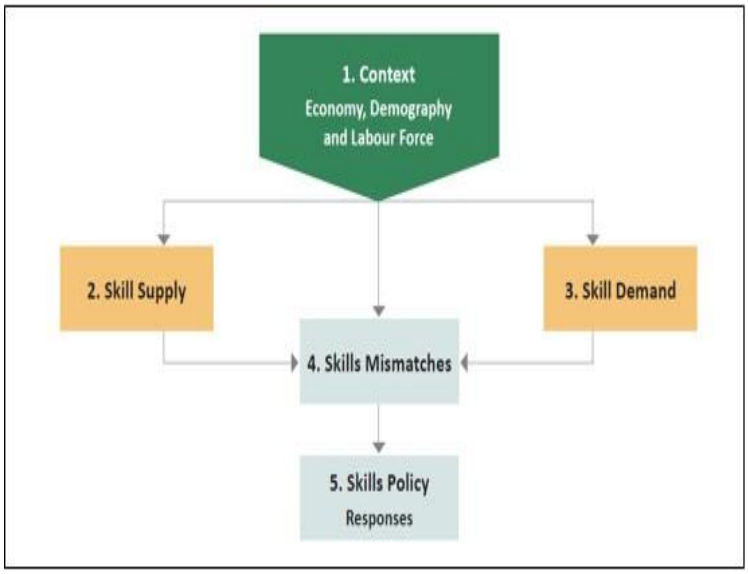

Figure 1: Skills Planning Methodological Framework (Source, HSRC: 2016)

PRELIMINARY RESULTS

The development of sector user skills must be mainstreamed within critical occupations identified in various sectors of the Eastern Cape economy. These are occupations that are both skill-based and have high digital content. For the purpose of formulating the provincial digital skills plan, this exercise will be performed for Manufacturing, Sustainable Energy and Agri Value Chain. The stakeholders will have a platform to engage and confirm these sector user skills for various occupations in the selected sectors. The digital skills framework and a five year digital skills plan is expected to serve as a baseline for the aforementioned sectors when evaluating the user skills of their labour force. The framework and plan will have information about the current skills that the sector users have, and will also highlight the demand of certain skills. It will also indicate where the education sector can try and re-align their training programmes to industry needs. The results of this investigation will also mitigate the challenge of skills mismatch by balancing skill supply and skill demand. For all this to be possible, there is a need to take part in multi-stakeholder innovation platforms with government, labour unions, business/industry clusters, professional bodies (Engineering South Africa, IITPSA), the student community, education institutions, Innovation and Research Centres (e.g. CSIR), communities and NPOs.

The engagement of the above mentioned stakeholders should further identify and confirm critical occupations for the ICT and related sectors of the Eastern Cape economy. ECSECC conducted a digital skills workshop where they invited some of the above mentioned stakeholders. Participants of the workshop included ECSECC, Department of Telecommunications and Postal Services, Eastern Cape Department of Education, Human Science Research Council, East London Industrial Development Zone, Eastern Cape Information Technology Initiative, MerSeta, Volkswagen, Walter Sisulu University and NEMISA. A summary of the workshop presentations and discussions were as follows:

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- **Eastern Cape Department of Education (EC DoE)**
  The EC DoE is looking at rolling out a comprehensive technology solution in order to enable blended learning and extensive teacher training. There will be schools admin systems, e-content, virtual learning solutions, connectivity and infrastructure.
- **Human Social Research Council (HSRC)**
  One of the most important solutions that HSRC presented was the need for pro-moting massive open online learning courses (MOOCs). They also presented their findings on connectivity in the Eastern Cape which showed that there is a very low percentage of people with connectivity. Therefore some of the 4IR solu-tions will be difficult to implement in certain areas.
- **East London Industrial Development Zone (ELIDZ)**
  ELIDZ presented the benefits of converting the ELIDZ into a smart park. Some of the benefits of this conversion include cost savings, new revenue streams, con-trol for IDZ and its tenants, risk mitigation and environmental impact.
- **Volkswagen SA (VW)**
  VW made a presentation on the changing nature of work as a result of 4IR. There was emphasis on the importance of reskilling the workers in order for them to survive this era of the 4IR.
- **National Union of Mine Workers (NUMSA)**
  NUMSA made a presentation on their views of NUMSA within VW. The presenter stated that the future of 4IR belongs to those who can act and think fast. NUMSA eluded that the current technological developments have to determine skills plan-ning in the country. Their point was that the interventions have to be inclusive of all role players.

CONCLUSION

We can conclude that the labour force and the state of the economy provides the strategic context for the need to start estimating the 4IR skills demand and supply. This is further supported by a report by Statistics SA in the 2nd quarter of 2018 which shows that the unemployment rate increased in the Eastern Cape, especially in the manufacturing sector. This increase is due to automation and the lack of skills within the labour force. It also means that the skills demand is less than the skills supply as most industries now rely on automation and are letting labour force go. Some industries in the province have in-house training to help upskill their labour force. This supports the higher education sector and post school education and training which are currently overwhelmed. Essentially, there is a need for different stakeholders to join hands in training the people of Eastern Cape to make sure the unemployment rate does not go beyond to what it is at the moment. More research needs to be done on the skills demand hoping that the higher education and post school education and training responds positively with the required skills supply

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A MATURITY MODEL FOR IMPROVING DATA GOVERNANCE PROCESSES IN GOVERNMENT DEPARTMENTS

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ABSTRACT

Aim/Purpose The paper proposes a Maturity Model for ensuring data governance is entrenched in government departments. The Data Governance Evaluation Maturity Model (DGMEM) is presented. The model was derived from secondary literature and tested and modified through an empirical case study of four government departments of the Eastern Cape Province, South Africa.

Background With the imminence of theFourth Industrial Revolution, valid, timeous and accurate data has become a critical asset toboth private and public organisations. This paper investigates the data governance and management practices of four government departments of the Eastern Cape Province. The investigation revealed that there were no entrenched, repeatable processes for every aspect of data governance in the departments. A Data Governance Maturity Evaluation Model (DGMEM) was thereafter proposed to improve data government processes.

Methodology A conceptual maturity model was built from a literature survey of 217 articles. The model was thereafter tested for applicability and relevance through a mixed method data collection and analysis technique. Eighty-six participants across four departments were involved in the data collection process. Triangulation was employed to confirm the reliability of the qualitative analysis of the quantitative questionnaire.

Contribution The Data Governance Maturity Evaluation Model (DGMEM) is the practical contribution of this paper. The theoretical contribution of the DGMEM is that it is theorydriven and the theories have been supported and validated by extensive empirical findings from stakeholders in government departments of the Eastern Cape. The mean score of 4.32/5 regarding the applicability of the model, assures that the model is able to solve the real-life problem of data governance in government departments.

Findings Data governance is lacking in government departments. It is asserted that the implementation of this model will improve the way data assets are recorded, used, archived and disposed of in government departments of the Eastern Cape Province.

Recommendations for Practitioners The DGMEMcan be used to improve data governance processes.

Recommendations for Reseachers The model should be tested for applicability in similar and bigger contexts (government departments) in other provinces of the South African Republic.

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Impact on Society	The model is proposed as a guide for government departments to evaluate their 'as is' state in the area of governing and managing their data assets. The rationale of the maturity model is for the government departments to move from their current state into an improved, more efficient modes of being. The incremental, progressive improvement willoffer better value and more efficient results in the way data is managed in the departments. The impact on society will be that fiscal and strategic plans are based on accurate and current data, leading to better service delivery.
Future Research	This should focus on the measurable way in which the model has been able to improve data governance processes when applied in a government department.
Keywords	Data Governance, Data Governance Maturity Evaluation Model, COBIT 5, Contingency theory

INTRODUCTION

The governance of data assets has become a topical issue in the public sector. Government departments are faced with increasingly complex data and information arising from multiple projects, different departments, divisions and several stakeholders seeking data for divergent end uses (Soares, 2015; Thomas, 2015; Seiner, 2014; Dismute, 2010; Khatri & Brown, 2010). Data serves as a major driver for business in the current knowledge economy (Olaitan, Herselman, & Wayi, 2016). Government departments have multiple data streams and are dependent on the accuracy and correctness of the data for fiscal and strategic planning (Thomas, 2015). This paper posits that a structured approach to the governance of data is required for the effective management of data assets in government departments and public enterprises. This is important for ensuring that critical data assets of government departments are well managed and do not put the departments at risk due to erroneous planning and projections, based on incorrect or obsolete data (Nazemoff, 2010).

An exploratory study of the literature regarding data governance in government departments of the Eastern Cape province of South Africa suggests that there are no clear data governance processes in place within the departments (Soares, 2015; DPSA, 2013). This dearth of clearly defined processes has led to an extemporised system of managing data assets in these departments and has resulted in inaccurate data, adverse audit outcomes and the inability of government to ensure that fiscal and strategic plans are based on verifiable, accurate and consistent data. This negatively affects effective and efficient service delivery in the province.

This paper discusses ways in which a Data Governance Maturity Evaluation Model could assist government departments of the Eastern Cape to manage their data assets more efficiently. It further proposes the use of the Maturity Evaluation Model as a way of identifying the current state of data governance within these departments; and thereafter, itrecommendsa way of moving from the current state to a desired, more structured state on ascaled maturity level. The paper is structured as follows: the next section discusses the importance of data governance and the components of an effective data governance programme. An analysis of current data governance practices was carried out, drawing a comparison between current practices and COBIT 5, as well as ISO 38500, both of which are framework sostensibly adapted for IT, and by extension, data management in the government departments.

DATA GOVERNANCE

The Data Governance Institute (2015) defines governance as a "*system of decision rights and accountabilities for information-related processes, executed according to agreed upon models,*

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which describe who can take what action with what information, when, under what circumstances, using what methods" (Data Governance Institute, 2015, p.1). Seiner (2014) describes data governance as the correct implementation and enforcement of authority regarding the management of data and data related assets.In the same vein, Kushner and Villar (2008), describe data governance as a management programme which treats data as a crucial asset to organisations, having within it a collection of corporate policies, standards, people, processes and technology (Kushner & Villar, 2008).

Based on the definitions above, the current paper posits that data governance is "a homogeneous set of processes which assures formal management of data assets in an enterprise". The fundamental aim of data governance is to ensure that data is trustworthy, managed by the right human resources, and follows a standardised process. Data governance also ensures that decisions based on available data do not place the enterprise at risk due to low quality, falsification of data, or use of obsolete data (Soares, 2016; Eckerson, 2014; Nazemoff, 2010). Effective enterprise-wide data governance precludes the occurrence of errors in decision-making and enhances efficiency of operations.

SIGNIFICANCE OF DATA GOVERNANCE IN GOVERNMENT DEPARTMENTS

Data forms the basis of information, which is the central, most important factor employed by governments in fiscal and developmental planning. Also, national decision-making on one hand, and government budgetary projections on the other, are heavily dependent on the availability of information which comes from data collected across a broad spectrum of government departments. The context of this study is the government departments of the Eastern Cape Province, South Africa. Some of the major factors for consideration in the context of the study include critical issues relating to data accuracy in government departments, the enormous risk presented by undue and unauthorised access to organisational data as exemplified by various data breaches in recent times, the consistent audit failure of EC departments in the annual auditor general's reports, the millennium development goals of the South African government (NDP 2030) and the availability, but insufficient use, of international best practices, such as Control Objectives for Information and Related Technology(COBIT), the Information Technology Infrastructure Library(ITIL) and the ISO/IEC 38500 standard for data governance (Soares, 2015; Eckerson, 2014; DPSA, 2013). The success of the aforementioned factors is dependent on accurate and current data from the provinces and is anchored in the need for citizens' data to be managed and protected (Ifinedo, 2012). Therefore, it is critical that the data on which such information is based is valid, accurate, and complete (VAC).

Current Data Governance Practices in the EC Departments

The Eastern Cape Government Departments, which are the context of this study, currently have in place a number of policies which allude to the importance of data governance (DPSA, 2013). Two of these policies are the Record Management Policy (NARS, 2006) and the Minimum Information Security Standards (South African Government, 2008). However, a cursory look at the operations of these departments does not reveal any implementation of data governance processes as outlined in well-known IT Governance frameworks such as COBIT 5 and ISO/IEC 38500(DPSA, 2013).To establish and further confirm the need for a structured data governance programme in the departments, a needs analysis, investigating the correlationbetween current data governance practices in four departments and recommended data governance processes in COBIT 5 and ISO 38500, was conducted with 25 respondents across four departments in the Province. **Table 1** outlines the result of the exercise.

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Table 1: Correlation between COBIT 5/ISO/IEC 38500 and Current Practices in EC Government Departments (Source: Olaitan, Wayi&Herselman)

COBIT 5	ISO/IEC 38500	Result Of Needs Analysis in the Departments	Correlation
Data Governance Structure			
Strategic	Strategic	Unstructured	×
Managerial	Functional guidance	ad hoc	×
Implementation	Objective evaluation of IT Governance processes	ad hoc	×
Data Attributes			
Clear Information Ownership	Accountability	Enterprise Data Management	√
Timely and correct information		None	×
Clear Enterprise architecture and efficiency	Ensuring stakeholders are confident of IT and all related governance activities	None	×
Compliance and Security		Data Security	√
COBIT 5	**ISO/IEC 38500**	**Result Of Needs Analysis in the Departments**	**Correlation**
Data Governance Structure			
		management	
Data Governance Enablers			
Enterprise resources and service capabilities	Evaluate current and future use of IT	None	×
IT Infrastructure	Ensure the use of IT meets business objective	ad hoc	×
People and Information		ad hoc	×
Alignment with other relevant standards and frameworks	Monitor conformance to policies and performance against plans	None	

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Phasesof Managing Data Lifecycle			
Plan - objective identification, architecture, definition of standards and conventions	Evaluating	ad hoc	×
Design - the physical implementation of what was planned	Directing	ad hoc	×
Build/ Acquire - covers the creation of data records, acquisition of data assets and data recovery from external sources	Monitoring	ad hoc	×
Use/Operate - the storage, sharing and disposal of data according to agreed conventions	Directing	ad hoc	×
Process			
Define Data Systems	Responsibility	ad hoc	×
CIO determines accountabilities for each layer of data	Strategy	ad hoc	×
Data definition, classification, security control and data integrity	Evaluation and monitoring	ad hoc	×
A nomenclature of where, how and duration of data retention, and clear guidelines on how such data is disposed of or deleted	Performance	None	×
Unique identification of users, their roles, and access levels in tandem with their business roles within the organisation	Human behaviour	None	×
COBIT 5	**ISO/IEC 38500**	**Result Of Needs Analysis in the Departments**	**Correlation**
Data Governance Structure			
Compliance guidelines enforced with enterprise's contractors or consultants handling data on behalf of the organisation outside its network or firewall settings.	Conformance	ad hoc	×

The lack of correlation between COBIT 5' and ISO/IEC 3500's recommended practice, shown on **Table 1**, further served to buttress the fact that data governance is not structured in the departments, with only enterprise data management and data security management showing a correlation to well-known data governance frameworks. The next section discusses Maturity

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Models and how they could be of benefit to the EC government departments in establishing structured and repeatable processes to govern their critical data assets.

MATURITY MODELS

A maturity model is a "*structured collection of elements that describe the characteristics of effective processes at different stages of development. It also suggests points of demarcation between stages and methods of transitioning from one stage to another*" (Okongwu, Morimoto, & Lauras, 2013, p. 8). A Maturity Model encapsulates the different phases or stages when a pre-determined set of processes relevant to the domain has been accomplished. Maturity Models are a valuable tool for benchmarking the current state of an organisation's practices and policies (Wendell, 2009). Maturity Models outline a descriptive 'as is' assessment of the entities or organisations under investigation (Poppelbub & Roglinger, 2011). A Maturity Model also provides a guideline for the organisation to move from a lower to a higher level of maturity. This paper's objective is to propose a Maturity Model that the Eastern Cape government departments can use to evaluate their current data management practices. Thereafter, the paper offers a prescriptive process to assist the departments to move to a higher, more desirable level of governing data in a structured manner. The next section discusses the underpinning theory employed for the research.

THE CONTINGENCY THEORY

The Contingency Theory is the grounding theory adapted for this study. The theory stipulates that there is no best or universally accepted way of organising a corporation, leading it or making decisions (Weber, Otto, & Osterle, 2009). The theory states that the best course of action in a given setting is dependent upon the prevalent internal and external situation of the context. To this end, every organisation must develop a data governance programme which is contingent upon the purposes of data within its context. For this study, a pragmatic solution is sought to the problem of lacking a structured methodology for governing the data assets of EC government departments. The theory also aligns with COBIT 5's recommendations that CIOs should establish specific processes and technology around data management, security controland definition of ownership, decisions and responsibilities regarding data assets. These must support the goal of ensuring the availability of reliable, accurate information which enablessound decision-making while keeping errors and inaccuracies to a minimum. To achieve this objective, both IT and business must establish the processes by which data is managed (Soares, 2016; Suer & Nolan, 2012). The next section discusses the methodology employed to find a solution to the research problem.

METHODOLOGY

A quantitative needs analysis survey was conducted with 25 respondents who were direct data stakeholders in four EC departments. The result of the survey confirmed the research problem (Table 1). Consistent with the Contingency Theory, a literature review of what constitutes best practice for data governance in the context of public enterprises was conducted. The literature was reviewed in line with the PRISMA statement (Moher, Liberati, Tetzalaff, Altman, & Prisma Group, 2009). A content analysis of 217 data governance and maturity model articlesconsidered as relevant to the objective of constructing a maturity model adaptable to government departments was carried out using the recommended steps in the PRISMA statement (Moher, Liberati, Tetzalaff, Altman, & Prisma Group, 2009). The task was made possible by the comparison of mature, frequently cited literature on maturity models and data governance processes which are known and practised internationally. Among these were frameworks such as COBIT 5, ISO/IEC 38500, the Data Governance Institute Maturity Model, the IBM Maturity

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Model and a number of authors considered experts in the domain under investigation. A conceptual model based on secondary literature was derived from the exercise. A mixed method data collection and analysis technique, consisting of both qualitative and quantitative instruments, was used to identify factors to assist the Eastern Cape Government Departments to measure their current levels of maturity, in a scientific manner, with regard to data governance. Twenty-five respondents completed a qualitative questionnaire hosted on Google Forms. The data was analysed using NVIVO Version 11. Focus group activities were conducted in three departments with 11 participants, these were analysed thematically. Quantitative data was collected from 50 participants across four departments. SPSS Version 24 was used to confirm the relevance of the components of the conceptual model to the context of the study.

DATA GOVERNANCE MATURITY EVALUATION MODEL

Following the review of extant literature ondata governance and maturity models, a conceptual model tagged the Data Governance Evaluation Maturity Model was constructed, based on what was perceived as needed byand directly relevant to the Eastern Cape government department data needs. The model was heavily influenced by the IBM Data Governance Maturity Model of 2007, and the components were derived from the data governance recommended processes in COBIT 5 and the principles of data governance as set out in ISO/IEC 38500. The next section presents the changes effected on the initial model based on the analysis of the results of the quantitative data and focus group interviews.

Changes Made to the Conceptual Model Based on Findings of the Data Analysis

Following the analysis of the first phase of qualitative data collection, it became apparent that a number of changes were required in order to make the model more relevant to the context of the Eastern Cape government departments. Bearing in mind that participants did not have a view of the model when the questions were posed, the researchers inferred, based on the responses that these changes would make the model more relevant to current data governance needs and also make for easier interpretation of the components of the model. **Table 2** below itemises the changes made to the model based on the findings of the data collection. The adjusted and final model is presented in **Figure 1**.

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Table 2: Changes made to the Conceptual DGMEM based on findings from primary data analysis

Conceptual model	Changes made	Rationale
Shows no link between the maturity stages and the attributes associated with them.	Arrows indicating the attributes of each maturity model stage and linking them are provided on the adjusted model.	Findings reveal that most participants in the department are not versed in data governance maturity processes, hence it is important to make the model as easy to interpret as possible.
The fourth point on the attributes of the optimised stage of data governance lists	Innovation- data transformed to knowledge, creates wisdom.	COBIT 5 outlines the Information Cycle whereby business processes (supported by IT Processes) produce data which needs to be processed and transformed into information, which is analysed into knowledge, which is
Innovation as an attribute of optimised data governance without elaborating on what this attribute means and how this can be done.		then applied to create wisdom (ISACA, 2013). The results of data analysis clearly show that most of the managers consider data as key to the positive achievement of their KPIs, hence the need to highlight the fact that innovation must be geared towards turning data into a knowledge base which produces information that creates the wisdom for the departments to achieve their strategic objectives.
Under enabling departmental structures, stewardship is listed before policies.	The model lists policies first, followed by stewardship and then processes.	The consistent thread through the results shows that there are policies in place for data governance but inadequate stewardship to implement an effective data governance plan. The logical progression therefore, is that there are policies in place, which data stewards are expected to employ in the implementation of data processes.

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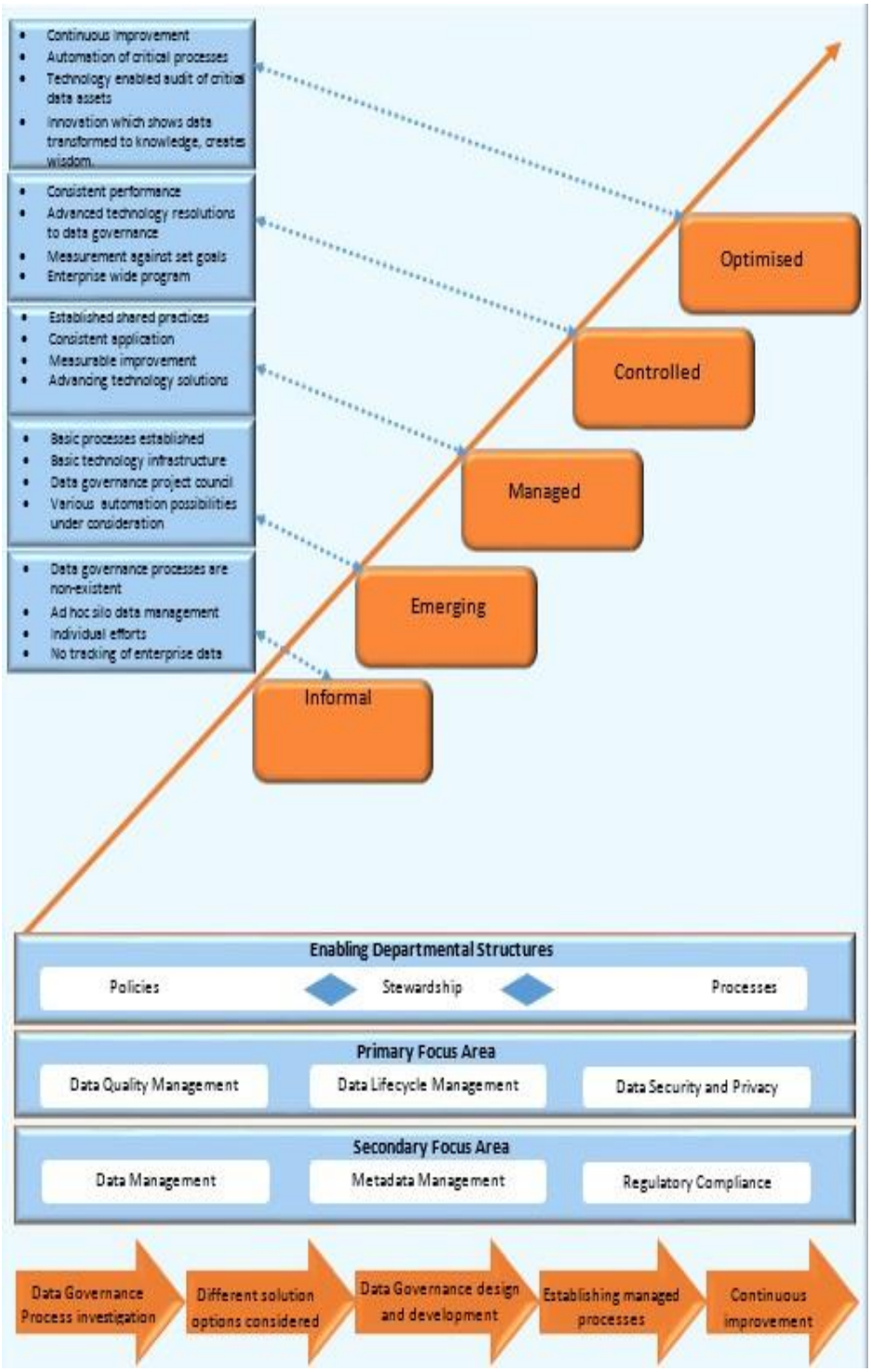

Figure 1: The Data Governance Evaluation Maturity Model

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EXPLANATION OF MODEL'S COMPONENTS

Walker and Avant (2011) describe a model as the symbolic representation of empirical experience. The DGMEM is projected to represent the reality of data governance and its different stages of maturity in the EC Government Departments. The major components of the model are explained below.

Primary Components

The three components which form the primary focus area of the conceptual model are data quality management, data lifecycle management, data security and privacy. The three components were chosen as primary areas, based on secondary literature and responses from the needs' analysis. At the core of quality information is quality data which satisfies the verifiable, accurate and complete (VAC) criteria for data. Data lifecycle management encapsulates the entire process of data management from input to disposal. The data security and privacy component is essential to the protection of data assets, leading to effective data governance for the enterprise. Data security and privacy is vital to the security and control of all the data assets of the enterprise, as data breaches could occur at any stage of its lifecycle if not properly managed.

Secondary Components

According to Poppelbub & Roglinger (2011), a prescriptive maturity model includes improvement processes. This encapsulates data management, which is considered a sub- component of this model. Metadata management is an important sub-component as it relates closely to the accountability for data breaches, data leakages or alteration which tie in with the importance of data governance to compliance and security and finally, the regulatory compliance aspect as it relates to data governance (Steinhart, 2010). The financial markets and the global meltdown of the 2008 era have led to a renewed scrutiny of data and its integrity in both private and public enterprises, thereby leading to several legislative and procedural compliance requirements for both public and private institutions (Eckerson, 2014). Thus, it is considered pertinent to integrate the regulatory compliance aspect into the maturity model. This will serve the purpose of ensuring that the entire process of data governance is carried out with the mind-set of accountability to the relevant bodies in government.

In the quantitative phase of data collection, the DGMEM was made available to 50 participants, and the context and the purpose and process of the components were explained to them. The questionnaire was designed to test the efficacy and usability of the artefact. The rationale for sharing the model with participants at this stage was to enable them to answer the questions in an informed manner, that is, by relating the components and processes directly to their own data processes. This was in line with the Contingency Theory which underscores the study.

The results of the data, analysed using SPSS Version 24, confirmed the relevance and applicability of the DGMEM. **Table 3** is a summary of the reliability scores for the questions.

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Table 3: Reliability Analysis

Variable/s	Valid N	Items Used	Cronbach's α
Applicability of DGMEM	50	11	0.593**
Capabilities	50	5	0.607**
Alignment of COBIT	50	13	0.677**
Expected Results	50	8	0.627**
Missing Components	50	5	0.632**

**Significantly acceptable reliability, Notes: Applicability of DGMEM = Applicability of the Data Governance Maturity Evaluation Model (DGMEM); Capabilities = People, Policies and Process Capabilities; Alignment of COBIT = Alignment of COBIT 5/ISO/IEC 38500 to Data Process on the DGMEM; Expected Results = Expected results from the implementation of the DGMEM; Missing Components = Missing Components of the DGMEM.

Table 3 shows the reliability of each scale as it relates to the variables measured. The Cronbach's alpha for the scales ranged from 0.593 to 0.67,7 which shows high reliability coefficients for the study variables.

METHODOLOGY

As already discussed in the methodology, the literature review, followed by a needs' analysis which was conducted with 25 participants, confirm the existence of the problem. Following confirmation of the problem's existence, it was deduced that a maturity model presented the best means of solving the research problem. The rationale for this choice was based on the review of extant literature and a cursory look at current departments' practices on data governance. The analysis revealsthat most of the departments were still unable to distinguish between data governance and information governance, and mostly treat data assets as an intangible asset.
The purpose of the DGMEM is to assist the departments in the evaluation of their current state, with regard to how their data assets are handled, with a process template of how to move from a lower level of maturity to a higher level. The DGMEM is prescriptive in nature, which therefore affords an opportunity to both the researcher and senior managers in the department to have first-hand experience of the model's "fit for purpose".

CONCLUSION

The study presents a compelling argument for a maturity model that could assist the government departments of the Eastern Cape Province to govern their data assets. An exploratory inquiry into the data processes of the Province's government departments has shown a lack of structure in the way data is handled. The currentsituation is undesirable and could lead to dire consequences, considering the significance of accurate, complete and verifiable data to the fiscal and strategic planning of developmental governance in the current information age.

The study's context, the Eastern Cape Province, which has an estimated population of seven million people is reputedly among the poorest in the Republic, hence any meaningful research in this context should impact positivelyon the data processes of the departments with a view to improving service delivery for the teeming population. It is believed that accurate, timely and verifiable data is critical to the usefulness of information, which creates knowledge; and is the single, most important factor in the attempt by government to have in place a sound theoretical and factual basis for strategic and fiscal planning.The consistency and reliability of the findings

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across the diverse work processes in these departments has given the researchers confidence that the model can be applied across a broad spectrum of public enterprises. The DGMEM is thus considered a veritable tool for the departments to evaluate their current data processes, with a view to incrementally improving their data governance processes by following the guidelines of the DGMEM and its various data components.

RECCOMENDATION FOR FUTURE RESEARCH

The model was derived from empirical literature and tested with three instruments (qualitative questionnaire, focus group interviews and a quantitative questionnaire) and has been found to be applicable and relevant to the context of the study. Results from findings led to some adjustments being made to the model. It is recommended that future research should focus on testing the final artefact in similar contexts in other provinces of the Republic.

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INVESTIGATING FACTORS INFLUENCING ICT ADOPTION AMONG SMEs IN THE HOSPITALITY INDUSTRY IN THE WESTERN CAPE

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ABSTRACT

Small to Medium Sized Enterprises (SMEs) play a major role in the economic development in South Africa (SA), providing up to 60% of the private labour force. ICT capabilities are especially crucial to stay competitive in the hospitality industry where technology like Social Media and Web 2.0 has revolutionised the hospitality industry. The absence of these ICT can have a negative impact on the operations of a business. Thus, the objective of this research study is to establish the ICT adoption factors in the hospitality industry, from a Western Cape perspective. Using a qualitative approach, with an Empirical design, analysing primary (interviews) and secondary data (literature study) with the aim identify the man ICT adoption factors among SMEs in the hospitality industry. The results of the research revealed ICT plays a major role in the survival of SMEs in the hospitality industry. Each day SMEs heavily rely on ICT to operate efficiently, for an array of daily operations. The findings indicate mostly general forms of ICT are being such as, Email, Social Media, Smart phones, Laptop and desktop computers, and WIFI technology.

Keywords: Information and Communication Technology, Small to Medium Size Enterprises, Hospitality Industry, Competitive Advantage, Adoption Barriers, Technological, Organisational, Environmental.

INTRODUCTION

Small to Medium-sized Enterprises (SMEs) plays a significant role in the South African (SA) economy. In the second quarter of 2015, the number of SMEs in South Africa was 2 251 821, (Statistics South Africa, Quarter 2: 2015). This article focuses on very small businesses, which has between 4 and 9 employees. The number of employees sets very Small Businesses apart from Small Businesses (10 to 49 employees), and Medium Businesses (20 to 200 employees), (National Small Business Amendment Act 29 of 2004). Jentzsch and Miniotas (1999) classifies SMEs as independently owned businesses where the capital predominantly comes from the owner(s), as well as business decision making are done by owners. SMEs in developing countries such as South Africa has the potential to reduce poverty, create new employment opportunities and facilitate export growth (Ramukumba, 2014). With a high national unemployment rate of 25% (Statistics South Africa, Quarter 2: 2015) SMEs are vital to economic development in SA. According to The Banking Association of South Africa, SMEs contribute approximately 34% to the national Gross Domestic Product (GDP) and provide up to 60% of SA's labour force. Like any other profit-driven business, SMEs in SA does not operate without challenges. Common challenges include, lack of managerial skills, low financial and human resources and the accessibility to quality ICT (Department of Trade and Industry, 2012).

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RESEARCH QUESTIONS

This paper investigates the ICT adoption factors among SMEs in the hospitality industry in the Western Cape. With the attempt to highlight why so many SMEs in the hospitality industry still operate (many failing) without ICT. As a result, the aforementioned factors have been attributed to the failure or survival of SMEs operating in the hospitality industry in Western Cape (WC).

The main research question is:

> *What are the Factors influencing ICT Adoption among SMES in the Hospitality industry in Western Cape?*

The secondary research questions are as follows:

- *What are technological factors affecting ICT adoption among SMEs in the hospitality industry?*
- *What are organizational factors affecting ICT adoption among SMEs in the hospitality industry?*
- *What are environmental factors affecting ICT adoption among SMEs in the hospitality industry?*

LITERATURE REVIEW

The impact of ICT on SMEs has been researched to a great extent over the past 15 years, and many researchers have pointed out the potential beneficial contribution of ICT if implemented correctly (Modimogale & Kroeze, 2009). With digitisation being ubiquitous within business processes, technology has shifted from being a luxury resource to an extremely fundamental resource for any business (Carr, 2004). ICT tools allow businesses to effective and efficiently access relevant information, timely and easy, which in turn enable them to maintain a competitive edge (Apiyo & Kiarie, 2018). From an operational perspective, ICT has the capabilities to link vital value chain processes (Porter & Millar, 1985), making business processes faster and more effective (Taylor, 2004).

ICT in a restaurant environment can be used to achieve market and operational efficiency (Sigala, 2003). Where market efficiency is the capability to adapt to the different demands from the restaurant market, and operational efficiency is to improve existing processes (Tussyadiah, Tian & Lockwood, 2017). An example of market efficiency is to adapt to new trends, such as a significant number of consumers are opting to pay for their meal with their smart phones (Beard and Wallace, 2016). Restaurants should adopt the necessary ICT to facilitate such payments to stay competitive within the market. Successful integration of ICT between Point of Sale (POS) and back-of-house operations is the key to operational efficiency and should increase productivity (Tussyadiah, Tian & Lockwood, 2017). ICT can be used as a tool to control the business operations within a restaurant environment, controlling operating standards like strict timelines (Whitelaw, 2008). For example, a mobile application on a smart phone can be used for tracking customer orders from taking to delivering the order. The information can, in turn, be used to monitor and improve operational standards if necessary. Another example using ICT to improve efficiency is a Kitchen Delivery System (KDS), which help track preparation times of dishes and can ensure meals are served hot and fresh (Doran, 2012).

Hotels and Bed and Breakfast (B&BS) can use technology to populate customer databases, (Whitelaw, 2008). Interactions with customers are a vital opportunity to collect new information

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used to satisfy future needs. This can be done by a quick online survey, saving the data to a dedicated customer database. The aforementioned ICT implementation is pivotal to the sustenance of SMEs in the hospitality industry. Acquiring expensive software licences, advance technological hardware and technological expertise are a luxury most SMEs in the Western Cape cannot afford. Through the advancement of internet-based applications SMEs have access to less expensive, more flexible and increased interconnection between business partners, (Gareeb & Naickar, 2015). However, ICT adoption in SA, Western Cape is not on par with other African developing countries, showing countries like Seychelles and Mauritius moving above SA in the ICT Development Index of 2017 (IDI).

MAIN ICT ADOPTION BARRIERS AMONG SMES IN THE HOSPITALITY INDUSTRY

McGregor et al, (2002), argued that SMEs face unique ICT adoption challenges than larger or corporate firms. The labour force of companies in the hospitality industry is probably one of the most important resources, since service delivery is their core business. ICT capabilities usually are not part of the key performance areas (KPA's) when recruiting restaurant, hotel and B&B staff, which subsequently lead to inadequate or lack of ICT skills amongst the staff, (Cragg, 2002). Thus, SMEs face many challenges in running and maintaining, hardware and information systems adopted, (Nkosana, Skinner & Goodier, 2016), (McGregor et al, 2002). Larger firms might have training departments to up skill staff when new technology is introduced, something almost always absent within SMEs in the hospitality industry. Which in turn lead to extra financial expenditure to employ consultants to train staff or send staff on expensive training courses. As a consequence of limited or inadequate ICT skills, SMEs are reluctant to adopt crucial ICT.

Larger firms usually have superior financial resources compared to SMEs operating in the same industries, (Nkosana, Skinner & Goodier, 2016). With superior financial resources, larger firms are more patient when it comes to Return on IT Investments, a characteristic SMEs owner's lack, (McGregor et al, 2002). With tighter operational budgets, SMEs tend to be more reliant on short-term revenue and seldom invest in long-term projects. Consequently, lack of financial resources can be noted as one of the main ICT adoption barriers among SMEs (Mahapatra & Krishnan, 2017). Within the Western Cape, there is a digital divide between underdeveloped rural areas and well- developed cosmopolitan areas. Some areas have some of South Africa's fastest fibre internet speeds.

Mobile Application/ Technology usage among SMEs in the hospitality industry

According to Svanaes, Alos and Dahl (2010), Mobile technology is one of the dominant forms of ICT usage amongst SMEs, mainly because of the portability, and cost-effectiveness.

Current applications available in the hospitality industry are amongst, Zapper, SnapScan and SureSwipe POS (Google Play Store, Apple App Store download percentages). These applications are free to download and implement and only charge a percentage of sales for the services. Other areas where SMEs use mobile technology are, communication with employees, clients and suppliers, coordinating deliveries and orders, banking and mobile advertising, (Steyn, Steyn & De Villiers (2014)).

Complimentary Wi-Fi in the hospitality industry

Virtually all modern computers, mobile devices and video game systems are equipped with Wi-Fi chips. According to Kovar (2016), offering complimentary Wi-Fi can be used to establish a competitive advantage. Previous research by Nor Iadah et al in 2011 proved offering complimentary Wi-Fi at restaurants is an innovative way to attract and retain customers. Wi-Fi

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have a relatively low maintenance cost, which means there will not be a substantial increase in costs for SMEs operating on limited financial budgets. Complimentary Wi-Fi also acts as a good tool for pushing promotions and advertisements to connected customers, (Chai, 2012).

Social Marketing strategies in the hospitality industry

In today's digital age companies need to find creative ways to reach out to their customers, expanding their clientele and improve current business, (Oji, Iwu & Tengeh, 2017). Social media platforms are the ideal solution, with almost half the world's population are online, (Oji, Iwu & Tengeh, 2017). Social media platforms used to note customer needs, sharing of information between client and business, and comprehending customer behaviour through online video/ photo uploads can give businesses a huge competitive edge, (Pradiptarini, 2011). A study in 2014 by Kymani revealed Facebook and Twitter have the most users and is an ideal method to share information among social classes.

Technological, Organisational and Environmental (TOE) Framework

If SMEs in the hospitality industry intend to remain competitive, then managing organisational change and adapting to the market is essential, (Neves, Almeida & Velez, 2018). Business change in the technological era we live in is synonymous to ICT implementation or improvement. Firms cannot adopt ICT just because it exists, but firms need the correct reasons for adopting and taking advantage of ICT (Grant & Meadows, 2016). This study seeks to address the adoption factors of ICT in WC SMEs within the technologyorganization-environment (TOE) framework. The TOE framework is an organisational level theory developed in 1990 by DePietro, Wiarda and Fleischer, which explains the three levels within a firm that influences innovation adoption decisions, namely Technological, Organisational and Environmental (Baker, 2012).

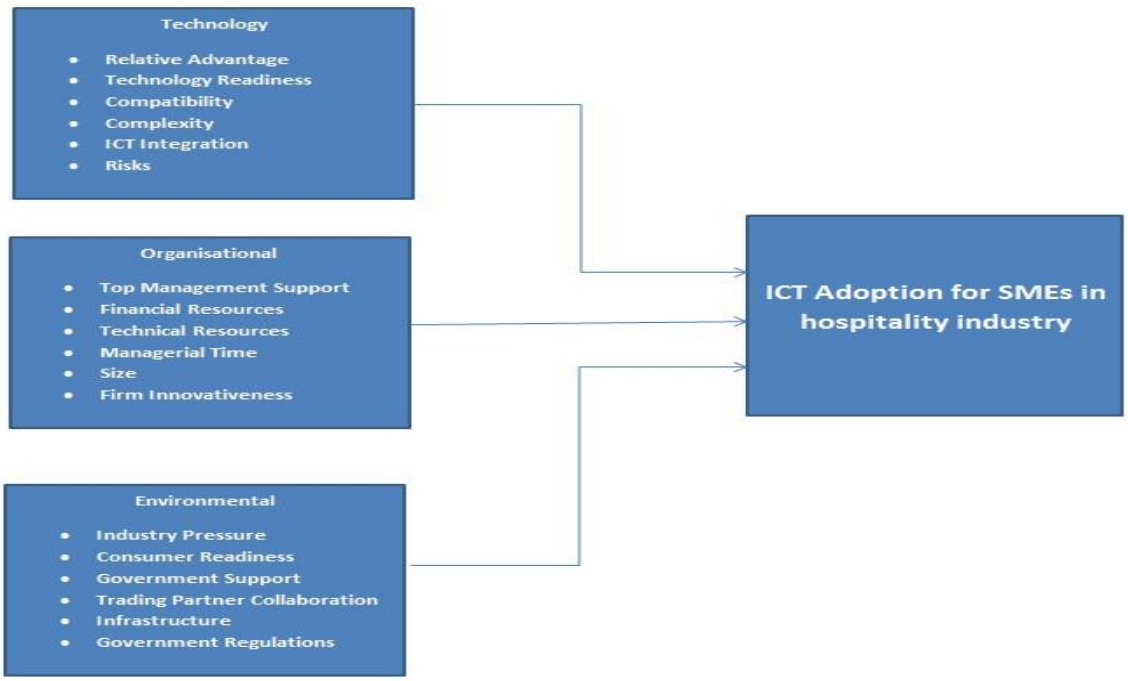

Figure 1: Integrated Model of Factors Influencing ICT Adoption Decisions in SMEs (Adapted Source: Taylor, 2014)

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i. Technology

The technology aspect of the framework consists of two parts, the existing technology within a firm and the technology not yet but can be adopted by the firm (Hoti, 2015). Pierce and Delbecq (1977) argue that technology innovation consists of three stages, initiation, adoption and implementation. Among many technological factors influencing ICT adoption researcher's points out; technological readiness; perceived benefits; and ICT integration as significant influencers (Zhu et al, 2006). According to Oliveira and Martins (2010) high perceived benefits and low risk with regards to ICT adoption have a positive influence on adoption. Technological readiness refers to as the internal IT infrastructure and the IT skills an organisation might have. System integration with existing ICT or existing business processes also play a major role when deciding on ICT adoption. Thus, ICT integration within the business is a positive predictor for adoption ICT (Oliveira & Martins, 2010).

ii. Organisational

The organisational aspect refers to the internal characteristics and resources of the firm (Baker, 2012). This can range from firm size, resources and culture which are all factors with can influence ICT adoption (Tushman & Nadler, 1986). Top management support is vital with regards to technological change within any organisation and creating a supportive culture and providing adequate resources have a positive influence on ICT adoption (Duan, Deng & Corbitt, 2012). SMEs might find it more difficult to adopt ICT with regards to their size, because bigger firms might have better financial and technical resources to do so (Bakos, 1991), or their size may be an adoption motivator as risk management will be easier to implements on a smaller firm.

iii. Environmental

The Environmental aspect focuses on the external variables of innovation adoption. This includes the structure of the industry, quality or lack thereof of the ICT infrastructure (Mucheru, 2013), as well as the regulatory bodies at play (Baker, 2012). Intense competition in the environment can promote ICT adoption (Mansfield 1968; Mansfield et al, 1977), whereas dominant firms in the value chain can influence value chain partners to either adopt or not adopt ICT based on their motives (Kamath & Liker 1994). Many previous researches suggest that pressures from competitors are a strong driver for ICT adoption, (Al-Qirim, 2007; Olivera & Martins, 2010).

RESEARCH DESIGN AND METHODOLOGY

This section outlines the methodology adopted to answer the research questions that were formulated to address the main research problem identified. For the purpose of the research, the model of Research Onion (Saunders et al, 2003) was selected to identify the steps involved in the research process. The proposed model is expected to provide a solution to the problem statement. The Research Philosophy used for this study is interpretivism. The principle of Philosophy of interpretivism is when nature and society are interpreted as two different objects (Martin & Guerin, 2006). Glesne and Peshkin (1992) states interpretivism is suited when the research study is qualitative of nature; the sample size is small and when the study is concerned with generalised theories.

The study is using an inductive approach, because it will follow a bottom up approach (Daff, 2011). Firstly, it identified the information then identified the generalised findings derived from the results. No hypothesis has been formulated, but the study use models and a framework to answer the research question and sub questions. The first stage of the research is done by a case study, using secondary data to study the research problem. Hofstee (2006), states using secondary data

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allows the researcher to obtain a holistic contextual view of the research problem, allowing the researcher to identify links and gaps. The second stage consists of the collection of primary qualitative data through semi structured interviews. First-hand information is gathered in terms of experiences, challenges, frustrations and opinions from the unit of analysis. The interview questions are mostly open-ended, which allowed the interviewer to add follow up questions depending on the responses from the interviewees. This method was selected as it allowed the researcher to uncover areas not previously deliberated, (Saunders et al, 2007).

Six organisations were selected to participate in the structured interviews. The organisations were selected according to the following criteria: The organisation operates within the hospitality industry. The organisation operates within South Africa, Western Cape geographical region. The ICT decisions should be made within the organisation. The organisation qualifies as an SME under the definition of the National Small Business Amendment Act of 2003.

To ensure reliability of the study a combination of methods was used to conclude on the findings, including secondary data, observations and semi structured interviews. Primary data was collected via the semi structured interviews. The interviews were conducted with the owners of the six establishments, who have full business decision making proxy. The organisations in question fall into the category of a Very Small business with 4 – 9 employees. One of the organisations is in the restaurant industry, another in the portable coffee stand industry, one in the B&B/ accommodation industry, two in the events catering industry and another in the fast food take-away industry. Different types of organisations were selected to represent the different business areas within the hospitality industry. The organisations were also selected from different demographical backgrounds representing, urban, portable and rural areas.

The sampling strategy used is the Maximum Variation (Heterogeneity) Sampling strategy. The reason for selecting this strategy is because the hospitality industry is a very large and diverse industry, thus selecting organisations from various business areas within the industry. This sampling strategy allowed the researcher to identify essential and variable features within the industry, as experienced by diverse stakeholders in various business areas, (Suri, 2011). The one-on-one interviews with the six organisations provided qualitative and exploratory data. The design classification is Empirical with a case study design, using primary and secondary data to establish factors influencing the adoption of ICT among SMEs in the hospitality industry in the WC. The study is involved with human perceptions and experiences, thus making a quantitative approach unviable. The objective of the interview questions was to establish if the information from the literature study is prevalent within these organisations. Furthermore, to identify if there are adoption factors not discovered in the literature study and if so to determine what those influencing factors are. The questions are designed around the case study and research objectives.

The sources of analysis identified in this study are semi structured interviews which are the primary data, and a literature review as the secondary data (Mouton, 2006). The interviews were recorded on an audio device for analysis after the interviews. Notes were also made of the interviewer's observations. A Grounded Theory framework is applied to discover the emerging patterns in the data. The data collected was compared to different sources, and observational analysis coupled with audio analysis was done to ensure the reliability of the data. For the data analysis, a Miles and Huberman (1994) qualitative thematic analysis approach was adopted and supported by analysis software QSR NVivo 12 Pro for coding. A rigorous coding procedure was

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performed which ensured a transparent and replicable approach to enhance the reliability of the research. Following the assumptions embedded within a qualitative paradigm, this study does not make claims to the wider general population but aims to identify ICT adoption factors in similar contexts of the study. The socio demographic sample profile is presented in **Table 5**.

Table 5: Socio demographic sample profile

Pseudonym	Gender	Business Type	Number of Employees	IT Knowledge	Company's Age (years)	Position
Respondent A	Male	B&B	5	Below Average	9	Owner
Respondent B	Male	Mobile Food truck	6	Average	3	Owner
Respondent C	Female	Catering	5	Below Average	3	Owner
Respondent D	Female	Business Office Canteen and Catering	5	Average	4	Owner
Respondent E	Female	Catering	5	Below Average	4	Owner
Respondent F	Male	Mobile Coffee Stand	6	Average	3	Owner

STUDY RESULTS

The findings of this study are divided into four main sections. First a general summary of the interviews, then I will break the other three sections down using the TOE framework.

DEMOGRAPHIC PROFILE OF ORGANISATION

All the SME's owners and managers have a general understanding of ICT and have some form of ICT implemented in the business. They understand the positive impact ICT have, and furthermore can have if additional ICT are implemented.

Respondent A's response on his current ICT profile was as follows:

> *"It basically include you know your WhatsApp your e-mails it would include the internet booking sites"* Respondent D's reply on he's current ICT profile: *"I have the POS, I have SnapScan, an ordering system and an email account"*

It was prevalent in all interviews that there are many challenges in relation to adopting and maintaining existing ICT. These challenges ranged from infrastructure to financial and poor ICT skills within the companies. When asked about ICT adoption constraints, **Respondent A** highlighted infrastructure challenges as follows*:*

> *"Suurbrak is 20 kilometres as I've mentioned outside of Swellendam so you think the technological options are fairly limited to the extent that it will depend on the type of signal that you will often get. So the changes and what to use within your B&B will largely depend on that. So as far as the rural village is concerned there's for example no Wi-Fi connection you know, there is no place there's no it not even*

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Telkom offers you know their sort of extended Wi-Fi projects so the only way of getting an internet connection will be hard spot on your Vodacom contract in my case for example."

Respondent B highlighted financial constraints as follows:

"Small business owners must be enough financial don't have money to buy all the big systems in one of those things so yeah I don't I don't think is anything else except the finances you know also if you go to big you might be need people to look after your system so I see that as a constraint because more people that you employ more money lose, if you in a small business, it eats into your profits"

Industry pressure or competition is a very strong ICT adoption motivator. All respondents acknowledge the importance of ICT to stay competitive and deliver good service to their technology aware customers, but not all are willing to upgrade their ICT portfolio based on competitor pressure alone.

Respondent D's comment on upgrading ICT to retain customers said:

"It's not good and not a nice feeling when I can't help the person, because I don't have the technology available and then they'll just go to the next shop buy the food there, but I'm working on getting that facilities available" Respondent B on upgrading ICT to retain customers: *"Well business is business, you're gonna lose customers for anything you know any simple reason. I have Wi-Fi the guy next to us also have Wi-Fi, if mine is slower they gonna go there. I just see that as part of the business I don't think that any one thing can/ will change the customer's loyalty so you know that to me is just part of part of the business"*

Technology

i. Relative advantage

Relative advantage refers to the degree the adopter feels confident that the adopted ICT will improve existing and new tasks within the business. The interviews revealed all SME owners feel the adopted ICT have made their business more marketable and increased their productivity. This suggests that SMEs in the hospitality industry in the WC are prone to adopt ICT when there the chance to improve business efficiency is recognised.

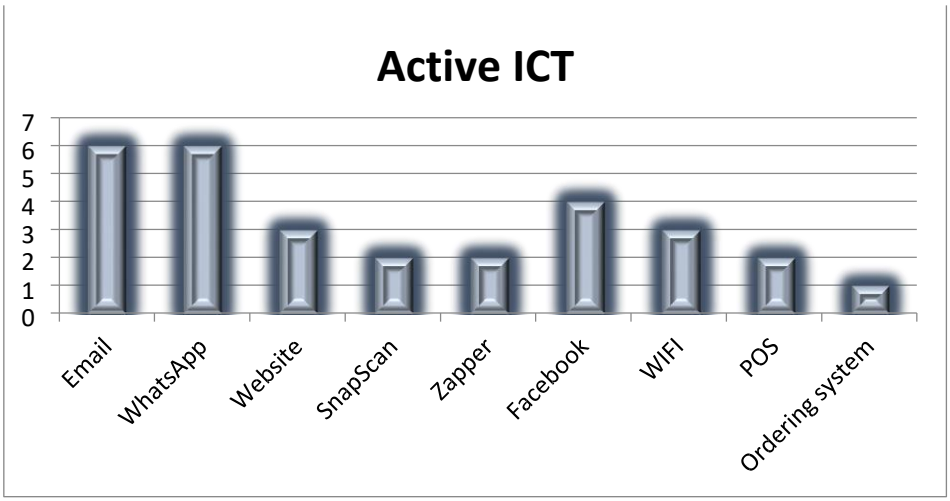

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Figure 2: Number of respondents using displayed ICT

ii. Technology Readiness

Technology Readiness refers to a company's technological infrastructure and IT human resources, (Zhu et al, 2006a). Literature suggests a company should have a specialized IT workforce and solid technological infrastructure to adopt a specific ICT system.

Respondent A's comment on technology infrastructure is as follows:

> "…*the technological options are fairly limited to the extent that it will depend on the type of signal I get. So the technological changes and what we use within the B&B will largely depend on that*." "...*I can access were the level of Technology available in Suurbrak that will be through you know you. Internet connection other options become very costly like for example to get the small service provider to provide you with a signal cause that will be in addition to your normal internet connection and that can be at the cost of about R400 month."*

Respondent B on his staff training on new systems:

> *"Some of them are older, all the people who is, is always a bit tricky when it comes to introducing technology to them ..." "…if you go to big you might be need people to look after your system so I see that as a constraint because more people that you employ more money you lose"*

iii. Compatibility and Complexity

Compatibility and Complexity can be grouped as Effort Expectancy, (Pather & Oluwafemi, 2017), which measures the level at which the business perceives that using ICT would be free of effort. Increased complexity can lead to extra financial expenditure, which in turn is an ICT adoption barrier.

While **Respondent C's** description of her staff understanding of the implemented systems was as follows:

> *"The employees are technology inclined. The employee does come from hospitality background…"*

Respondent E said the following about the same issue:

> *"...in business we keep thing simple, as soon as you go complicated that's where you'll get problems…"*

iv. Risks

Technological Risks refers to the risk if the ICT might fail in the business. None of the respondents have a viable contingency plan should the ICT fail. A high risk of ICT failures with a lack of a contingency plan is an ICT adoption barrier, and all respondents agree they would rather not adopt ICT if the business operations are too much dependent on it.

Respondent A comment on if his systems fail:

> *"If I must be on offline for some time on my emails for example, I will definitely lose bookings…"*

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Organisation

i. Top management support, Managerial time and Firm innovativeness

Ramdani et al, (2009) indicates Top Management support is critical when adopting new ICTs. Top Management needs to create a supporting climate and ensure relevant resources are allocated to support the essential needs of new ICTs. According to Tushman and Nadler, (1986) Top management needs to promote their views on technological innovation within the business to emphasize the technological vision for the future.

Respondent C on promoting ICT changes and managerial support:

> *"We promote ICT by providing accurate training…" "In our business we want to start the application where you can apply online, fill in a quotation online so all the information instead of having to wait for someone to basically give you the answers you automate it automatically see your price and conditions."*

ii. Firm Size

SMEs might find it more difficult to adopt ICT with regards to their size, because bigger firms might have better financial and technical resources to do so (Bakos, 1991), or their size may be an adoption motivator as risk management will be easier to implements on a smaller firm.

Environmental

i. Industry pressure

Industry pressure is synonymous with competitor pressure. Hoti (2015), states that high rivalry in the market promotes ICT adoption to gain bigger market share and competitive advantage.

Respondent D on upgrading ICT to retain customers said:

> *"It's not good and not a nice feeling when I can't help the person, because I don't have the technology available and then they'll just go to the next shop buy the food there, but I'm working on getting that facilities available."*

Respondent A on upgrading ICT to retain customers said:

> "*ICT will be a big Factor to make bookings and the exchange of information easier and more reliable. I don't think it is a major Factor always, that will determine whether the booking will be accepted or not. I think Suurbrak as a rural village offer many other qualities that you will not find in your cities or in your town. Here is your nature factor, your wildlife animal bird factor so obviously it (ICT) will be a big factor because of the people want to reliable information. They want the ease of doing the bookings; they want the ease of paying you know after the visit you know if with the cards. So those things are things that I cannot perhaps offer this point in time but I think we on the other hand offer alternative things that can complement or even make up for how late in ICT at the present moment."*

ii. Consumer readiness

The lack of customer readiness for certain industry ICT is an inhibitor to ICT adoption for businesses. Oji, Iwu and Tengeh (2017) indicate more than half the world's population are on social media. Social media platforms are a great tool to collect customer data, (Pradiptarini, 2011),

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and many of the younger generation use social media to research or contact businesses before they actually engage in any transactions.

Responding consumer ICT awareness, **Respondent D** said:

> "*The credit card facilities are a necessity because no one carries round cash anymore. I do have a snap scan option but some people are scared, the older people to be exact because of fraud so yes I think they do expect me to have credit card facilities".* Respondent B on consumer ICT awareness: "*Well customers vary a lot from the very young ones to very old people, but I think the bulk of them are probably in the in the 18 to 35 range and people these days in that bracket are very technologically aware…"*

iii. Trading partner collaboration

Trading partners who request a certain level of ICT functionality as a pre-requisite for doing business is a major adoption motivator, (Oliveira & Martins, 2010). This is consistent with the interview findings as all respondents said they will adopt ICT if it is affordable and will improve their business with trading partners.

DISCUSSION

The objective of the study was to identify the factors influencing the adoption of ICT among SMEs in the hospitality industry from a Western Cape perspective. The results of the study revealed ICT plays a major role in the survival of SMEs in the hospitality industry. Each day SMEs heavily rely on ICT to operate efficiently, for an array of daily operations. The results indicate mostly general forms of ICT are being used such as, Email, Social Media, Smart phones, Laptop and desktop computers, and WIFI technology. A few SMEs are using production orientated ICT such as, POS, Food ordering systems, electronic payment facilities and company Websites. The interviews findings suggest having a good IT infrastructure is pivotal in considering adopting additional ICT.

The results support previous studies observations) that suggests SMEs need to see an immediate ROI when adopting ICT and extra expenditure on technology infrastructure may hinder the adoption process(McGregor et al, 2002). Complexity and Compatibility also play a major role in ICT adoption. The results are consistent with earlier studies (Zhu et al, 2006), that compatibility does encourage SMEs to adopt ICT. Organisational culture plays a pivotal role in adoption new ICT. Establishing a pro technology culture was identified as mainly the responsibility of top management. The findings provide empirical support that top management support is crucial to the successful adoption of ICT and is consistent with conclusions from related studies (Ramdani et al, 2009). The results indicated are promoting technological changes within their business and set a substantial time apart to train and educate staff where necessary. According to Oliveira and Martins (2010) small firms have an advantage when implementing ICT because close collaboration and coordination can easily be achieved in smaller firms. The businesses environment operate in are always pivotal in the dictation on how companies adapt. Many previous researchers suggest that pressures from competitors are a strong driver for ICT adoption (Hoti, 2015). The results indicate the hospitality is a very personal industry in terms of one on one interaction with the customers. Thus, respondents' rate personal interaction and customer service satisfaction higher than the level of ICT their competitors might have.

In conclusion, based on the results the numerous factors were identified as critical important for ICT adoption in the hospitality industry in the Western Cape. In summary it was shown that these factors are prevalent in ICT adoption decision making among SMEs in the hospitality industry.

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Although this study may bring clarity as to what the ICT adoption factors are which influence SMEs in the hospitality industry in the Western Cape, there were some limitations worth mentioning. A short timeframe of four months was available to conclude the study, and the study was done part time while the researcher worked full time. A small sample size of only six organisations was used. There are additional TOE factors which were not covered in this study, such as government involvement, which may also play an important role in ICT adoption decision making. In this study the hospitality industry was looked at from a holistic view. I believe future research focusing on a specific area of the industry for example the fast food industry alone will uncover more important results which this study might have missed.

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INVESTIGATING THE BARRIERS OF M-COMMERCE ADOPTION WITHIN SMMEs IN CAPE TOWN

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ABSTRACT

Mobile commerce became a significant concept within the 21st century business environment. Consequently, it has created a revolution in the way business organisations buy, sell, and render services. As a result, m-commerce has been used as a strategic tool by business organisations within South Africa. However, many SMMEs within South Africa have not utilized the various advantages presented by the mobile commerce trend. Therefore, this study investigated the factors hindering the adoption of m-commerce by SMMEs within the Western Cape Province. For this reason, the objective of the study was to identify the barriers affecting the adoption of m-commerce using the TOE framework. Seven variables of a theoretical framework developed on the basis of the TOE framework are tested using semistructured interviews in the Western Cape Province. As a result, the research carried out a qualitative research technique in which interview schedules were used to gather raw data from SMMEs. The study adopted a grounded theory research design within the methodology. In addition, the research has utilized a non-probability sampling technique in which, purposive sampling have been used to gather participants. The findings indicate that the seven variables relative advantage, complexity, compatibility, top management support, firm size, organizational readiness and competitive pressure, all have a significant effect on an SMMEs decision to adopt m-commerce. However, 3 additional barriers have been identified namely, privacy and security, trust and risk. Furthermore, the study contributes to the body of knowledge on m-commerce adoption and identifies valuable insights into the key factors affecting SMMEs adoption of m-commerce.

Keywords: M-Commerce, E-Commerce, SMMEs, TOE Framework, Qualitative content analysis, M-Commerce Barriers.

INTRODUCTION

Industrial revolution 4.0 presented the 21st century with a cutting-edge wireless revolution aimed at transforming computing and wireless mobilization (Chou, Chuang & Shao, 2016). Coupled with the growth and use of the internet, mobile commerce (m-commerce) is evolving at a very fast pace with the advanced progression of wireless devices (Sexton, Johnson & Hignite, 2002). M-commerce is considered by Alfahl, Sanzogni, & Houghton, (2012) as the next generation of electronic commerce (e-commerce). Therefore, in order to understand m-commerce, it is important to understand the term e-commerce. According to Ghorishi (2009), e-commerce can be defined as the exchange of goods and services through electronic networks. As a result, e-commerce is referred to as an electronic transaction conducted between two or more parties through computer desktop technologies (Kim & Peterson, 2017). However, with the continuous advancements in information communication technologies (ICT) the demand for services through

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wireless connections has been on the increase (Chou, Chuang & Shao, 2016) including the emergence of m-commerce.

While the internet has created an invaluable platform (e-commerce) that has changed the way business is conducted, m-commerce has created a quantum leap of technological applications (Hanebeck & Raisinghani, 2002). According to Jain *et al*. (2011) m-commerce is defined as the utilization of wireless handheld technologies in order to assist or facilitate business transactions. As a result, m-commerce serves as a platform to conduct electronic business transactions via wireless connected device such as mobile phones (Khaskheli, Jun & AhmendBhuiyan, 2017). Consequently, m-commerce presents business organizations with distinctive features such as ubiquity, convenience, personalization, localization and accessibility (Anh, 2015). According to Yee *et al*. (2015) these distinctive features enables businesses to reach out to a larger scale of customers and suppliers at diverse locations. However, despite the advanced progression of information communication and the acceptance thereof, Small, Medium and Micro Enterprises (SMMEs) within developing countries such as South Africa have been lagging behind with the adoption of m-commerce (Khaskheli, Jun & Ahmed Bhuiyan, 2017). Even though M-Commerce has been fully utilized by corporate organisations, SMMEs have been lagging behind especially in developing countries such as South Africa. Consequently, majority of SMMEs within SA have not taken advantage of the mobile commerce trend. Primary research question is: *What are the organisational factors hindering the adoption of m-commerce by SMMEs within the Western Cape Province?*

LITERATURE REVIEW

Mobile commerce (m-commerce) has several definitions. In general, the concept of mcommerce definition has been narrowed to the use of mobile devices on any platform to conduct business. Although, m-commerce also involves the transfer of ownership (Khalifa, Cheng & Shen, 2012) as well as facilitates business transactions (Khaskheli, Jun & AhmendBhuiyan, 2017). These m-commerce transactions include mobile advertising and shopping, product location, mobile inventory management, proactive service management, mobile banking, and wireless mobile re-engineering (Yang & Huang, 2017). However mobile commerce has been reported to also include the mobile environment, such as location based services and mobile banking (Joubert & Van Belle, 2013). M-commerce services are reachable through wireless connected devices such as smart phones, laptops and tablets. These devices are considered to contain a different platform of presentations, processing and interaction modalities (Kourouthanassis & Giaglis, 2012). For this reason, the definition of m-commerce that will be adopted for this study is any business information transaction that leads to the exchange of monetary value via a wireless network-enabled device (Parasuraman & Zinkhan, 2015).

M-COMMERCE ATTRIBUTES

In a study conducted by Anh (2015) m-commerce consists of five main attributes comprising of ubiquity, convenience, personalization, localization and accessibility. Ubiquity refers to the use of a wireless device that enables users to obtain information and conduct transactions from any location at any given time Niranjanamurthy *et al.* (2013). Thus, m-commerce enables business organisations to gain easier access to information in real-time. As a result, ubiquity allows businesses to save time upon completing a specific task as well as improve customer satisfaction (Okazaki, Molina & Hirose, 2012). The convenience attribute of mcommerce relates to the agility and availability provided by mobile devices (Clarke, 2008). This implies that m-commerce presents business organisations with convenience as business transactions can be executed with ease (Ashraf *et al*., 2017) and without requiring conventional computers (Sissing, Dlamini &

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Johnston, 2017). In m-commerce, personalization is used as a tool to customize information in order to meet customers' expectations and improve user experience (Clarke, 2008). As a result, m-commerce allows users to personalize their interface such as storing personal information, in order to increase customer intention and efficiency while conducting m-commerce activities (Kalinic & Marinkovic, 2015).

Fourthly, in the context of m-commerce, localization refers to the ability to locate the location of a user at any given time (Anh, 2015). Consequently, users can receive information about the available services relevant to their location (Clarke, 2008). Lastly, accessibility allows business organisations to access customers or suppliers at any time and place on a hand held device (Hemmati, 2016). In conclusion, the five attributes give the users of m-commerce the ability to enjoy the benefits of anywhere-anytime mobile services (Gupta & Madan, 2011). As a result, m-commerce presents business organisations with a whole new set of unprecedented service capabilities (Kourouthanassis & Giaglis, 2012). With the fast progression and positive attributes of m-commerce it is evident that m-commerce is quickly becoming the highest industry leader (Albertyn-Burton & Scheepers, 2017).

ADOPTION OF M-COMMERCE BY SMMES WITHIN DEVELOPING COUNTRIES

Ghobakhloo, Arias-Aranda & Benitez-Amado (2011) believes that m-commerce has a significant contribution to the advancements of micro businesses within developing countries. With the fast progression of m-commerce (Albertyn-Burton & Scheepers, 2017) large business organisations have evidently been enjoying the benefits offered by m-commerce (Rahman & Sloan, 2015). However, Grandon & Pearson (2004) states that a small amount of studies have focused on the adoption of m-commerce by Small, Medium and Micro Enterprises (SMMEs) regardless of the numerous benefits m-commerce offers. As a result, literature points to SMMEs lagging behind on the adoption of m-commerce within South Africa (Li & Wang, 2018).

Benefits

SMMEs have been characterized by Ho (2017) to be flexible and in a good position to adopt new technology trends. As a result, m-commerce offers numerous benefits without requiring process modifications or investments which in turn benefits the country (Balocco, Mogre & Toletti, 2009). Consequently, SMMEs play a vital role within the South African economy (Jili, Masuku & Selepe, 2017). It is estimated that approximately 90% of all formal businesses in SA comprises SMMEs, which makes a contribution of over 76% to employment (Ayandibu & Houghton, 2017). As a result, South Africa benefits with a decrease in the unemployment rate making SMMEs essential for the growth of the South African economy. Consequently, SMMEs are one of the highest contributors, contributing approximately 50% towards the South African Gross Domestic Product (GDP) (Ramukumba, 2014). As a result, SMMEs generate wealth and improve the standard of living within South Africa (Barba-Sanchez, Martinez-Ruiz & Jimenez-Zarco, 2007).

Barriers

Little research has focused on the barriers that have negatively affected the adoption of mcommerce by SMMEs (Rahman, 2013). Consequently, revealing an important gap in the literature that this particular study aims to fill. According to (Khalifa & Shen, 2008) perceived risk has been identified as one of the major barriers affecting the adoption of mcommerce. In addition, the lack of trust has been identified by Alduaij (2018) to be another major barrier that negatively affects the adoption of m-commerce. Ozturk *et al*. (2017) validated a negative correlation between trust and risk, as the lack of trust imposes a high risk on organisations to adopt m-commerce. Furthermore, it was also found that consumer unawareness (Mahatanankoon & Vila-Ruiz, 2007) and lack of innovation (Li, Fu & Li, 2007) is added to the barriers business organisations face.

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TOE FRAMEWORK

Developed by Tornatzky & Fleischer (1990) the Technology-Organisation-Environment (TOE) framework specifies three different factors that affect the adoption and usage of technological advancements (Maduku, Mpinganjira & Duh, 2016). In addition, TOE framework has been used to investigate the level of adoption as well as the factors hindering adoption of m-commerce. It is important to indicate that the TOE framework has proven to provide empirical support in studying the adoption of information technology domains (Maduku, Mpingangjira & Duh, 2016), and is therefore recommended by Ghobakhloo, AriasAranda & Benitez-Amado (2011) as the most suitable framework to identify the factors hindering the adoption of m-commerce within SMMEs.

Technological context

In a study conducted by Hoti (2015) the technological context of TOE framework refers to the internal and external technological innovation that affects business productivity. The internal technology refers to the innovation currently used while external technology refers to innovation currently available within the market (Low, Chen & Wu, 2011). Compatibility refers to the degree of m-commerce fitting the existing values, culture and IT infrastructure of the business (Hwang, Huang & Wu, 2016). Lastly, complexity refers to the degree to which businesses perceive m-commerce as difficult to use and understand (Chiu, Chen & Chen, 2017).

Organisational context

The Organisational context of the TOE framework refers to the available resources and characteristics of an organisation (Pudjianto *et al*., 2011). According to Lian, Yen & Wang (2014) the size of the firm is an important factor that affects the adoption of technology. As a result, the size of the firm can have a negative or positive affect on the adoption of new technology however, Alshamaila, Papagiannidis & Li (2013) found that small firms have complete flexibility to be more innovative and adapt to new technology. Lastly, technological readiness takes into account the ability of the business organisations human resources to understand and adopt new technology (Oliveira & Martins, 2011).

Environmental context

The environmental context of the TOE framework refers to the external environment that the firm conducts their business (Maduku, Mpinganjira & Duh, 2016). In a study conducted by Micheni (2015) it was found that competitive pressure is a significant factor that influences a firms' decision to adopt new technology. According to Nkhoma & Dang, (2013) competitive pressure refers to the pressure of the external environment to adopt new technology in order to maintain a competitive advantage within the industry. As a result, the pressure from competitors' forces business organisations to develop positive intentions towards adopting new innovation (Maduku, Mpinganjira & Duh, 2016).

RESEARCH METHODOLOGY

This study adopted grounded theory as a research design. According to Kolb (2012) Barney Glaser and Anselm Strauss developed grounded theory as means for analysing qualitative research with the goal of discovering emerging theory from the Existing literature and primary data were compared in order to provide insight and clarity on the research topic (Johnson, 2015). As a result, grounded theory ultimately assisted the researcher in identifying the barriers hindering

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the adoption of m-commerce by SMMEs. The unit of analysis type for this study is organisational, in particular small, medium and micro enterprises. The primary question aims to understand the motives around the organisational factors affecting the adoption of m-commerce by SMMEs. The interview schedule consisted of 5 semi-structured open-ended questions. In which an unstructured probing component was employed in order to dig deeper and identify the underlying issues of the leading question. As a result, detailed explanations have been gathered on the factors affecting SMMEs adoption of m-commerce.

DATA SOURCES AND SAMPLING

The study collected secondary data from various articles in order to re-analyse the existing data on factors hindering the SMMEs adoption of m-commerce. Consequently, through analysing secondary data the researcher was able to identify the existing gap within the research that this study aims to fill. Furthermore, primary data has been obtained from 10 SMMEs located within the Western Cape. The research population therefore comprised of SMMEs located within the Western Cape Province. Purposive sampling is suggested by (Richardson, 2009) as the power lies in picking information-rich cases for an in-depth analysis of the central subject being studied. In conclusion, purposive sampling strategy has been selected as it increases the credibility of the results obtained from participants (Palinkas *et al.,* 2013).

RESEARCH METHOD

This research followed a qualitative approach. Qualitative research is defined as a research method that focuses on the beliefs and interpretations of the participants (Bengtsson, 2016). The study used semi-structured interviews in order to gather data. A semi-structured interview is defined as a qualitative research technique in which participants have to answer pre-set open-ended questions in which the researcher have the complete freedom to probe (Jamshed, 2014). The qualitative technique has been employed because of the in-depth nature that it provides in order to achieve the research objectives.

DATA ANALYSIS

Based on the method (interview schedule) employed within this study, the data has been analysed using content analysis. According to Elo *et al*. (2014) content analysis is defined as a research technique used to make valid inferences through the interpretation and coding of textual data. Thus, the main objective of content analysis is to systematically transform textual data into an organized and concise summary of the key results (Erlingsson & Brysiewicz, 2017). The researcher made use of the following content analysis process in order to analyse the raw data.

Transcribing

The researcher conducted non-standardized interviews, which were audio-recorded in order to be transcribed later. According to Litchfield (2018) transcription refers to the process of producing a written format of the actual words and phrases used within the interview audiorecordings. As a result, all 10 interviews were typed out into an individual word document. Furthermore, in order to maintain confidentiality each interviewee was assigned a name participant 1, 2, 3 up until participant 10.

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RESEARCH RESULTS

Based on the TOE framework various barriers were identified through content analysis within this study (Table 4). A total of 10 SMMEs were interviewed on the constructs of the TOE framework. However, 3 additional barriers have been identified due to the probing component used within the interviews. The following major constructs were explored as suggested by (Tornatzky and Fleischer, 1990).

TECHNOLOGICAL CONTEXT

The first construct explored was the technological context. The TOE framework suggests that the technology context consist of 3 key attributes consisting of relative advantage, complexity and compatibility.

Relative advantage

According to Chee, Suhaimi & Quan (2016) relative advantage is defined as the degree of perceived benefits of new innovation. Thus, unawareness served as a barrier for the selected SMMEs to implement any m-commerce applications. However, the results indicate that majority of the 10 selected SMMEs would recommend the usage of m-commerce after familiarizing themselves with the topic. Consequently, indicating interest by SMMEs to use m-commerce. In addition, two of the selected SMME do not recognize any benefits with mcommerce and believes that it is irrelevant for their business, making them reluctant to implementing m-commerce within their operations. Therefore, based on the above discussion it can be concluded that the unawareness of the relative advantages of m-commerce can serves as a negative barrier towards m-commerce adoption within SMMEs.

Complexity

According to Hoti (2015) complexity refers to the degree of perceived difficulty of new innovation. Majority of the participants have been reluctant to adopt m-commerce due to the interface appearance of applications. In addition, participants are not fully aware of their smart phones capabilities which serve as a barrier to adopting certain m-commerce applications. Based on the above it can be concluded that the complexity of m-commerce applications has a negative effect on SMMEs decision to adopt m-commerce. However, in order to overcome this particular barrier it is suggested that developers should take all complexity issues into account, in order to reach the highest level of simplification. Consequently, the easier the application is to use the more users will adopt and adapt.

Compatibility

The following construct suggested by (Tornatzky and Fleischer, 1990) was compatibility. According to Alshamaila, Papagiannidis & Li (2013) compatibility refers to the extent that the innovation is consistent with the firms existing infrastructure, values and culture. It has been found that m-commerce is not compatible with certain SMMEs existing infrastructure which serves as a barrier for adoption. Based on the findings participants prefer to make use of traditional operational methods to conduct business. Consequently, participants prefer to make use of traditional banking methods and hard copy documents as they believe that it is the safest option. Based on the above it can be concluded that compatibility has a negative effect on SMMEs decision to adopt m-commerce.

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ORGANISATIONAL CONTEXT

The next construct explored was the organisation context. The TOE framework suggest that the organisational context consist of 3 key attributes which consists of top management support, firm size and technological readiness.

Top management support

As a result, top management support becomes essential as they possess the power to adopt and adapt technical changes at the organisational level. However, it has been revealed that the majority of SMMEs are not aware of m-commerce services and its relative advantages. Therefore, due to the unawareness of m-commerce activities there is no support from top management to implement mobile commerce. It can therefore be concluded that the lack of top management support serves as a negative barrier toward the adoption of m-commerce by SMMEs.

Firm size

The size of a firm is an important aspect when technology adoption is involved (Makena, 2013). As a result, the size of the firm often limits SMMEs ability to survive any failures. However, based on the interviews participants are reluctant to spend any money on technology including a smart phone or mobile data. As a result, participants believe that mcommerce is not needed due to the size of their business. Based on the above discussion it can be concluded that the size of the firm has a negative effect on SMMEs decision to adopt m-commerce.

Technological readiness

According to Gangwar, Date & Raoot (2014) technological readiness refers to the extent of information systems (IS) knowledge and human resources available. Based on the interviews as previously mentioned it has been found that the lack of ICT knowledge serves as a major barrier for m-commerce adoption by SMMEs. As the interviews revealed that majority of the SMMEs consist of the owner alone, with the occasional help of family and friends. Consequently, hindering the successful adoption of m-commerce and preventing these SMMEs from fully reaping the benefits presented by m-commerce adoption.

ENVIRONMENTAL CONTEXT

The last construct explored was the environmental context. Within this context only one attribute has been explored namely competitive pressure.

Competitive Pressure

According to Chiu, Chen & Chen (2017) competitive pressure drives SMMEs to adopt mcommerce in order to maintain a competitive advantage within the market. As a result, participants believe that m-commerce serves no purpose and is irrelevant for their business. Therefore, based on the above discussion it can be concluded that competitive pressure has a negative effect towards m-commerce adoption.

OTHER BARRIERS IDENTIFIED

Privacy and security

Consequently, these SMMEs have concerns pertaining to the privacy of information and the security of their payment details. This is evident within the interviews in which the participants are

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reluctant to make use of mobile banking, due to the fear of information being misused and identify theft. As a result, privacy and security are one of the factors that held SMMEs back from implementing m-commerce within their business operation. Based on the above discussion it can be concluded that the lack of privacy and security serves as a negative barrier towards the adoption of m-commerce by SMMEs.

Trust

The privacy concerns that have been identified by participants, revealed a lack of trust in mcommerce. As a result, lack of trust has been found to be another barrier to m-commerce adoption. Consequently, participants are sceptical that m-commerce has the ability to meet their needs with the wondering mind if m-commerce is feasible and secure. As a result, the uncertainty causes participants to doubt the integrity of m-commerce services. In a study conducted by Siau & Shen (2003) one of the main reasons consumers experience the lack of trust in m-commerce is due to the lack of personal interaction. Therefore, based on the discussion above it can be concluded that the lack of trust serves as a negative barrier for the adoption of m-commerce within SMMEs.

Perceived Risk

According to Kleijnen, Ruyter & Wetzels (2007) perceived risk refers to the potential cost weighed against the benefits of m-commerce. The findings revealed that SMMEs are concerned with the perceived risk involved with m-commerce. Consequently, there is a fear of failing to implement m-commerce or losing capital with any online transaction. As a result, participants have become reluctant to adopt m-commerce within their operations regardless of the benefits. Therefore, it can be concluded that the perceived risk has a negative effect on SMMEs intention to adopt m-commerce.

CONCLUSION

The purpose of this study was to identify the organisational barriers affecting the adoption of m-commerce by SMMEs within the Western Cape. In order to achieve this a few steps were taken. It was found that many SMMEs are unaware of the m-commerce services, which negatively affects their intent to adopt m-commerce. Perceived complexity was also identified as a factor that hinders the adoption of m-commerce. The study identified that mcommerce appears to be complex to SMME users and thus creates a negative barrier for adoption. Lastly, compatibility was also identified as a negative barrier.

In conclusion, this study identified a total of 10 barriers affecting the adoption of mcommerce by SMMEs. Based on the above discussion all 10 factors have a negative effect on a firms' intent to adopt new technology, mobile commerce in particular. This research contributes to the body of knowledge on m-commerce barriers within SMMEs. Previous literature on the barriers together with the primary data collected by this investigation has provided new insights into the barriers SMMEs are challenged with. However, due to the limitation of purposive sampling this study is recommended for further research in which a quantitative approach could be used to sample a larger population. This would provide an improved representation of the population along with a better understanding of the challenges.

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TOWARDS A MODEL FOR BUILDING PUBLIC AWARENESS FOR SUCCESSFUL CYBERSECURITY SKILLING

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ABSTRACT

Aim/Purpose	The aim of this study was to create a Cybersecurity awareness model that can guide the design of an effective cybersecurity awareness programme.
Background	Despite certain authors suggestion that there are some clear indications of attempts to raise cybersecurity awareness and to establish an effective cybersecurity culture in South Africa, the literature review revealed that there are no works specifically dedicated to the models that can guide the design of the cybersecurity awareness programmes and, in that sense, be a precursor for skilling South African population and workforce and, in that sense, developing cybersecurity culture.
Methodology	This conceptual paper is based on the review of the pertinent literature of two kinds: academic and industry 'best practice'. The inclusion of the industry-based publication is also based on the fact that there are very scarce academic publications on the topic. The study subscribed to two prerequisites for the development of a conceptual model: problem description and goals to be achieved.
Contribution	As being somewhat pioneering in South Africa, this study brings a novel Cybersecurity awareness model that can be used to guide the development of an appropriate awareness programme.
Findings	The proposed Cybersecurity awareness model consists of a number of components such as Processes, Needs assessment role players, Dimensions, Vital features, Approaches, Policy and strategy considerations, Motivating users, and Evaluation. The attention to these components is a precondition for building an effective cybersecurity programme.
Recommendations for Practitioners	The policy-makers are advised to design cybersecurity skilling policies in the way that an effective awareness programme should be executed before the skilling initiatives begin. Also, the practitioners are advised to use the proposed model to guide designing of their cybersecurity awareness programmes and then, hopefully, to report back a degree of success.
Recommendation for Researchers	Empirically testing and possibly enhance the proposed model.
Impact on Society	Successful cybersecurity awareness campaigns and making a preparing the workforce and citizens for an effective cybersecurity skilling initiative.
Future Research	To test and enhance the proposed model and conduct fairly frequent future research on the topic in this fast-advancing field of cybersecurity
Keywords	Cybersecurity, awareness, model, programme, skills.

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INTRODUCTION

The introduction of new information and communication technologies (ICT) positioned modern societies in a constant state of flux. The consequence is that the evolution of technology increases risk and its safe and secure use. Hence, safety and security awareness is no longer simply a luxury, but a necessity as cybersecurity threats come in various forms (e.g. intrusion, denial of services, viruses) and are increasingly threatening individuals, companies and national critical digital infrastructure. In this regard, the literature suggests that a large portion of the South African population that has not had regular and sustained exposure to technology and broadband Internet access, expose local communities to cyber threats (Grobler, Van Vuren & Zaaiman, 2013).

An 'emergent skill need' is defined as the change in skills that are needed to adequately fulfil a certain job function in the future (Dijkgraaf, 2009) and, for starting learning these skills public awareness is crucial (ECORYS, 2010). The cybersecurity skills are such kinds of skills. Furthermore, being a part of a learning continuum (awareness-training-education), awareness is an essential first step but can also include cybersecurity basics literacy (NIST, 2016).

Despite certain authors' suggestion that there are some clear indications of attempts to raise cybersecurity awareness and to establish an effective cybersecurity culture in South Africa (e.g. Kritzinger, Bada & Nurse, 2017), the literature review revealed that there are no readily available works specifically dedicated to the models for building the cybersecurity awareness programmes - as a precursor for skilling South African workforce and population and developing an appropriate cybersecurity culture.

However, there are some academic works from other fields that confirm needs for building public awareness in order to enhance interest in certain skills (Gould, 2002). This is also supported by supplementary voices for the South African industry that point out the importance of awareness campaigns for cybersecurity skilling (Mybroadband, 2018). This importance is also recognised internationally. For example, in May 2108, the Computer Education in India organised an awareness programme regarding skill development programs launched by Prime Minister, Narendra Modi, for the awareness of the students and public at large (Daily Excelsior, 2018).

The cybersecurity campaigns in South Africa are officially led by the Cybersecurity Hub (Department of Telecommunications and Postal Services) but this entity is currently under-resourced and is not being able to effectively plan and deliver such campaigns (Mitrovic, 2018). While some organisations are launching cybersecurity awareness programs, citizens are rarely offered such a programme or campaign. In this regard, government responsibility cannot be ignored but governments cannot do the job alone. It seems that a lot remains to be done, especially in terms of changing societal attitude through targeted cybersecurity awareness campaigns.

All the above suggests that there is a need for a model that will guide cybersecurity awareness campaigns for building appropriate consciousness for the need of cybersecurity skilling. This conceptual paper, therefore, proposes a model that can be used for building an effective cybersecurity awareness programmes in the South African companies and society or, possibly, elsewhere.

The further structure of this paper is as follows: a brief description of the approach to this study is given, followed by the presentation of the reviewed literature. The subsequent section presents the proposed cybersecurity awareness model, which is followed by the concluding remarks

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APROACH OF THE STUDY

Since the topic of cybersecurity reflects a fast-changing field of the information and communication technologies, this conceptual paper is based on the review of the pertinent literature of two kinds: academic and industry 'best practice'. The inclusion of the industry-based publication is also based on two facts: (i) there are very scarce academic publications on the topic and (ii) the industry is reacting much faster than academics and produces numerous up-to-date reports

The study subscribed to two prerequisites for the development of a conceptual model: (i) problem description and (ii) goals to be achieved (Birta & Arbez, 2013). The conceptual model given in this paper is the result of the processes (Robinson et al., 2015) leading from the task (to propose a cybersecurity awareness model) to the specification of the conceptualisation of the ontological structure (identifying the common cybersecurity awareness elements). The fundamental objective of this conceptual model was to provide a point of reference (Kung & Solvberg, 1986) and a multi-level insight (Cropanzano, 2009) for the current understanding and the necessary further research in this still embryonic topic in South Africa.

LITERATURE REVIEW

The reviewed literature revealed that the relevance of information security (often interchangeably used with the term 'cybersecurity') awareness is widely agreed upon among information security researchers since early 1990s (e.g. McLean, 1992; Thompson & Von Solms, 1997; Straub & Welke, 1998) till the present time (e.g. De Brujin and Janssen, 2017). Hence no wonder that there is a number of different definitions and concepts of cybersecurity awareness. Thus, in order to construct and propose a model for building an effective cybersecurity awareness programme, the next sections will bring the discussion on appropriate definitions and the elements for an awareness building programme, as found in the pertinent literature.

DEFINITIONS

Cybersecurity can be widely defined as the ability to prevent or minimise the abuse of national, organisational or personal cyberspace by cyber-attacks. By cyberspace, we mean the estimated environment in which communication over digital networks occurs. In other words, cyberspace can be seen as a global area of digital infrastructure that includes telecommunication and computer systems networks, including processes that occur within these networks.

Cybersecurity awareness can be seen as a methodology used to educate internet users to be sensitive to the various cyber threats and the vulnerabilities of computers and data to these threats (Siponen, 2000). Cybersecurity awareness can also be defined as the degree of users' understanding of the importance of information security, and their responsibilities to exercise sufficient levels of information control to protect the organisation's data and networks (Shaw et al., 2009).

Based on the above definitions, it is visible that cybersecurity awareness plays two major roles:

- Alerting the users of the organisational informational resources of cybersecurity issues and threats, and

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- Enhancing these users' understanding of cyber threats so they can be fully committed to embracing security during the use of the organisational information systems and resources.

In contemporary literature is also noticeable that various bodies, institutions or authors tend to more precisely define terms that others use interchangeably. For example, the US National Institute for Standards and Technology (NIST, 1998) makes a distinction between 'awareness presentation' and 'training' by clearly stating that awareness is not training. The purpose of awareness presentations is simply to focus attention on security. During cybersecurity sessions, individuals should recognise cybersecurity concerns and learn how to respond accordingly.

In awareness activities, the learner is the recipient of information while, in a training environment, learners have a more active role. Furthermore, awareness relies on reaching broad audiences with attractive packaging techniques. Training is, on the other hand, more formal, having a goal of building knowledge and skills to facilitate the working performance (NIST, 1998).

In this paper, we subscribe to the above NIST (1998) definition of the notion of cybersecurity awareness.

ELEMENTS OF CYBERSECURITY AWARENESS PROGRAMME

A 'programme' is generally defined as s plan of action aimed at accomplishing a clear business objective, detailing the work to be done, role players, timeline, and the required resources or means. It is crucial to that cybersecurity awareness programme should be designed, developed and implemented with the organisational or national goals, needs and strategies in mind (e.g. Kortjan, 2013; Kritzinger, Bada & Nurse, 2017). Based on the NIST 800-50 (NIST, 2003) special publication, successful cybersecurity programmes should consist of:

- Assessing the needs;
- Developing a cybersecurity policy that reflects business needs tempered by known risks;
- Informing users of their cybersecurity responsibilities;
- Establishing processes for monitoring and reviewing the programme;
- Establishing rewards/incentives for compliance and sanctions for non-compliance.

Although all the above steps are important, it seems that informing users is one of the most crucial steps. As De Brujin and Janssen (2017) point out, cybersecurity has been the domain of specialists and experts who are not trained to communicate about the issues. Hence, De Bruijn (2017) stresses that there is a need for message framing, which is a strategy for communicating a complex societal problem in a way that the main arguments are clearly understandable and cannot be easily challenged.

Needs assessment and awareness programme role players

The designing of cybersecurity programmes should start and be led by the needs assessment (NIST, 2003) which, as mentioned, should be tightly linked to the organisational or national needs (Kortjan, 2013; Kritzinger, Bada & Nurse, 2017). The NIST 800-50 (NIST, 2003) framework suggests that the key organisational personnel should be included in conducting a cybersecurity needs assessment:

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Executive Management: organisational leaders need to fully understand directives and laws that form the basis for the security awareness programme. They also need to understand their leadership roles in ensuring full compliance by users within their units.

Security Personnel (security program managers and security officers): these individuals act as expert consultants for their organisation, therefore must be well educated on cybersecurity policy and accepted best practices.

System Owners: these people must have a broad understanding of cybersecurity policy and a high degree of understanding regarding cybersecurity controls and requirements applicable to the systems they manage.

System Administrators and *IT Support Personnel*: these professionals are entrusted with a high degree of authority over support operations critical to a successful security program. They need a higher degree of technical knowledge regarding effective cybersecurity practices and implementation.

Operational Managers and *System Users*: these individuals need a high degree of cybersecurity awareness and training on security controls and rules of behaviour for systems they use to conduct business operations.

The NIST's advice to the latter group of the stakeholders clearly shows a need for both awareness programmes and skills training, which confirms the link between awareness and skilling.

Dimensions

Siponen (2001) suggests the following five dimensions of cybersecurity awareness:

- *Organisational* dimension refers to different target groups for security awareness at an organizational level. Examples of these categories may include: top management, information technology (IT)/ information systems (IS) management, information security staff, computing/IS professionals, end users of various kinds (e.g., casual end-users, parametric end-users, sophisticated end-users and stand-alone users) and third parties.
- *General public* dimension has the main objective of increasing public awareness of relevant security issues. The main idea of this dimension is based on the argument that there are some central information security issues that every citizen using IT should be aware of.
- *Socio-political* dimension involves increasing people's information security awareness with respect to the socio-political nature of IT. This dimension includes the following categories (target groups): lawyers, public relations people, politicians and the government. This dimension is important in terms of the overall well-being of a society.
- *Computer ethical* dimension objective is to provide relevant (e.g. technical) information for the computer ethics scholars and to learn from and make use of their conclusions.
- *Institutional education* dimension refers to a society-driven process of education that is aimed at making individuals proper members of society within the well-developed culture in a desirable way, i.e. in the way free of indoctrination.

Yet again, the latter statement emphasises the link between awareness and skilling.

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Vital features of the awareness programmes

Winkler& Manke (2013) suggests some vital elements responsible for the success of the awareness programme:

- *Communication* feature means that a significant part of a campaign is done through communication, which can be accomplished by collateral, distributed materials such as newsletters, blogs, posters, and other internal or external communications.
- *Computer-based training* is the most omnipresent component of cybersecurity awareness programs, as it is the most accepted method of achieving compliance.
- *Events* are important as well-executed events bring the cybersecurity awareness programs to life.
- *Cybersecurity Portal* is significant as an internal or external cybersecurity portal provides several functions such as a knowledge base that includes information on cybersecurity-related topics. It is also important to include information on home and personal security strategies, such as protecting children online and securing social media accounts.
- *Behavioural testing* and *teachable moments* refer to attacks through phishing, baiting (USB drive drops) and Social Engineering tests are recommended. However, it is also important to give the employees 'teachable moments' through these tests.
- *Teaching new skills effectively* refers to what looks like a lack of motivation is sometimes really a lack of ability. Hence, teachers, security awareness professionals must break down complex goals in short, clear achievable steps.

The analysis of these, by the reviewed literature suggested, vital features also confirms a strong link between awareness and skilling.

Approaches to the awareness programmes

Roper, Fischer & Grau (2005) argue that there are four common approaches that are used to address security awareness programmes, namely:

- *Requirements-driven* programmes are usually based either on external requirements (standards and national or international regulations) or internal requirements based on organisational instructions for addressing certain issues.
- *Means-driven* programmes are usually driven by available means and resources
- *Needs-driven* programme is informed by the organisational cybersecurity needs.
- *Combined* programmes consist of the combination of these three programmes.

The first three types of programmes have advantages and disadvantages, which can be balanced by combining them into a comprehensive organisational cybersecurity programme.

One of the problems with the requirement-driven programmes is, for example, its orientation on compliance, which does not address some specific local threats. Also, the available budget can be largely spent on compliance and not having resources for training users on how to meet the programme's objectives or on addressing acute cybersecurity threats.

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Policy and strategy considerations

Based on the strategy, policy and implementation modes, the NIST 800-50 (NIST, 2003) document suggests the following three common approaches:

- *Centralised policy*, *strategy*, and *implementation* (fully centralised) entail responsibility and budget for the entire organisation's cybersecurity awareness programme that is given to a central authority. This model is often deployed by organisations that are relatively small or have a high degree of structure and central management of most IT functions as well as having a high degree of similarity in mission and operational objectives across all of its components.
- *Centralised policy* and *strategy*, *distributed implementation* (partly decentralised) require that security awareness and training policy and strategy are defined by a central authority, but the implementation is delegated to line management officials in the organisation. Awareness campaign budget allocation, material development, and scheduling are the responsibilities of these officials. This partially decentralised program management model is often deployed by organisations that are relatively large or have a fairly decentralized structure with clear responsibilities assigned to both the headquarters (central) and unit levels. These organisations also have organizational units with diverse missions, so that awareness and training programs may differ significantly, based on unit-specific needs.
- *Centralised policy*, *distributed strategy* and *implementation* (partly centralised) advocates that the central cybersecurity awareness authority (e.g. cybersecurity program manager) disseminates broad policy and expectations regarding security awareness and training requirements, but gives responsibility for executing the entire program to other organizational units. This model normally uses a series of distributed authority directives, driven from the central authority.

This fully decentralised program management model is often deployed by organisations that are relatively large, have a very decentralised structure with general responsibilities assigned to the headquarters (central) and specific responsibilities assigned to unit levels, have functions that are spread over a wide geographical area; or have quasi-autonomous organisational units with separate and distinct missions, so that awareness and training programs may need to differ greatly.

The policy and strategy considerations related to the awareness programmes yet again confirm that the awareness programmes are a necessary part of an effective skilling.

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Evaluation

As technology is fast changing and evolving at ever increasing speed, continuous improvement of cybersecurity awareness programmes cannot happen without appropriate evaluation and feedback. These mechanisms are critical components of any security awareness programme. However, it is important to note that the feedback mechanism must be designed in such a way to address the programme's objectives.

The pertinent literature offers a number of evaluation models of which there will be mentioned only three relevant models. The NIST 800-50 standard (NIST, 2003) states that many methods can be applied to solicit feedback but the most common include evaluation forms/questionnaires, focus groups, selective interviews, independent observations, formal status reports, and security program benchmarking (external view).

The same framework suggest that the evaluation of these programmes should recognise the importance of key indicators such as funding for implementing the strategy, enabling those with key responsibilities (CIO, program officials, and IT cybersecurity program manager) to effectively implement the strategy, support for broad distribution (e.g., web, e-mail, TV) and posting of cybersecurity awareness items, executive/senior level communication to staff regarding cybersecurity (e.g., staff meetings, broadcasts to all users by agency head), the use of metrics (e.g. to indicate a decline in cybersecurity incidents or violations, the percentage of users being exposed to awareness material is increasing, the percentage of users with significant security responsibilities being appropriately trained is increasing).

It is also important to pay attention that the managers do not use their status in the organization to avoid cybersecurity controls that are consistently adhered to by the rank and file. Level of attendance at mandatory cybersecurity forums/briefings, recognition of cybersecurity contributions (e.g., awards, contests) and motivation demonstrated by those playing key roles in managing/coordinating the cybersecurity programme are also considered as the key awareness programme's indicators.

The Kirkpatrick Evaluation Model (Bates, 2004) for evaluating training is still the most recognised method of evaluating the effectiveness of training programmes. This model consists of four levels, namely:

- *Reaction*: This level solicits opinions of the learning experience following a training event or course.
- *Learning*: This level measures the degree to which participants acquired the intended knowledge, skills and attitudes as a result of the training.
- *Behaviour*: This level measures the degree to which participants' behaviours change as a result of the training.
- *Results*: This level seeks to determine the tangible results of the training such as reduced cost, improved quality and efficiency, increased productivity, employee retention, increased sales and higher morale.

Although the NIST 800-50 standard's recommendations are respectable, we here suggest that, at least, the Kirkpatrick Evaluation Model should be used for the evaluation of the cybersecurity awareness programmes.

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The SANS Institute, one of the leading institutions in researching cybersecurity awareness, has produced the five-stage Security Awareness Maturity Model (SANS, 2011), namely: Non-Existent, Compliance Focussed, Promoting Awareness and Behaviour Change, Long-term Sustainment and Culture Change, and Metrics Framework. These are discussed briefly below.

- *Non-Existent* - Cybersecurity awareness programme does not exist. Employees have no idea that they are a target, that their actions have a direct impact on the security of the organisation, do not know or understand organisation policies, and easily fall victim to attacks.
- *Compliance Focused* - Cybersecurity awareness programme is designed primarily to meet specific compliance or audit requirements. Training is limited to annual or ad-hoc basis. Employees are unsure of organisational policies and/or their role in protecting their organisation's information assets.
- *Promoting Awareness and Behaviour Change* - Cybersecurity awareness programme identifies the training topics that have the greatest impact in supporting the organisation's mission and focuses on those key topics. The program goes beyond just annual training and includes continual reinforcement throughout the year. Content is communicated in an engaging and positive manner that encourages behaviour change at work, home and while travelling. As a result, people understand and follow organisation policies and actively recognise, prevent and report incidents.
- *Long-Term Sustainment and Culture Change* - Cybersecurity awareness programme has the processes, resources and leadership support in place for a long-term life cycle, including at a minimum an annual review and update of the programme. As a result, the programme is an established part of the organisation's culture and is current and engaging. It takes a minimum of 3-5 years before you can effectively change the culture.
- *Metrics Framework* - Cybersecurity awareness programme has a robust metrics framework to track progress and measure impact. As a result, the programme is continuously improving and able to demonstrate return on investment. This stage does not imply metrics are not part of every stage (they are), this stage reinforces that to truly have a mature programme, and you must have metrics to demonstrate success.

Taking into consideeration that the SNAS institute is one of the leaders in exploring cybersecurity awareness, the presented model is recommended for assessing the maturity of organisational or national cybersecurity awareness.

Motivating users

The importance of motivating end-users of information and communication technologies is fairly well-documented (e.g. Arasanmi et al., 2011; Lee, Lee & Hwang, 2015). The reviewed literature also suggests the use of the Fog Behavioural model for motivating end users to adopt the cybersecurity awareness programmes.

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However, the motivating users to become aware of the cybersecurity threats is, it seems, still in its (academic) infancy as there are no many readily available works on the topic. One of the available 'best practice' works suggests that motivating end users is based on understanding the human side of the cybersecurity phenomenon – hence, awareness messages that should be tailor-made for a particular audience. In that regard, Mihai (2008) suggest the following:

- *The self-interest of the users*: it is proven that human beings tend to retain facts better if they can personally identify with the situation. For, example, the organisational cybersecurity policies should be presented in a way that can be used by the users not just to protect their organisation but also to use it at home.
- *Memory persistence*: newer examples of cybersecurity breaches or cases are more likely to be remembered by the users and help reinforce the consequences of cybersecurity gaps than old, even spectacular stories.
- *Perceived importance*: the perceived importance of cybersecurity policies and regulations will determine the use of and adherence to all kind of cybersecurity regulations.
- *Self-efficacy*: Users will adopt policies that they understand rather than those that look alien to them. For example, if users understand the value of strong password authentication, the acceptance of this regulation will be more likely.

PROPOSED MODEL FOR DESIGNING AN EFFECTIVE CYBERSECURITY AWARENESS PROGRAMME

As presented thus far, the reviewed literature has offered building blocks for the cybersecurity awareness' model that can be used for designing an effective awareness programme. The analysis of the literature findings suggest that this model should consist of, at least, the following main components: Processes, Needs assessment role players, Dimensions, Vital features, Approaches, Policy and strategy considerations, Motivating users, and Evaluation (**Figure 1**). The subcomponents of the proposed cybersecurity awareness model are given in **Table 1**.

The Processes related to the creation of the cybersecurity awareness programme start with assessing needs associated with the identified risks. This is followed by developing cybersecurity awareness-related strategy and policies. The next process is related to appropriately inform users of their cybersecurity responsibilities. Establishing and communicating rewards/incentives for compliance and sanctions for non-compliance should also be performed. Monitoring of the execution of the awareness programme should be followed by regular formative and summative evaluations.

The needs assessment should be done by gathering information from all stakeholders, including, at least, executive management, security personnel, system owners, system administrators, and operational managers, system users in organisations or communities. The latter also refers to the dimensions of the awareness programmes that include organisations and the general public. The socio-political dimension includes lawyers, public relations people, politicians and the government while the Computer ethical dimension primarily refers to the computer ethics scholars.

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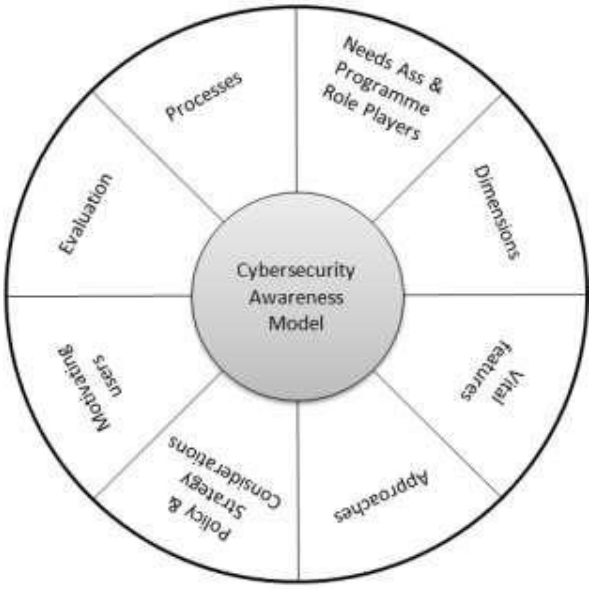

Figure 1: The main components of the proposed Cybersecurity awareness model (Source: Authors)

The Vital features element includes the awareness of the importance of the computer-based cybersecurity training, establishing the appropriate Internet portal, teaching new skills related to this fast-changing discipline, followed by behavioural testing through, for example, controlled phishing attacks. Communication, as one of the most important features in this context, should be done through message framing, which is a strategy for communicating a complex societal problem in a way that the main arguments are clearly understandable and cannot be easily challenged.

The Approaches related to the creation of cybersecurity awareness programme can be linked to the organisational or national requirements (e.g. compliance), needs (e.g. business or national needs), and available means (e.g. various resources) or, often, the combination of these drivers.

Table 1: Proposed Cybersecurity awareness model (Source: Authors)

Main element	Sub-element
Processes	Developing cybersecurity policy
	Informing users
	Establishing processes for monitoring and reviewing
	Establishing rewards/incentives for compliance and sanctions for non-compliance
Needs assessment and awareness programme role players	Executive Management
	Security Personnel
	System Owners
	System Administrators
	Operational Managers
	System Users

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Table 1: Proposed Cybersecurity awareness model (continued)

Main element	Sub-element
Dimensions	Organisational
	General public
	Socio-political
	Computer ethical
Vital features	Communication
	Computer-based training
	Cybersecurity Portal
	Behavioural testing
	Teaching new skills effectively
Approaches	Requirements-driven
	Means-driven
	Needs-driven
	Combined
Policy and strategy considerations	Fully centralised
	Partly decentralised
	Partly centralised
Motivating users	The self-interest of the users
	Memory persistence
	Perceived importance
	Self-efficacy
Evaluation	
Effectiveness of training programmes	Reaction
	Learning
	Behaviour
	Results
Maturity	Non-Existent
	Compliance Focused
	Promoting Awareness and Behaviour Change
	Long-Term Sustainment and Culture Change
	Metrics Framework

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The cybersecurity awareness strategies and policies vastly depend on the nature of organisations or communities involved. Smaller organisations are likely to embrace a fully centralised approach while more complex organisations and diverse communities are likely to adopt either partly decentralised or partly centralised approach.

Motivating users to adopt the cybersecurity awareness programmes is of the utmost importance as their perception of its beneficial nature will determine their interest in such programmes.

Finally, in order to judge the effectiveness of the implemented awareness programme, monitoring and periodic evaluations are required. Benchmarking the maturity of the cybersecurity awareness should be also performed in order to make an improvement to the current programmes.

CONCLUSION

This study was motivated by the fact that the cybersecurity awareness in South Africa is not at the satisfactory level and that there is no a model for guiding the development of an effective cybersecurity awareness programme. At the same time, the development of cybersecurity skills is a must in this highly connected but also insecure digital world. As awareness of needs is a precursor to successful skilling, a model that can guide awareness programmes became a necessity.

The model presented in this paper is based on an extensive literature review of both academic works and the industry 'best practice' reports. The analysis of the literature has resulted in a proposition of the Cybersecurity awareness model, which then can be used by various public or private organisations to guide their cybersecurity awareness initiatives.

This paper also points out to the policy implications related to the cybersecurity skilling initiatives. The policy-makers are advised to designed skilling policies that favour the execution of appropriate awareness programmes, possibly based on the proposed model, before starting cybersecurity skilling programmes and initiatives. The practitioners are advised to use the proposed model to guide designing of their cybersecurity awareness programmes and then, hopefully, report back on a degree of a success.

The limitation of this work is seen in the fact that this model is not empirically tested so its practical validity is not confirmed as yet. Hence, the major recommendation for further research is to empirically test the model in private and public organisations. Furthermore, the field of information and communication technologies is fast changing, so does the area of cybersecurity Hereafter, there will be a need for a frequent research on the topic in order to keep the development of the cybersecurity awareness programmes current.

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DIGITAL SKILLS IN THE PUBLIC SECTOR: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Aim/Purpose The process of digitisation in developing countries has been marred by project failure and wasteful expenditure emanating from a lack of various digital skills in the public sector. In this review, an investigation of the prevalence of e-skills in the South African public sector was undertaken.

Background The following themes emerged from the literature review: Human Capital Developments, Sector of Government, Soft Skills, Technical Skills, Organisation, and National Context. The review has identified studies that have been conducted on e-skills and gaps for future studies in the public sector

Methodology A Systematic Literature Review method was used to meet the objective of the research. A total of seventeen articles were selected based on a predefined criteria covering the period 2010 to 2018

Findings In conclusion, the research identified the different elements related to ICT skills in the public sector. It is envisaged that this research will assist future studies in areas that have been identified in terms of e-skills for the implementation of a digital government.

Future Research The selected research articles did not adequately discuss how certification and accreditation can enable stakeholders to acquire skills as well as how continuous professional development in ICT affects performance appraisal of public sector employees.

South Africa has 12 official languages and ability to converse in different languages or language of instruction can have an impact on working in a team of ICT personnel. Studies were found that address how the language of instruction affects stakeholders in terms of acquiring e-skills or working on e-government projects.

It was evident from this SLR that some local municipalities are not able to retain skilled ICT personnel. This creates an opportunity for future studies to be undertaken on how to retain employees with advanced ICT skills in different public sector organisation.

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A gap between the setting of policy documents and its implementation was revealed by this SLR, especially in respect of lack of leadership when implementing policies. Future studies should therefore explore the issue of how leadership can be used to implement formulated policies.

Lastly, a gap in terms of which specific hardware skills are essential for the digitisation of the public sector was identified since hardware skills range from basic skills required for desktop support to advanced skills required for supporting cloud-based servers. Future studies should address this gap.

Keywords e-Government, e-Skill, ICT, Public Sector, Digitisation, Government Services.

PROBLEM STATEMENT

According to Twinomurinzi (2012), a skill is the ability to convert knowledge into an idea or a product that can add value to an organisation. This review will focus on this ability in the context of the public sector. Furthermore, Twinomurinzi (2012) has addressed the process and environment that can enable an individual to acquire the skills or develop an ability from novice to mastery. It is at this level of mastery that creativity and innovativeness manifest by drastically or radically changing how things are done.
The term digital skills or ICT-skills and e-skills will be used interchangeably in this review. These skills can be used in various sectors of society and the government by creating an enabling environment through digitisation.

The benefits of digitisation (also known as e-government) include contributing towards the improvement of service delivery for the citizens, especially at local government level (Mawela, Ochara & Twinomurinzi, 2017). Digitisation enables citizens to access their municipal accounts, pay rates and taxes and make queries electronically. This reduces the number of people physically going to municipal offices, which and in turn reduce the cost that the municipality has to incur employing customer service personnel. In order for such innovation to occur in the public sector, digital skills are required at a mastery level and it is also expected that the requisite processes are put in place to ensure that public servants acquire those skills.

Munyoka & Maharaj (2016) have cited lack of various digital skills required for the implementation of e-Government or digitisation as the main reason behind failure of digitisation in many developing countries. While e-skills are regarded as an enabler of the successful implementation of e-government or a digitisation in government, the status and levels of e-skills among government employees is not known. It is for this reason that this study seeks to determine, through a systematic literature review, the levels of e-skills that are available in the South African public sector.

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RESEARCH QUESTIONS

In order to determine the levels of e-skills in the public sector, the proposed systematic literature review will attempt to address the following question:

What research has been undertaken concerning e-skills in the public sector?

RESEARCH SUB-QUESTIONS

The following sub-questions were formulated with the view to address the main research question posed in the previous section:

- What are the main findings of research in e-skills in the public sector organizations?
- What conclusions can be drawn from the findings of previous studies on digital skills and digitisation in the public sector?
- What area of digital skills has not been addressed by selected research articles, is important for the digitisation of the public sector and that it warrants further research?

RESEARCH OBJECTIVES

The objective of this review is to identify and summarise findings on selected studies about the current prevalence of digital skills in the public sector. This will be done by selecting a specific number of articles based on a predefined criteria, from articles published during the period 2010 to 2018. It is envisaged that the review will identify emerging themes that could assist in highlighting what has been researched before on the selected topic, identify gaps and make recommendations for further research.

BACKGROUND

DEFINITION OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

Mbatha, Ocholla & Le Roux (2011) posit that ICT is a word used to state a combination of different technologies used in formulating, manipulating and broadcasting information. These technologies incorporate all phases of data and information storage and retrieval using computers, telecommunication, satellites, fibre optics, multimedia applications, and electronic broadcast technologies (Mbatha, Ocholla & Le Roux, 2011). As far as Twinomurinzi et al. (2017) are concerned, ICT is not due to complexities entailed in ICT and it has a single succinct definition ICT can however be defined in terms of categories that relate to how ICT is used. ICT advancements coupled with its use has enabled organisations to survive and thrive under challenging environments. Since this review is focused on the public sector, it is at this point necessary to discuss this sector in the context of digitisation.

PUBLIC SECTOR AND E-GOVERNMENT

Public Sector

The Institute of Internal Auditors (2011) defines the public sector as organisations that are controlled and receive funding from the government or government owned entities. Their main purpose is to offer a service to the public. The concept of defining the public sector is not clear because according to The Institute of Internal Auditors (2011) there are different types of public sector organisations, which are as follows:

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- Core government - these include government department that reports directly to the central government.
- Government agencies – these Include organisations tasked with fulfilling a mandate of a specific government ministry but do not report directly to the central government and the employees are not employed by the central government.

e-Government

Lohmeier (2013) describes e-Government the use of ICT to support and improve government processes to deliver services to its customers and citizens at large. In a nutshell, e-Government involves the use of ICT to enhance easy access of government services and it is aimed at bringing efficiency in service delivery. Hunnius & Schuppan (2013) are of the view that e-Government can change how the whole government works if fully implemented. e-Government provides an opportunity to automate some manual tasks that do not require human discretion, and in the process changes its role from being a support mechanism for government processes to determining the processes required by the government due to the elimination of redundant activities. For the e-Government to be implemented, the public sector needs to have various competences to fully implement digitisation. One of the reasons why many governments have failed to fully transform their government operations to e-Government is the lack of various competences or skills (i.e. e-skills) (Hunnius & Schuppan, 2013).

e-Skill is regarded as the ability to convert ICT Knowledge into an innovative and financially viable product (Twinomurinzi, 2012). This skill is very crucial in the public sector because it creates new ways of doing business because it changes how the public sector interacts with the citizens. For example, filing tax returns with the South African Revenue Authority (SARS) can now be easily done in the comfort of the taxpayers' homes. The adoption of the much more efficient e-filing system has led to an improvement in tax compliance and collection, which in turn increases revenue for the government.

ICT skills play a major role in improving an organisation performance because the adoption of an ICT system on its own does not necessarily translate into value addition. In order to take advantage of the opportunities presented by ICT, specific attention should also be paid to the upskilling of the employees who will be using the ICT-based systems to render the relevant service.

South Africa is currently facing a shortage of suitable ICT skills. Other challenges include the slow pace at which new technologies are adopted by mainstream tertiary institutions and lack of opportunities for graduates to gain practical experience on how to apply their skills in a workplace environment (Calitz et al. 2015). As shown in **Table 1**, different the skills that are required by both the private and public sectors have been categorised by Calitz et al. (2015).

Table 1: ICT Skills Matrix adapted from (Calitz et al., 2015)

Technical Skill	**Non-Technical Skills**
Fundamental Skills Programming, System Testing, Database Design, Operating Systems, Telecommunication **Operational Skills** Operations, IT Services, Disaster Recovery, mainframe **Essential Skills** System Analysis and Design, IT Architectures	**Project Management Skills** Leadership, Planning, Budgeting, Integration, Risk **Problem / Opportunity Skills** Business & Industry, Knowledge, Business Process, Design, Change Management **Relationship Skills** User & Communications Management, Negotiation and Stake Holders Relationship

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These skills can then be further categorised as indicated in **Table 2**.

Table 2: Skills Categorization Adapted from (Calitz et al. 2015)

Soft Skill	**Business Skills**	**Technical Skills**	**Programming Skills**
Problem Solving Skills	**Business Process**	**Software Development**	**Current Languages**
Ability to Learn	Accounting	Agile Development	.NET
Attention to details	Business Process Design	CASE Tools	AJAX
Business Problem Solving	Contracting and Legal	Client Server	ASP
Creativity	Finance	Programming	C/C++
Critical Thinking	Marketing	SDLC	C#
General Problem Solving	Supply Chain	System Testing	Coldfusion
Research Skills	Management	System Analysis	HTML/XHTML/DHTML
Working Under Pressure		System Design	Java/J2EE/J2P
	Management Skills	User-Interface Design	Perl
Interpersonal Skills		Web based Application Development	PHP
	Change Management		SQL
Conflict Resolution	Managing Service Providers	**Business Application**	Visual Basic
Interpersonal Relationship	Outsourcing Management		XML
Leadership	User Relationship Management	Applying IT to Business Problems	
Self Esteem	Working Globally	Customer Relationship Management	
Teamwork	Working with Virtual Teams	Enterprise Resource Planning	**Legacy Languages**
		Operating System	
Work Ethics	**Project Management**	Transaction Processing Systems	Ada
Initiative Motivation to work		Web Services	COBOL
Integrity/ Honesty/ Ethics	Project Management/ Planning/ Scheduling		Smalltalk
Professional Ethics	Project Risk Management	**Information Management**	
Responsibility			
Self-Management	**Strategy Skills**	Data Mining	
Time Management		Data Warehousing	
	Business Intelligence	Database Administration	
Language Skills	Business Strategy	Electronic Data interchange	
Oral and Written	Project Integration	Online Analytical Processing	
		Hardware	
		Business Continuity Planning	
		IT Architecture Standards	
		Network Administration	
		Security	
		Voice Data Telecom	

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According to Manpowergroup (2015), there is a gap between ICT skills taught at tertiary institutions and the skills required by the private and public sectors. This means that new graduates entering the job market (both private and public sectors) have outdated ICT skills. Manda & Backhouse (2017) have highlighted a need for governments to formulate a process to empower its employees and citizens with the necessary ICT skills to fully benefit from a digitised government.

ACQUIRING DIGITAL SKILLS

Government Policy on ICT Skill

In Malaysia, government policy enables knowledge transfer to local ICT professionals by requiring foreign companies to employ locals in the ICT departments, thereby creating a local skills base (Twinomurinzi, 2012). South Africa has approached has put in place an enabler for resolving the shortage of ICT skills in the form of the policy framework on digitisation (Manda & Backhouse, 2017).

However, such policies have been introduced with a combination of other approaches such as the market review process of the Independent Communications Authority of South Africa (ICASA), which seeks to address issues related to the availability of broadband and the cost of data in the country. Broadband availability and cost of data have a bearing on the accessibility of digitisation tools that the general public and public sector employee can use acquire and develop the skills required for the 4th industrial revolution. Manda & Backhouse (2017) and Ogwueleka (2017) have also articulated the need for the supporting infrastructure or a creation of a conducive environment for digital skills acquisition and retention. A conducive environment for retention of skills is enabled by the government investing in technologies that employees have recently received training on. If the government lags too far behind in terms of modernising or implementing the latest technology, employees might use the acquired skills to secure employment in the private sector, and this will create a perpetual skills gap in the government.

RESEARCH METHODOLOGY

OVERVIEW OF THE METHODOLOGICAL APPROACH

ICT skills are the backbone of a digital government. The final outcome of this SLR is the identification of any potential gaps and future research opportunities following a scrutiny of previously published research material using an explicitly defined methodology (Kitchenham, 2004). Specifically, the SLR involves listing all selected articles and methods used in the research (Siddaway, 2014). This approach reduces bias in the research since the list can be peer reviewed for potential gaps. Kitchenham (2004) postulates that in order to eliminate bias, a specific research protocol is required. This research protocol is expected to state the research questions and the background to the questions, the strategy that will be adopted to conduct the research, the scoping of the data, the inclusion and exclusion criteria, and data extraction strategy. Following the undertaking of the research protocol, information or data will need to be synthesized and a projected time line is also required for the research. The SLR has the advantage of ensuring that all the relevant material are analysed using a rigorous methodology (O'Brien & Mc Guckin, 2016). However, the disadvantage is that the SLR does not eliminate bias but only reduces it. Furthermore, the inclusion and exclusion criteria introduces bias by pre-selecting certain articles

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CONDUCTING THE SLR

This section addresses issues relating to how the research will actually be conducted following specific guidelines (Kitchenham & Charters, 2007). As part of the SLR process, a review protocol is designed.

Protocol Review

According Kitchenham & Charters (2007), the review protocol identifies the methodology that will be used and it minimizes the possibility of bias by the researcher. In the field of medicine review protocols are usually reviewed by their peers.

The Research Question

The review intends to answer the following questions and sub-questions:

Main question: What research has been undertaken concerning e-skills in the Public sector?

Sub-questions:

- What are the main findings of research in e-skills in the public sector organizations?
- What conclusions can be drawn from the findings of previous studies on digital skills and digitisation of public sector?
- What area of digital skills has not been addressed by selected research articles, is important for the digitisation of the public sector and that it warrants further research?

Sources of Data and Search Strategy

The aim of the review is to find articles addressing the research topic. This was done using key words on Google scholar and as well as the structured questions that are connected to the specific key search words.

Database used in the Search

In order to access articles from reliable academic database and information that is publicly available and addresses research the question and sub-questions, the following databases were used in the search:

- IEEE Xplore
- SCOPUS
- Google Scholar

Study Selection Criteria

A systematic literature review involves a comprehensive search for specific information that adheres to specific inclusion and exclusion criteria that have been identified by the researcher. The process to include or exclude an article was commenced by sequentially scrutinizing the title and the abstract of the article, both of which had to meet the following inclusion and exclusion criteria:

- **Inclusion Criteria**
  - The article should have been published between 2010 and 2018.
  - The article should contain the key search words “public sector” and “ICT” or “e-skills” or “digital skills” in either the abstract or discussion or conclusion sections.
  - The article should be in English

- **Exclusion criteria**
  - Duplicate of a selected article.
  - The article is not in English.

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- The article was published prior to year 2010.
- An article that did not have the relevant key search words in the article topic, abstract, discussion and conclusion.

Data Extraction

An excel sheet was used to list all articles identified for this SLR and the relevant column was populated with the title and author of the study. The final list of all the papers that were downloaded for analysis was tabulated.

Synthesis of the Extracted Data

The extracted data was synthesised using qualitative techniques by identifying emerging themes from the articles.

Project Timelines

The academic requirement was that the SLR should be submitted on the 14th of January 2019. The projected time lines agreed upon for the research are indicated in **Table 3**.

Table 3: Project Plan for the SLR

Timeframe		Deliverables	Activities
23-Apr-18	30-Apr-18	Understand the Systematic Literature Revie	A paragraph on the SLR process and requirements
30-Apr-18	7-May-18	Topic assignment and focus	Connect with the direct supervisor
7-May-18	14-May-18		Download papers related to topic area
14-May-18	21-May-18		Compile the literature review on the topic area
21-May-18	28-May-18		Review with supervisor progress
28-May-18	4-Jun-18	Download papers for the SLR	Define inclusion / exclusion criteria
4-Jun-18	11-Jun-18		Download papers to be analyzed
11-Jun-18	18-Jun-18		Begin the analysis
18-Jun-18	25-Jun-18		Review with supervisor progress
25-Jun-18	2-Jul-18	analyze papers	Analyze the papers downloaded
2-Jul-18	9-Jul-18		Begin the write up
9-Jul-18	16-Jul-18		Review with supervisor progress
16-Jul-18	23-Jul-18		
23-Jul-18	30-Jul-18		
30-Jul-18	6-Aug-18	Finalize the SLR	Write up the research
6-Aug-18	13-Aug-18		Review with supervisor progress
13-Aug-18	20-Aug-18		
20-Aug-18	27-Aug-18		
27-Aug-18	3-Sep-18	Compile a model for research	Collect empirical data
3-Sep-18	10-Sep-18		Review with supervisor progress
10-Sep-18	17-Sep-18		
17-Sep-18	24-Sep-18		

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Table 3: Project Plan for the SLR (continued)

24-Sep-18	1-Oct-18	Perform analysis	Do the Analysis
1-Oct-18	8-Oct-18		Review with supervisor progress
8-Oct-18	15-Oct-18		
15-Oct-18	22-Oct-18	Write up the completed research	Write up the research
22-Oct-18	29-Oct-18		Review with supervisor progress
29-Oct-18	5-Nov-18		
5-Nov-18	12-Nov-18		
12-Nov-18	19-Nov-18	**Submit the final research**	

ACTUAL IDENTIFICATION AND SELECTION OF RESEARCH ARTICLES

PRELIMINARY IDENTIFICATION AND SELECTION OF RESEARCH ARTICLES THROUGH SEARCH TERMS AND KEYWORDS

This section deals with the identification of the primary research articles. Using key words, several databases were explored for relevant articles that will assist in answering research questions and meeting the research objectives. The initial pilot search used key words on Google Scholar and returned 2.4 million articles. The search was then modified to include structured questions and connected the specific key search words with Boolean “OR” and “AND” as follows:

“ict-skill” OR “digital skills” OR “e-skills” AND “public sector”

The following key words were used by the researcher:

“ict-skill” OR “digital skills” OR “e-skills” AND “e-government”

By using this approach, the number of articles returned were drastically reduced. The same modified approach was adopted for conducting the actual SLR search on different databases. During the actual SLR search, the key words identified by the researcher were used to conduct a search on the titles and abstracts of specific journal articles.

FINAL IDENTIFICATION AND SELECTION OF RESEARCH ARTICLES FOR THE SLR

Adherence to Inclusion and Exclusion Criteria

The initial process for the identification and selection of primary research articles led to the selection final articles to be used in this review. The process to include or exclude the article started by going through the title of the article followed by the abstract, both had to meet the inclusion and exclusion criteria. Articles that were excluded did not meet the criteria either by not being related to the key search words “public sector” or had the key search words “public sector” but the article had nothing to do with ICT skills.

Quality Assessment

In order to check for the quality for the downloaded papers, the inclusion and exclusion checklist above was used. The first aspect involved a sequential check of whether or not the key words for this review appeared in the title, abstract, contents, and the findings and conclusion of the research article.

Thereafter, attempts were made to answer the question of whether the article had a discussion or conclusion on the themes being developed by this research article. In cases where the article met the above the internal validity, the article was checked again to ensure that the research

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design and methodology was appropriate for the subject being researched. The appropriate population group, which entailed all public sector employees, was used.

Classification and Coding

After the analysis of the studies found in the database, a classification and coding framework was developed using numbers and letter codes. The classification dimensions, which and have been adopted from Amui et al. (2017) and are listed in **Table 4**, are as follows:

1. Human Capability Development was coded as 1 from A to D scale
2. Sector of Government was coded as 2 from A to C scale
3. Focus was coded as 3A
4. Soft Skills was coded as 4 from A to D scale
5. Technical Skills was coded as 5 from A to D scale
6. Organisational skills was coded as 6 from A to E scale
7. National Context was coded as 7A and 7B

Table 4: Framework with classification and codes for analyzing the studies.

Classification		Codes
Human Capability Development	Self-Study	1A
	Workshops	1B
	University	1C
	On Job Training	1D
Sector of Government	Municipality	2A
	National Government	2B
	State Owned Entities	2C
Focus	ICT skills	3A
Soft Skills	Problem Solving	4A
	Interpersonal Skills	4B
	Work Ethics	4C
	Language	4D
Technical Skills	Software Development	5A
	Business Application	5B
	Information Management	5C
	Hardware	5D
Organisation	Business Process	6A
	Management Skills	6B
	Project Management	6C
	Policy Formulation and Implementation	6D
	Enterprise Architecture	6E
National Context	Developing Countries	7A
	Developed Countries	7B

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Final List of Selected Articles

As shown in **Table 5**, the various stages of the selection process led to the identification and final selection of a total of 17 articles. Details of the selected articles are indicated in **Table 6**.

Table 5: Number of articles generated during the different stages of the SLR.

Stages	Search Area	Number of Articles
1	Search articles with key words in the Digital Database	N = 6310
2	Search article with key words in the Title	N= 22
3	Search article with key words in the Title, Abstract and Content	N = 27
4	Selected articles based on selection inclusion and exclusion criteria	N = 17

Table 6: Final list of articles selected for the SLR.

Reference	Title of Research Article
Calitz et al.(2015)	SouthAfricanAlumni PerceptionsoftheIndustryICTSkills Requirements
Manda & Backhouse (2017)	Digital Transformation for Inclusive Growth in South Africa: Challenges andOpportunitiesinthe4th IndustrialRevolution
Twinomurinzi (2012)	The role of ICT in sustainable and responsible development: e-Skilling
Twinomurinzi et al. (2017)	TowardsaSharedWorldviewone-Skills: ADiscoursebetween Government, hdustryandAcademiaontheICTSkillsParadox
Mawela et al. (2017)	e-GovernmentImplementation: A ReflectiononSouthAfrican Municipalities
Van Jaarsveldt (2010)	Information Technology Skills for the South African Public Service

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Table 6: Final list of articles selected for the SLR (continued)

Reference	Title of Research Article
Hunnius (2013)	Competency Requirements for Transformational E-Government
Alkhwaldi et al. (2017)	From E-government to Cloud-government : Challenges of Jordanian Citizens' Acceptance for Public Services, 298–304.
Lohmeier (2013)	e-Government - a Driving Force for Public Sector Innovation?
Munyoka & Maharaj (2016)	A critical analysis of Zambia's e-government adoption
Ogwueleka (2017)	Conceptual Model of Social-Private Partnership for E-Skill Delivery
Roca (2015)	ICT Literacy and Skills Acquisition Plan in Barcelona 2010-2015
Mogogole & Jokonya (2018)	A Conceptual Framework for Implementing IT Change Management in Public Sector
Van Laar et al. (2017)	The relation between 21st-Century Skills and Digital Skills: A Systematic Literature Review
Odat (2012)	e-Government in Developing Countries: Framework of Challenges and Opportunities
Mbatha, Ocholla and Roux (2011)	Some implications of Information and Communication Technologies (ICTs) on Public Service Work Environments in South Africa
Khan et al. (2010)	e-Government Skills Identification and Development : Toward a Staged-Based User-Centric Approach for Developing Countries

ANALYSIS OF THE SELECTED ARTICLES

The 17 articles that were identified covered different areas related to ICT skills. The articles were classified and coded as previously described (see **Table 4**).

HUMAN CAPITAL DEVELOPMENT

According to Mbatha, Ocholla & Le Roux (2011), learning ICT skills is part of Human Capital Development. This section looked at articles on previously conducted research in order to explore how various stakeholders in the public sector acquire ICT skills. As indicated in **Figure 1**, the findings from the selected research articles indicated that Self Study was a theme that has been extensively researched as compared to the Workshops and University theme.

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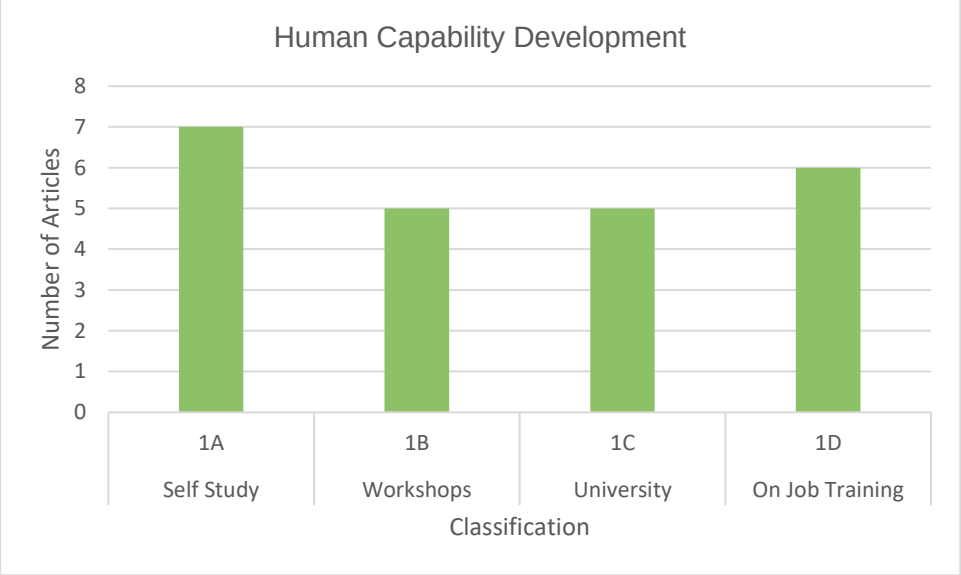

Figure 1: Human Capital Development

SECTOR OF GOVERNMENT

The Public Sector them is consisted of different organs (Mawela, Ochara &Twinomurinzi, 2017). The municipality or local government is at the frontline for providing services to the public. Compared to other sectors of the Public Sector, the highest number of articles (i.e. 13) is based on 2B National Government. The lowest number of articles (i.e. 5) were recoded for State Owned Entities (see **Figure 2**).

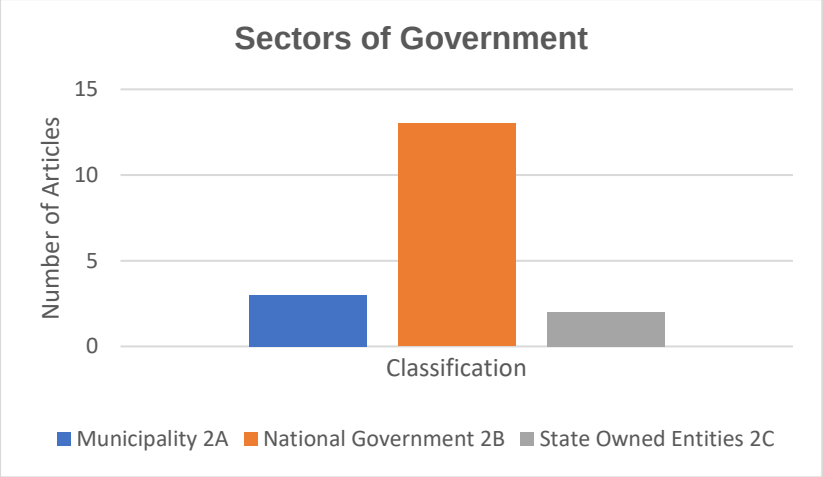

Figure 2: Sector of Government

SOFT SKILLS

The categorization of Soft and Technical Skills is adapted from Calitz et al. (2015). **Figure 3** indicates that the code 4B, which was used for Interpersonal skills, is the most discussed soft skill in the public sector with 9 articles. The least researched soft skill based on the selected articles is language; out of the 17 selected articles only 4 researched language as a skill. South Africa has 12 official languages and ability to converse in different languages or language of instruction can have an impact in working in a team of ICT personnel.

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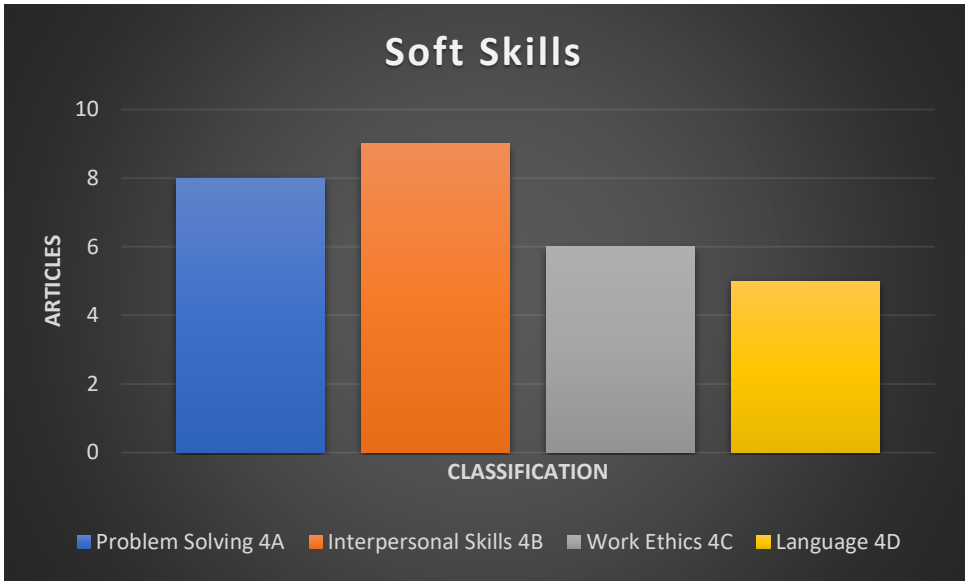

Figure 3: Soft skills

TECHNICAL SKILLS

This is one of the critical skills for employees or consultants involved in the implementation of e-Government (van Laar et al., 2017). As indicated in **Figure 4**, e-skills related to hardware were discussed in 10 articles, the least number of articles focussing Business Application including the likes of SAP, Pastel and Oracle.

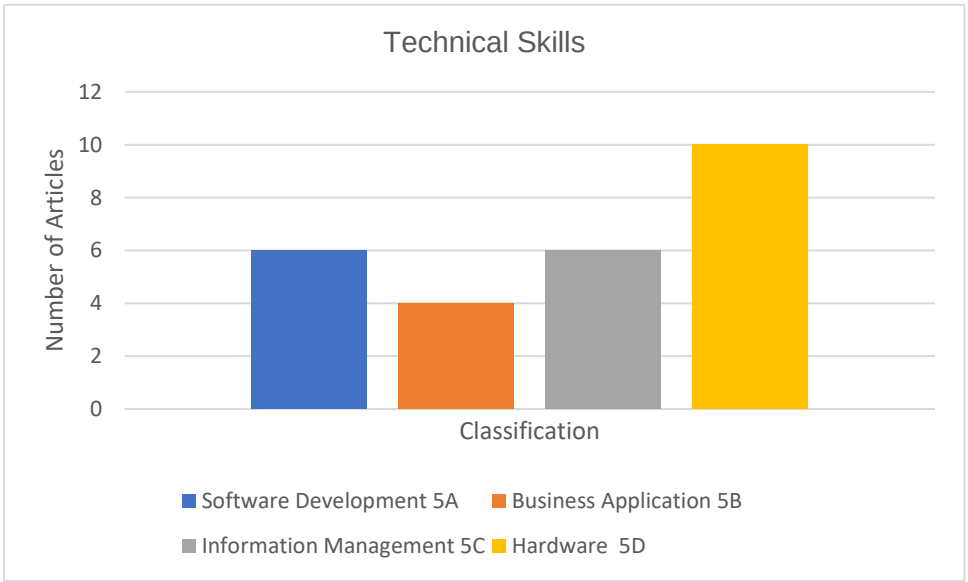

Figure 4: Technical Skills

ORGANISATION

As indicated by Mbatha, Ocholla & Le Roux (2011), Management Skills in ICT are critical for the implementation of digitisation. **Figure 5** shows that public sector related ICT management skills were discussed in 12 articles.

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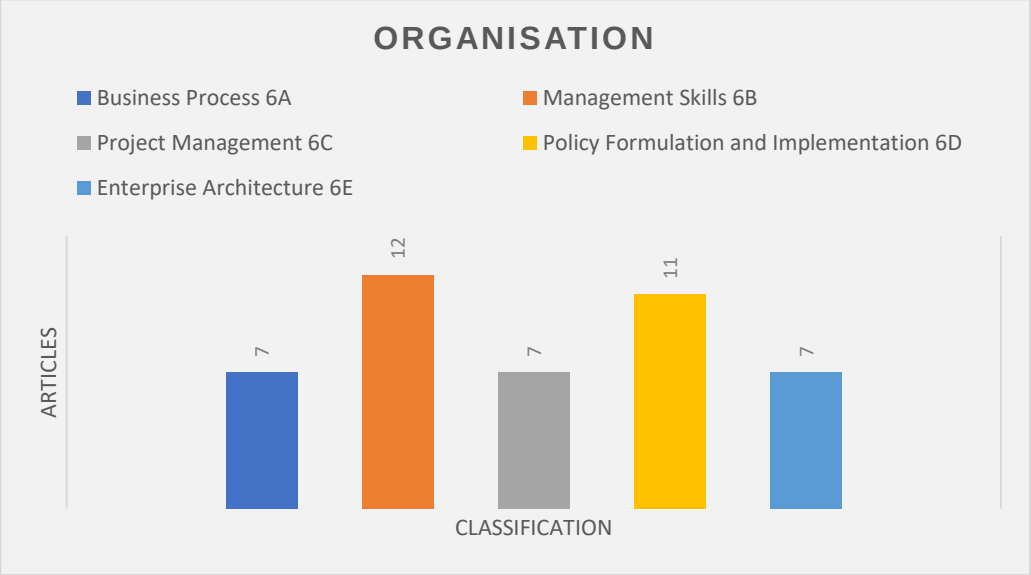

Figure 5: Organizational Skills

NATIONAL CONTEXT

Different regions of the world face different challenges in terms of digitisation of the public sector. Eight of the selected articles was focused on discussing South African public sector as a model developing country and seven articles discussed different phases of e-Government of developed countries.

DISCUSSION OF RESULTS

In this section, an attempt will be made to answer research question and sub-questions and also see whether the research objective has been met.

Table 7: Results for all Categories

		Human Cap Develop				Sector of Gove			Focus	Soft Skills				Technical Skills				Organisation				
Aurthor	**Country**	1A	1B	1C	1D	2A	2B	2C	3A	4A	4B	4C	4D	5A	5B	5C	5D	6A	6B	6C	6D	6E
Calitz, A., Cullen, M. D., Greyling (2015)	South Africa	1A		1C	1D				3A	4A	4B			5A	5B		5D	6A				6E
Manda and Backhouse (2017)	South Africa						2B		3A										6B		6D	
Twinomurinzi, H (2012)	South Africa	1A	1B	1C	1D		2B		3A								5D		6B		6D	
Twinomurinzi et al. (2017)	South Africa			1C	1D		2B		3A					5A					6B		6D	
Mawela, Ochara and Twinomurinzi (2017)	South Africa					2A	2B		3A	4A	4B					5C	5D		6B	6C	6D	
Jaarsveldt, L. Van (2010)	South Africa	1A				2A	2B		3A	4A	4B		4D			5C			6B			
Hunnius, S (2013)	Europe					2A	2B	2C	3A	4A	4B	4C	4D	5A	5B	5C	5D	6A	6B	6C	6D	6E
Lkhwaldi, Amala and Ahwaji (2017)	Jordan								3A													
Lohmeier, A (2013)	Germany								3A		4B	4C	4D	5A	5B	5C	5D		6B	6C	6D	6E
Munyoka and Maharaj (2016)	Zambia						2B		3A	4A	4B						5D	6A	6B	6C	6D	6E
Nonyelum, F (2017)	Nigeria	1A	1B	1C	1D		2B		3A													
Roca, J (2015)	Barcelona	1A	1B		1D		2B		3A												6D	
Mogogole and Jokonya (2018)	South Africa						2B		3A	4A	4B	4C					5D	6A	6B	6C	6D	6E
Van Laar et al. (2017)	The Netherla	1A	1B				2B		3A	4A	4B	4C	4D	5A		5C	5D	6A	6B	6C		
Odat (2012)	Jordan						2B		3A			4C					5D	6A	6B		6D	6E
Mbatha, Ocholla and Roux (2011)	South Africa								3A													
Khan et al. (2010)	Asia, Africa, S	1A	1B	1C	1D		2B	2C	3A	4A	4B	4C	4D	5A	5B	5C	5D	6A	6B	6C	6D	6E

The research question was that was posed earlier is as follows:

What research has been undertaken concerning e-skills in the public sector?

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In order to answer the above question, the following sub-questions were developed:

- What are the main findings of research in e-skills in the public sector organizations?
- What conclusions can be drawn from the findings of previous studies on digital skills and digitisation of the public sector?
- What area of digital skills has not been addressed by selected research articles, is important for the digitisation of the public sector and that it warrants further research?

The answers to the main question, "*What are the main findings of research in e-skills in the public sector organizations?*", are as follows:

HUMAN CAPITAL DEVELOPMENTS

Findings indicate that some research has been undertaken on how the Human Capability Development aspect in terms of how public sector employees acquire ICT skills. The results indicate that different stakeholders in the public sector use self-study and on the job training to acquire new ICT skills.

The research highlighted the impact of the slow pace of changing the curriculum at Universities when compared with other available avenues that offer timeous and relevant ICT skills. According to Calitz, Cullen & Greyling (2015), some of the skills taught at universities are outdated and new recruits entering the public sector have outdated skills, because the technology would have changed by the time these recruits gain employment within the public sector. This explains why a high number of public sector employees tend to acquire their skills through on-the-job training.

Twinomurinzi et al. (2017) have mentioned that academics are often overstretched and underpaid may therefore lack the necessary motivation to keep changing the curriculum to match the pace of changes in the ICT world. In addition, Twinomurinzi et al. (2017) articulates a shared vision that involves all the stakeholders involved with university education in order to address the situation that has led to University curriculum to lag behind in offering up to date ICT training. Lohmeier (2013) has found that public sector employees in developed countries have far more advanced ICT skills because they often have to continue with self-development in order to remain relevant and innovative.

The research articles that were reviewed did not adequately address the issue of how certification and accreditation can enable stakeholders to acquire skills as well as how continuous professional development in ICT affects the performance appraisal of public sector employees.

SECTOR OF GOVERNMENT

The review indicate that the Sector of Government in South Africa is broken down into national and local government. It was evident from the research article by Mawela, Ochara & Twinomurinzi (2017) that local government at the level of municipalities do not have big budgets to that attract ICT skilled employees when compared with other organisations in the public sector. This makes it difficult to train and retain skilled employees because as soon these acquire the relevant skills they join the national government.

SOFT SKILLS

This SLR has revealed that Soft Skills are divided as shown in Table 4. Some of the research articles were found deliberated on the type of soft skills that are required to implement a digital government as well as the status of those skills in developing countries. The SLR has revealed that Interpersonal Skills and Problem Solving Skills are important when implementing a digital government. For example, Mogogole & Jokonya (2018) are of the view that these skills are critical because developing governments require personnel with an ability to deal with different

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stakeholders both within and outside the public sector in order for them to achieve digitisation. According to (Roca, 2015) also due to generational gap these skills are required in order to address stakeholders with different views to digitisation. As far as Roca (2015) is concerned, the existing generational gap warrants a preponderance of these skills when dealing with stakeholders with different digitisation views. Khan et al. (2010) have taken an interesting angle on the issue of skills by suggesting the use of consultants for the implementation of digitisation in the public sector. Interpersonal Skills and Problem Solving Skills are apparently required for such a transition and Khan et al. (2010) are of the opinion that specialised consultants possessing such skills are well placed to manage the transition (Khan et al., 2010).

The of aspect of the language, which was articulated by Alkhwaldi, Amala & Qahwaji (2017) as a challenge to e-Government was not thoroughly addressed by research articles that were reviewed. The issue of language is very important particularly in the context of South Africa as different demographics in the public sector often mean that various population groups are often comfortable with different languages. This means therefore that the language barrier tends to affect the ICT skills acquisition process.

TECHNICAL SKILLS

The reviewed articles revealed various technical skills involved in e-Government as per Figure 4, which is focused on the technical skills required to implement digitisation. The most discussed skill that is required for the implementation of digitisation was found to be Hardware Skills followed by Software Development and Information System Management skills. The SLR revealed that most governments need to acquire, install and maintain infrastructure in order to digitise. According to Odat (2012), the reason behind the failure of e-government implementation in developing countries is lack of Hardware Management related skills. The selected research articles also addressed the issue of infrastructure as an enabler for digitisation. The issue of which specific hardware skills are essential for the digitisation of the public sector has not been addressed; hardware skills range from basic skills required for desktop support to advanced skills required for supporting cloud-based servers.

The hardware that is required for digitisation include networks, security, architecture, and on-premise or cloud-based servers. Munyoka & Maharaj (2016) have also discussed the issue of corruption when it comes to acquisition of ICT hardware in the public sector. Among other things, a lack ICT skills in senior executives that need to provide oversight on the procurement process in a way promote corruption. There are gaps in terms of research articles that address the issue of skills that are required at a senior level in the public sector in order to procure the correct hardware and ensure ethics are adhered to.

In contrast to Hunnius' (2013) assertion that technical skills are a big challenge in developing countries, developed countries are facing a different challenge on how the various skills set required for the implementation of e government projects should be managed.

Van Jaarsveldt (2010) have opined that the technical skills required for digitization vary based on the environment or level of digitisation, especially since more developing countries have overcome hardware related challenges and have now entered into the software development phase. A gap relating to research that is focussed on software development skills required for the implementation of digitisation has been identified.

ORGANISATION

The SLR indicate that there is some research that has been conducted on the Management Skills in the public sector. Most of the research articles in this topic were focused on the challenges associated with e-Government and lack of leadership in the public sector. Through this SLR, it was established that many public sector organisations failed to implement ICT policy due to a

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lack of leadership. A gap between setting of policy documents and its implementation has been identified. Odat (2012) indicated a shortage of ICT leadership skills across less developed countries.

NATIONAL CONTEXT

In addition, Odat (2012) compared challenges faced by less developed countries when implementing e-government compared to developed countries. The same issue of context was addressed in some of the selected research articles. Very few articles looked at cross sectional context, which combines and contrasts developing and developed countries. This gap of cross sectional articles on e-skills in the public sector will reveal the specific type of disparity that exists between developing and developed countries and will thus allow the developing countries to address any potential gaps in their quest to implement digitisation.

CHALLENGES, LIMITATIONS AND VALIDITY THREATS

The challenges, limitation and threats to validity of this review are as follows:

- **Research Questions**: The questions used might not have addressed all the aspects required to understand digitals skills in the public sector. However, such a risk was mitigated by a further break down of the main research question into sub-research questions.
- **Subjectivity in article selection**: There is no guarantee that all the relevant research articles were selected; judgement was used by the reviewer during the selection of the research articles for the SLR. Only digital articles were selected for this review. This process was guided by the inclusion and exclusion criteria.
- **Subjectivity in data extraction**: No peer review was conducted on this SLR, and this runs the risk of introducing a threat of biasness on the data extraction by the reviewer. However, this risk as mitigated by going through the selected material several times.
- **Repeatability of the systematic process**: The reviewer used a review protocol to enable future researchers to replicate the process.

The next section will answer the following question:

> *What conclusions can be drawn from the findings of previous studies on digital skills and digitisation of public sector?*

CONCLUSION

This paper presented a systematic literature review on “Digital Innovation and Transformation through e-Skills”, which is aimed at identifying the availability of digital skills in the Public sector. The initial search resulted in millions of articles but was subsequently it narrowed down to 6310 using key words. In the end, a total of 17 research articles were selected for the review. The SLR achieved its objective and answered all question as stated in the review protocol.

From the selected articles themes emerged from the findings and were categorised (see **Table 4**). The research indicates that self-study and on job training are the main methods that are used by public sector employees to acquire digital skills. The studies that were reviewed tended to focus on national government as opposed to local government and other public sector organisations. The selected research articles identified soft and technical skills as an enabler for digitisation of the government. Interpersonal and problem solving skills were found to be key soft

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skills for the implementation of e-government. Similarly, and Hardware and Software Development were identified as key technical skills for the implementation of e-government. Leadership and thereof were also identified and discussed in the context of enabling the digitisation in the public sector. The majority of the selected articles were focused on developing countries.

In conclusion, the research identified the different elements related to ICT skills in the public sector. It is envisaged that this research will assist future studies in areas that have been identified in terms of e-skills for the implementation of a digital government.

The next section will answer the question:

What is the area of digital skills that has not been addressed by selected articles and what is the potential future research direction?

RECOMMENDATIONS AND FUTURE WORK

The selected research articles did not adequately discuss how certification and accreditation can enable stakeholders to acquire skills as well as how continuous professional development in ICT affects performance appraisal of public sector employees.

South Africa has 12 official languages and ability to converse in different languages or language of instruction can have an impact on working in a team of ICT personnel. Studies were found that address how the language of instruction affects stakeholders in terms of acquiring e-skills or working on e-government projects.

It was evident from this SLR that some local municipalities are not able to retain skilled ICT personnel. This creates an opportunity for future studies to be undertaken on how to retain employees with advanced ICT skills in different public sector organisation.

A gap between the setting of policy documents and its implementation was revealed by this SLR, especially in respect of lack of leadership when implementing policies. Future studies should therefore explore the issue of how leadership can be used to implement formulated policies.

Lastly, a gap in terms of which specific hardware skills are essential for the digitisation of the public sector was identified since hardware skills range from basic skills required for desktop support to advanced skills required for supporting cloud-based servers. Future studies should address this gap.

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ABSTRACTS

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SCHOOL LEAVERS' PERCEPTIONS OF E-LEARNING FOR UNDERGRADUATE STUDIES AT HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

Aim/Purpose	The present phenomenographic research project aimed to determine the perception of matric learners in the Winelands region of the Western Cape towards the prospect of using ICT and eLearning to access higher education for either academic, or skills-based courses.
Background	This research focuses on the perception of matric learners towards eLearning as an alternative to traditional face-to-face education and not as an addition to face-to-face education.
Methodology	Informal group interviews were held with matric learners where same set of open ended questions were asked of each group. The interviews were then coded and analysis was informed by the social constructivist and variation theories.
Findings	The present research found that matric learners are not as prepared for eLearning as would be generally expected or hoped. The findings showed that eLearning is still considered as a last option to education and tainted by significant social stigma.
Recommendations for Practitioners	The findings showed that the majority of participants had little or no knowledge about available eLearning options. Thus, it is recommended that eLearning providers launch rigorous marketing campaigns. Learners, parents, teachers, future employers, and the public at large need to know that eLearning options are available and should be given the necessary acceptance. Prospective students, teachers, and employers alike should be informed about the benefits of eLearning.
Impact on Society	A clear example is the lower financial costs incurred or the fact that individuals who study through eLearning can gain invaluable practical experience while studying
Keywords	eLearning, MOOCs, Knowledge Age, ODL, ODeL, phenomenography, social constructivist theory, variation theory

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REVIEW OF INTERNET-BASED TECHNOLOGIES FOR ELECTIONEERING IN SOUTH AFRICA

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ABSTRACT

Aim/Purpose The aim of the paper is to develop a generic framework to guide the effective and efficient use of internet-based technologies for electoral management pro- cesses in South Africa.

Background Over the past two-decade, new technologies have played an increasingly integral role in the organization of elections around the world. A number of countries have turned to a variety of technological solutions in a bid to make elections more efficient, more cost-effective and to strengthen stakeholder trust at each stage of the electoral cycle. Technology is used in elections to achieve two objectives: (1) to ensure that all information produced during the electoral process, particularly the election results and the electoral roll, is correct and trustworthy and (2) to generate broad acceptance that the electoral outcome is a true and fair representation of the citizens' will.

Methodology The paper by design is a mixed method with qualitative and quantitative data-analysis methods, consequently the paper adopted content analysis and descriptive analysis methods were used in this paper for the data analysis. The paper population consists of 600 participants, which comprises, South African registered Voters, IEC South Africa, Political parties, NGOs, Media house, Government institutions, Elections observes, Electoral expert located in Gauteng. The paper made use of stratified purposeful Sampling of 385 voters as representation of four (4) Geo-political Areas of Gauteng region.

To achieve this objective, the paper adopted an artefact model to improve human and technology performance, exploring the existing literature in order to develop a framework, which comprises of views and opinions of elections stakeholder. It includes a detailed Designed- Science approach; make use of a case paper strategy to collect data through literature review, recorded obser- vations, questionnaires, focus groups and expert reviews.

Findings The views of Voters and electoral stakeholders about the use of Internet based technology for electoral Process management

Recommendations for Practitioners The findings showed that the majority of participants had little or no knowledge about available eLearning options. Thus, it is recommended that eLearning providers launch rigorous marketing campaigns. Learners, parents, teachers, future employers, and the public at large need to know that eLearning options are available and should be given the necessary acceptance. Prospective students, teachers, and employers alike should be informed about the benefits of eLearning.

Impact on Society The paper suggests having an effective and efficient automated electoral pro-cess, systematizing and standardizing of observational methodologies to help and improve electoral missions to observe e-enabled elections.

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Keywords Internet based technologies, Electoral Management Processes, South Africa, Elections, IBT Framework, voters, Stakeholders.

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KEY DRIVERS TO ENHANCE MEDIA LITERACY IN THE COMMUNITY

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ABSTRACT

Aim/Purpose Research conducted on e-skills and e-literacy in developing countries dates back further and is more readily available than research specifically aimed at *media literacy* and what has been done to date to enhance the media literacy levels of communities in these countries. Notwithstanding, developing countries are slowly beginning to realise that media literacy can play a significant role in the policy making, governance and democracy of a country. This realisation of the importance and significance of a media literate community is however not yet appreciated by

Background Media is generally defined as conduits of communication through which messages, news, data, entertainment and education are distributed. This can be done through media such as books, magazines, newspapers, radio, television, mail, fax, telephone, disks, CD's and the Internet, among others (BusinessDictionary, 2017; Techopedia, 2017). Media literacy describes a set of important skills we all should possess in order to retrieve, evaluate, and convey information from a wide variety of media (White, 2013).

Gentikow (2015) posits that apart from the generally accepted definition of media literacy, it also means "…the mastering of a nation's cultural canon". A literate person has therefore not only the ability to read and write, but also has a cultural and social education (Gentikow, 2015). The task of mastering a nation's cultural canon is more challenging in countries where e-literacy and media literacy are not a priority, which is the case in some African countries.

To assist in establishing a media literacy training footprint in South Africa, this research has identified the importance of a media literate nation, core media

Methodology A comprehensive literature review was conducted to identify the key media literacy drivers in a community context in South Africa. Literature on media literacy in both developed and developing countries was reviewed.

Contribution Key drivers to assist in becoming an enabler for successful media literacy training to communities in South Africa (and other African countries), have been identified. These key drivers offer a clearer picture of media literacy and should be taken into consideration when developing a media literacy framework in a community context.

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Findings	Key media literacy drivers are portrayed in literature to be the following: • Different people experience the same media message differently • All media messages are constructed • Media messages are constructed using a creative language with its own rules • Most media messages are planned to gain profit and/or powe
Recommendations for Practitioners	Media literacy practitioners should acquaint themselves with the framework used to develop the media literacy training programmes they offer in order to ensure that relevant concepts are addressed for relevant communities. For example, a training programme focusing on intense practical work that requires continuous Internet access will not be feasible in areas where connectivity is still a major
Recommendation for Researchers	Developing a framework – in this case a media literacy framework – is not always an easy task. Conducting a thorough literature review where key drivers and concepts are identified provides a starting point for outlining the framework, which can then be expanded upon.
Impact on Society	Not only will the identified key drivers contribute to the development of a media literacy framework in a community context in South Africa, other developing countries can also consider these drivers for their own unique media literacy training challenges.
Future Research	Now that key media literacy drivers and concepts have been identified, the next step is to take these into consideration and develop a media literacy framework aligned with NEMISA's Digital Skills Framework One (DSFOne) (Claassen, 2017) and vision of e-skilling the nation by 2030. Using the media literacy framework, a media literacy training programme can then be developed.
Keywords	Media literacy, key drivers, developing countries, community, framework

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STRATEGIC INTENTIONS IN DIGITAL GOVERNMENT PROJECT PRIORITISATION: A CASE STUDY OF ZIMBABWE

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ABSTRACT

Aim/Purpose One of the challenges of Digital Government is the failure to optimally prioritize Digital Government initiatives from the public value perspective. This study uses a Digital Government project prioritization approach that helps decision makers to formulate Digital Government strategy through examining the *Strengths*, *Weaknesses*, *Opportunities* and *Threats* (SWOT) of Digital Government projects.

Background A pragmatic, mixed methods approach employing qualitative and quantitative analysis was adopted in this study. Data was collected through interviews with the members of a steering committee responsible for the selection and implementation of Digital Government projects. This exercise was followed by a focus group of thirteen managers which was used to rank the relative importance of various criteria that relate to the delivery of public value. Analytical Hierarchy Process, a quantitative analytical technique incorporating rationalistic, deductive and systems thinking approaches in decision making from a general and holistic perspective was used to analyse the data

Findings Insights from the analysis show that for a better Digital Government strategy realization from a public value perspective, there should be integrated approaches employing multi-criteria decision making in conjunction with Strengths, Weaknesses, Opportunities and Threats. The reality, as expressed through the results is that Digital Government project prioritization is primarily geared towards attaining greater *internal automation of government processes,* as opposed to a new model which envisages transforming and supporting the external workings of government.

Keywords Digital Government, Project Prioritisation, SWOT analysis, Analytic Hierarchy Process, Africa.

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SA CONNECT POLICY IMPLICATIONS FOR THE INNOVATIVE USE OF ICT IN SOUTH AFRICAN RURAL SCHOOLS AND ITS IMPACT TOWARDS DIFFUSION AND ADOPTION OF TABLETS

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ABSTRACT

Aim/Purpose This study investigates Information and Communication Technology (ICT) policy implications by considering the impact on rural teachers' readiness to adopt tablet computers. The research seeks to understand which factors impact on ICT use by considering the interplay between the education system readiness and policies.

Background The South Africa Broadband (SA Connect) policy aims to ensure that the country achieves universal internet access by 2030. The policy offers an opportunity to present the fourth industrial revolution to schools in South Africa. The policy is further supported by the rising digital literacy of students and increases the need for effective use by teachers of ICTs for teaching and learning. Meanwhile, schools in rural areas in South Africa (SA) are hampered by a shortage of quali- fied teachers. Owing to financial and other constraints, rural teachers are not ade- quately supported in terms of ICT provision, infrastructure, training and technical support.

Methodology This research used baseline data from the Information and Communication Tech- nology for Education (ICT4E) project undertaken in schools in rural areas of seven provinces in South Africa, employing a cross-sectional timeframe. The technology readiness index (TRI) was used as the theoretical lens on open-ended questionnaires with 197 teachers from 24 schools.

Contribution This research contributes to theory by offering empirical evidence of the usefulness of the technology readiness index (TRI) as a theoretical framework for presenting teachers' readiness to adopt tablets in a situation of conflicting forces.

Findings Our main finding is that 90% of the teachers are ready to use technology despite the financial, technical and digital literacy challenges faced by rural teachers; and they are, in fact, already using technology for teaching and learning. This is made possible by a voluntary support network consisting of colleagues, family and friends. Counterintuitively, we found little in relation to teachers' discomfort and insecurity, but rather a sense of confidence in using tablets. Furthermore, it tran- spired that schools have a policy that prohibits the use of tablets, cell phones and laptops. The intention of the local school policy is to support discipline in schools, but the unintended consequence may be to restrict teachers in their use of tablets for teaching and learning, thereby counteracting the SA Connect policy.

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Recommendations for practitioners	We also show the disconnect between policies banning ICTs in schools and its ef- fect on the SA Connect policy, with a recommendation on the need to revisit the restriction of ICTs in school policy.
Recommendation for researchers	The novelty of the research is in the evidence that suggests that teachers do not experience discomfort in adopting ICTs for teaching and learning.
Impact on society	The research confirms widespread adoption of the internet at the schools and surrounding environment in which teachers operate; hence, depicting the
Future research	Future research should focus on the types of support teachers in rural areas provide to one another, using a qualitative method to offer an in-depth
Keywords	South Africa Connect policy, policy disconnect, digital skills, technology readiness index, ICT for rural development

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INVESTINGATING FACTORS AFFECTING SME'S IT ADOPTION IN DEVELOPING COUNTRIES

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ABSTRACT

Small and Medium Enterprises (SME's) constitute the most dynamic firms in emerging economies, by driving economic growth and job creation in developing. Therefore, it is paramount to identify factors that SME's face that could hinder their growth. The most common factors faced by SMEs are the lack of technical and managerial skills. Furthermore, it is stated that the rapidly changing environment makes innovation more challenging. Thus, it is important for SME's need to stay ahead of the innovation curve in order for competitive advantage to take place and drive economic growth. The study was therefore undertaken to examine the factors affecting SME's information technology (IT) adoption in developing countries.

The meta-synthesis research method approach was used for the proposed study, as a systematic review was conducted. The data was analysed using secondary qualitative articles and journals. An analysis of the data was used in order to apply to TechnologicalOrganizational-Environmental (TOE) framework to the factors that affect IT adoption in developing countries. Furthermore, TOE framework, was used as the basis of the application to the literature. Lastly, research and findings was discussed, by conclusions drawn from the current study.

Keywords: SME, technology adoption, developing countries, factors, meta-synthesis, TOE framework

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THE CHALLENGES MICRO-ENTERPRISES EXPERIENCE IN USING SUPPORT INFORMATION FROM E-GOVERNMENT WEBSITES INSOUTH AFRICA

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ABSTRACT

Aim/Purpose This study investigated the challenges micro-enterprise owners in South Africa face as they seek to use support information from e-Government websites.

Background The South African Government introduced E-Government websites and Information and Communication Technologies (ICTs) to offer support information services and encourage the development of small and medium enterprises (SMEs) such as micro-enterprises in the country. Despite the availability of such support information, micro-enterprise owners do not optimally use this information due to number of challenges they face.

Methodology The study adopted a case study design and employed a qualitative method. Data were gathered through semi-structured interviews, document reviews and field notes. About 17 micro-enterprises with access to technology and two experts from the department of e-Government in Western Cape province in South Africa were targeted. The study used Sen's Capability Approach as a theoretical framework.

Contribution We separated ICT and E-Government commodities for analysis. Analyzing ICT and e-Government separately, this study contributes to new understanding that even those microenterprises with ICTs have challenges in accessing support information from e-Government websites.

Findings The study found that microenterprises did not experience any challenges such as limited ICT literacy skills with using the ICTs. Micro-enterprises encountered problems when they attempted to access e-Government information services through websites. The problems included content, structure and design, navigation of websites, e-Government websites not being mobile-friendly, language and red tape. These challenges limited the micro-enterprises from deriving benefits of support information from e-Government websites. The results also established that if microenterprises could access support information using e-Government websites, this could positively impact their businesses.

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Recommendations for Practitioners	There is need for the support information for micro-enterprises to be up-to-date, relevant, and simplified. The government should design websites that are mobilefriendly. Government should develop a centralized and inclusive government-to- business (G2B) portal that could contain and provide all of the support information for micro-enterprises– similar to a "SME Solutions Centre".
Recommendations for researchers	Researchers should develop local contextual models for analyzing the impacts of ICTs and E-Government on Micro-enterprises in developing countries
Impact on Society	This study contributes to the gap in ICT4D research in terms of challenges microenterprises experience in using support information from E-Government in developing countries.
Future Research	Similar study should be conducted in other provinces of South Africa.
Keywords	Micro-enterprises, E-government, Use, ICTs, Capability Approach Model, South Africa

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RESEARCH-IN-PROGRESS

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DIGITAL LITERACY IN SOCIAL MEDIA AND THE FACTORS AFFECTING A KNOWLEDGE-BASED ECONOMY

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ABSTRACT

Aim/Purpose	This literature review has been conducted to answer the following research question: "What research exists concerning digital literacy in Social media?"
Background	With the rise in the use of information communication technologies in the 21st century, society is required to nurture and develop a level of digital literacy to successfully contribute and survive in a knowledge-based economy where many organizations are incorporating different technologies into their operations. With the changes in technology, societies have changed the way they communicate with each other as more communication and interaction is occurring through social media. With the incorporation of social media in communication mediums, a need arises for people to gain a level of digital literacy.
Methodology	A systematic literature review process was used.
Contribution	Adds to the body of work that tackles the relationships between digital literacy and social media.
Findings	The literature revealed that a level of digital literacy is needed to use social media effectively for professional and personal use as well as to fully understand and be aware of the negative aspects associated with the use of social media. Definitions of digital literacy were also established.
Recommendations for Practitioners	Make digital literacy part of the education system.
Recommendation for Researchers	Definitions of digital literacy have been established. More research is needed regarding digital literacy needed in social media.
Impact on Society	The implications of this research can assist society to better equip younger generations to gain the necessary skills to be an active members of a knowledge-based society.
Future Research	Further research needs to be undertaken with regards to the state and levels of digital literacy in social media and how they affect social media in an African context.

Keywords	Digital skills, Digital literacy, 21st century skills, Social media

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INTRODUCTION AND BACKGROUND

We live in the age of the knowledge-based economy, which relies on knowledge that is driven by the advances in Information and Communication Technologies (ICTs). In a knowledge-based economy, society requires new ways to think, work, live and build new capabilities (Sharif, 2013). Although ICTs are drivers of innovation and are therefore at the core of this ever-changing economy since organisations that exist in a global economy are governed by high competition, economic dependency and alliances, they do not create a knowledge-based economy. In fact, people initiate and drive innovation.

Today's workplaces require highly skilled individuals with the capability to tackle complex and interactive tasks. Therefore, the human capital of an organisation needs to have a combination of hard and soft skills in order to be adequately prepared to work in most industries (Szilárd, Benedek & Ionel-Cioca, 2018). Hard skills refer to technical skills and soft skills refers to communication, creativity, team -work, problem-solving and other personal skills (Szilárd, Benedek & Ionel-Cioca, 2018). A combination of hard and soft skills is required as workers are expected to skilfully select knowledge from the vast amount of information available and be able to apply this knowledge both professionally and in their personal lives. Knowledge is, however, not enough for the development of an economy and sustainable growth. Creativity and innovation are the critical necessities required to turn knowledge into a product, idea or commodity that adds value to the individual, organisation or society. The application of knowledge can be referred to as a skill.

Since knowledge is essential in the 21st century, it has also become important for people to acquire the requisite 21st century skills. The 21st century skills are comprised of collaboration, communication, digital literacy, digital citizenship, problem solving, critical thinking, creativity and productivity (Van Laar *et al.*, 2017). With an increasing integration of ICTs in many aspects of our lives and the concomitant enhancement of the global knowledge by society, it is essential for people to develop digital skills in order to gain employment and be part of the broader society. Global communication and collaboration have increased with the rise of social media networks. With the use of social media, one of the several factors that need to be considered is whether there is any correlation between digital literacy and the use of social media. Social media has become a useful tool that is used in many industries, and it affects how knowledge-based societies collaborate and communicate. This literature review is specifically focused on:

- Identifying written articles on digital literacy and social media;
- Classifying the identified articles according to specific characteristics;
- Providing a brief summary of each main concept within the study of digital literacy and social media;
- Using information on the identified articles to identify the gaps that exist in the current research; and
- Identifying the type of research that needs to be considered for future studies.

PROBLEM STATEMENT

The internet has become an important source of information and this has a huge effect on the private and professional lives of society. The internet has exposed society to a range of opportunities for accessing information, gaining and exchanging knowledge and realising personal learning goals. The increasing need for digital literacy and having digital competence for individuals in a knowledge-based society has also become imperative. As social media has become embedded in the methods of communication within society, the question arises if digital

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literacy development needs to be addressed to enable all members of society to use social media for above average functions. In the society structure, knowledge gaps exist that need to be identified and eradicated as the rise in the need for individuals to have digital literacy has resulted in a need to investigate and analyse the progression of digital literacy in different contexts. It is for this reason that this study is focussed on reviewing the relevant literature as it pertains to digital literacy in social media. This paper aims to evaluate digital in relation to social media looking as existing research.

RESEARCH QUESTION

A literature review has been conducted to answer the following key research question:

What research exists concerning digital literacy in social media?

RESEARCH OBJECTIVES

In order to adequately address the research question posed in the preceding section, the following key objectives were formulated:

- Identify the concepts used to describe digital literacy needed in a digital environment.
- Assess digital literacy levels from a social media context.
- Determine whether limitations exist in the ability of individuals to attain digital literacy.
- Determine whether a need exists for further research in digital literacy in social media?

LITERATURE REVIEW OVERVIEW

LITERATURE REVIEW INTRODUCTION

ICTs have the potential to minimize the social inequalities that exist in a knowledge-based society and are therefore critical for the attainment of sustainable developmental goals. With the widespread use of ICTs, digital literacy has become a prerequisite for most employment opportunities, accessing government services and for participating in the global economy. There is therefore a need for digital inclusion for all members of society. Since the need for digital literacy has become an essential part of an individual's success in the academic and professional spheres, the various aspects that will be discussed in this section are:

- The definition and concept of digital literacy;
- Drivers of digital literacy;
- Definition and concepts of social media;
- Advantages and disadvantages of social media;
- Social media and its correlation to digital literacy; and
- The digital divide.

A discussion of the above-mentioned aspects is necessary in order to provide an overview of the literature that exists in relation to digital literacy and social media. Such a discussion, it is envisaged, will also serve to identify any potential gaps that exist in the current literature and thus allow future research needs and opportunities to be established.

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DEFINITION AND CONCEPTS OF DIGITAL LITERACY

Digital literacy cannot be addressed from a single and isolated perspective for the simple reason that it has been defined by various researchers. Accordingly, the various definitions of "digital literacy" used by researchers of publications reviewed in this study are displayed in **Table 1**.

Table 1: The definition of digital literacy by various researchers

Reference	Definition of Digital literacy
Van Laar et al. (2017)	Digital literacy is a mind-set that allows users to execute tasks in digital environments with ease. Digital literacy is comprised of the following: 1. A comprehensive knowledge of ICTs to solve interactive tasks in our daily lives. 2. Skills not technologically driven as they are not skills needed for use of a software program. 3. Aids the performance of skills that support complex thinking processes. 4. Supports skills that are related to cognitive processes which then encourage a person's continuous learning. 5. Knowledge one needs to use ICTs.
Paul Glister (1997)	The capability to comprehend and make use of digital sources in a digital age.
Wamuyu (2017)	The capability to asses, use, contribute and bring about the use of the world wide web and information technologies
Pérez-Escoda, Castro-Zubizarreta & Fandos-Igado, (2016)	Multidimensional approach that consists of perception, attitude and the ability for an individual to make use of digital tools to identify, acquire and analyse digital resources to create multimedia content, knowledge and collaborate with other people.

To fully participate in a knowledge-based economy an individual needs a combination of hard and soft skills. Hard skills are considered technical skills that equip people to adapt to a dynamic technological environment and soft skills refer to more cognitive skills such as how one communicates and collaborates with others (Szilárd, Benedek & Ionel-Cioca, 2018). Thus, digital literacy and digital competence can be considered as types of literacy one should have to aid them in the performance of their soft skills. Digital competence is the confidence and critical use of ICT for employment, learning, self-development and participation in society (Van Laar *et al.*, 2017). Digital literacy is essentially about controlling ideas and developing the requisite skills needed for finding information and applying them to one's personal life (Bawden, 2008).

There are four main internet skills groups, namely: medium related, content related, safety and security and general (Scheerder, van Deursen & van Dijk, 2017). Medium related skills relates to software skills such as working with spreadsheets, using a browser and email, word processing and file manipulation. Content related skills include formal, information, strategic, creative and social skills. Safety and security skills relate to ethics and the acceptable use of ICTs. Lastly, general medium skills relate to internet skills, digital competence and digital literacy. When investigating digital literacy, one needs to discuss what determines digital literacy. According to (Pérez-Escoda, Castro-Zubizarreta & Fandos-Igado, 2016), the following factors determine an individual's level of digital literacy:

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- The extent to which an individual makes use of technological devices as well as their use of the internet.
- The degree to which ICTs are integrated in an individual's daily life.
- The level of digital competence in communication, context creation, security and problem solving.

Drivers of digital literacy

Digital literacy as a concept was introduced by Paul Glister as part of his book called Glister (Bawden, 2008). In earlier works, digital literacy did not include lists of skills, expertise or ways of thinking. The initial definition of digital literacy was quite general. In more recent years studies have incorporated a new phrase that incorporates the various skills needed to succeed in a knowledge-based society. This term is "21st century skills", which include skills such as digital literacy, critical thinking, problem solving, creativity, collaboration and productivity (Van Laar *et al.*, 2017). These skills are regarded as 21st century skills to indicate the relevance to the current knowledge economy and developments in social interactions compared to the previous century whereby only industrial skills were the only key skills that were required. In the 21st century, the use of digital media and the internet has grown at an exponential rate. Internet use can be defined by the frequency and type of activities done on the internet by an individual.

The degree to which ICTs are integrated in an individual's daily life can be affected by sociodemographic, economic, social, cultural, personal, material and motivational determinants (Pérez-Escoda, Castro-Zubizarreta & Fandos-Igado, 2016). Once these determinants are identified and assessed, the implications of these findings in terms of the teaching and training needs as well as the areas educators can focus on in a school environment can then be better understood. As digital literacy has become an integral part of an individual's academic and professional life, this type of literacy needs to be taught from lower levels of education. Education is a huge determinant of digital literacy. Previous research has focused on identifying what determines the extent of internet usage (Scheerder, van Deursen & van Dijk, 2017). To reform and make digital literacy part of the education system the following needs to be done: (a) policymakers need to ensure the curriculum is complete and digital content is included; (b) stakeholders in the education ecosystem need to change the way they think about the role of teachers; and lastly (c) the methods of assessments need to be changed (Rotherham & Willingham, 2010).

DEFINITION AND CONCEPTS OF SOCIAL MEDIA

Facebook is a social media platform that is penetrating multiple sectors of society, especially within the younger generations. Additionally, Facebook has become a port of entry for people who are accessing the internet for the first time (Correa, 2016). The internet has exposed the society to a range of opportunities to access information, gaining and exchanging knowledge and realising personal learning goals (Greenhow & Lewin, 2016). With this new exposure there has been a high acceptance of social media applications. These social media applications are being used within both formal educational and social settings. These applications encourage a more active and interactive internet usage through online networks, communities of multi-directional communication, knowledge exchange and people sharing digital content such as photos, music and videos.

Social media is described as websites and online applications where users create and participate in online communities through communicating, collaborating, publishing, managing and interacting (Greenhow & Lewin, 2016). A typical feature of social media is the promotion of users using a profile page. Other features include connections between users through news feeds and users sharing content they have created. Pages on these sites are dynamically amended and content can be embedded. Examples of social media sites include Facebook (a social network), YouTube (a media sharing service), Blogger (a blogging tool), Twitter (a micro blogging tool),

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Delicious (a social bookmarking site), Zotero (a bibliographic tool) and SlideShare (a presentation sharing toll). Since the exposure to social media sites, news journalists and other organisations have used these platforms to publish news articles; these sites have therefore become part of society's day-to-day function (Siddiqui & Singh, 2016).

Social media has affected various aspects of society including education, business, society and the younger generation (i.e. the Z generation) (Pérez-Escoda, Castro-Zubizarreta & Fandos-Igado, 2016). The educational benefits of using social media platforms is a contentious issue but research on the use of social media in education has shown that integrating these platforms into the classroom can create new forms of analysis, communication, collaboration and have positive cognitive, social and emotional effects (Greenhow & Lewin, 2016). Social media can be used in an innovative way in education as students can be taught to use this platform for more than just messaging and texting. Social media has the potential to increase collaboration between teachers and students as students can easily communicate and share information.

In the area of business social media can be used to enhance an organization's performance in terms of achieving business objectives and increasing sales since social media platforms facilitate a two-way communication between the organisation and its customers. Organizations can also promote their business by advertising on social media platforms and customers can instantly provide their preferences and interact with the business at a personal level. If an organization has already established a brand, they can make use of social media to further develop their brand and give their business an online presence. In addition, social media can be used in various business functions such as marketing, HR, creative, operations, strategy and business development (Siddiqui & Singh, 2016).

Internet access and social media has become an important necessity for the youth of the society as they make use of social media to communicate and converse with their friends and other people that they may not personally know. Research shows that youth entering collage institutions are strong in email tools, the worldwide web and the basic use of Microsoft office tools. Less skills have been observed in developing spreadsheets, creating databases, preparing presentations and developing newsletters, brochures and reference lists (Buzzetto-Hollywood, Elobaid and Elobeid, 2018). With the use of social media in education and other aspects of a knowledge-based society, digital competence skills need to be addressed. These skills are not automatically gained through using online platforms; research has revealed that basic exposure, use of and coexistence with ICT tools does not necessarily imply that individuals gain digital literacy or competence (Pérez-Escoda, Castro-Zubizarreta & Fandos-Igado, 2016).

Advantages of social media

The advantage of social media on society is that it assists people to interact with people that they would not necessarily have met outside social media platforms. Furthermore, other than creating opportunities for potential writers and bloggers, social media allows the sharing of ideas beyond geographical barriers and unites huge groups of people to achieve specific goals that bring positive changes within communities. Social media can also create awareness through campaigns, articles and promotions that can assist a community to become more knowledgeable about current affairs. As social media is integrating more into society and more advantages are arising, educational institutions are incorporating social media into their curriculum.

An Indian study has shown that the advantages of integrating social media within education systems is that collaboration between student and teachers increases dramatically. Social media platforms enable students to effectively reach each other for teamwork projects and to easily request for assistance with homework. Students who do not take interest consistently in class can express their views on social media and teachers or facilitators can get these students to engage more in class through sharing on social media about class activities, events and homework tasks. The increased use of social media increases the interest of students taking up social media marketing as a career option and thus growing the industry further. The advantage of access to

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social media and the use of social media platforms within the classroom provides teachers with the opportunity to promote good digital citizenship and responsible ways to use the internet more productively (Siddiqui & Singh, 2016).

Educational institutions can also benefit from incorporating social media and promoting digital literacy as they stand to gain brand equity and awareness, amend the cost/revenue ratio, create flexibility and choice for their students, develop pedagogical innovation, extend education and democratize knowledge (Kaplan & Haenlein, 2016). The positive effect of social media on the youth is that it helps them stay connected with each other, useful information is exchanged over social platforms, youth can find support systems on social media platforms which they may not necessarily find in traditional relationships and youth can use social media to research prospective career choices. Other advantages also exist in the use of social media in organizations; organizations can use these platforms to better understand their customer audience, aid in promotional activities, assists to attract new customers, enhance organization's market insight on competition and increase the organization's brand awareness without spending incurring high costs. In the health industry, social media can speed up and enhance communication between a patient and doctor (Hawn, 2009), and this inevitably creates happier patients.

Disadvantages of social media

Although there are positive aspects in the use of social media, the negative effects that need to be considered are: (a) social media has the potential to be a distraction in the classroom as teachers may not be able to recognise who is paying attention; (b) privacy concerns arise as some students may post personal information on these platforms; (c) there is a lot of inappropriate information that is posted on these platforms which could lead to students misusing these platforms and believing inaccurate information that can cause an education system failure; and lastly (d) students can also lose their ability to engage in face-to-face communication (Greenhow & Lewin, 2016). In business, social media is not totally risk free as customers are free to post their opinion and negative comments that can cause reputational damage to the organisational (Greenhow & Lewin, 2016). Furthermore, organizations become prone to hackers, and if an incorrect brand strategy is in place this can cause a viral social disadvantage to an organization's brand (Greenhow & Lewin, 2016). Making use of social media is time consuming, and a dedicated person will need to be appointed at a cost to the organization. It should be also borne in mind that organisations sometimes have difficulty in measuring results from social media advertising, and this could cause an organization to lose money and thus negate the appointment of a social media person in an organization.

As the use of social media and internet access grows within the youth population it can have negative effects on the younger generations as it can cause the youth to waste a lot of time chatting on social sites and this can affect their health, as these platforms are potentially addictive. In addition, this can result in valuable time being devoted to non-beneficial social interactions and not spending enough time building personal relationships with family members. Children also stand to be negatively affected by graphic and violent media shared on these platforms. Some online blogs can incite youth to take inappropriate actions such as civil strife and disobedience. The main negative effect of social media is in relation to safety and privacy. Given the online nature of these platforms, the risks of being exposed to kidnapping, murder and robbery are often high especially when private details are being shared online. In fact, instances have been reported whereby young people are lured online by strangers with devastating consequences.

As professional industries incorporate social media in their operations, the protection and privacy of personal data is a huge concern and needs to be constantly monitored, especially when considering the recent adoption of various sorts of applications by professionals (Hawn, 2009). The collection of personal data and the use of this data may be one of the main disadvantages of the use of social media, as users of social media are not aware how much of their personal data is being recorded and used to track their online behaviours or if their data is being sold to malicious entities for usage. Disadvantages associated with social media remain the abuse of personal data

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for financial gain, social discrimination and/or coercion. There has also been multiple instances in the past where people's personal information was collected by government and private institutions without their knowledge and used to monitor their social media usage as social media platforms have become integrated and mostly owned by monopoly organisations. Social media organisations collect data from different sources and consolidate the data to acquire a full picture of a user's economic status, resource usage and their interests. When collecting such data, issues pertaining to data security and data privacy arise. The use of social media in everyday activities done by people leave traces of fingerprint data relating to their interests, habits and intentions, which can be exploited by potential hackers and anyone with bad intentions.

Digital literacy in relation to social media

Digital literacy and social media have essentially affected how people from different communities interact with each other online. Social media has changed the lifestyles of members of communities because people can now reconnect with old friends and make new friends through social media. The changes social media has brought to society has been recognised by organisations and thus they have started to incorporate social media strategies into the business operations. With this integration it become essential for people who want to grow careers in social media strategy roles to have advanced levels of digital literacy. Although social media does not determine digital literacy, one's level of digital literacy determines how they interact with social media platforms.

Deficiencies in digital literacy in the following areas hamper the amount of people perusing careers in social media development and management as these are considered advanced concepts in the average social media user:

- Privacy and security – a high number of social media users are not careful when sharing private information. Awareness of internet security is important regarding content created and shared by users.
- Ethical and legal use – there are cases where users are cyberbullied, and this has caused schools to ban some social media sites. It is evident that a very low percentage of students are aware of intellectual property laws governing online content as many cases of cyberbullying are arising.
- Users often lack an awareness of risks posed by creating and sharing content on their social media profiles with respect to their current and future employability. It is now common for employers to screen the social media platforms of their current and potential employees.
- Clients and customers that use ecommerce platforms to purchase goods and/or services should guard against their accounts being hacked or being scammed out of their purchases.

As these concepts above are considered advanced and are commonly not known by the average social media user, this creates boundaries. In developing countries there is a resulting skills gap as advanced concepts of digital literacy are not made easily available to parts of the communities within these countries. The widening skills gap is often established by simply looking at the difference in the level of effectiveness and time required to finish a task between people that have and do not have digital literacy (Correa, 2016).

In order to address the widening skills gap, not only should digital literacy be taught as a separate school subject, it should also be included as part of the main curriculum. The building of digital competence should start from a young age with students learning to use the digital tools confidently and creatively and paying specific attention to security, safety and privacy. Teachers need to be equipped with digital competence themselves to support students. Digital literacy

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should be made part of initial teacher training and in-service training. The training should include aspects of using ICT as both a learning tool within a subject and as a tool a learner will use for their coursework and learning related activities outside school. Students should also learn digital competence in context as they should be encouraged and allowed to use ICT for their learning, information searching and creation tasks. Innovative learning approaches should also be used to support digital competence. Digital competence will aid professionals and students to use social media with the appropriate knowledge and thus social media can be used by education and training institutions to facilitate access by current and prospective students to information. In the South African context, the following challenges have been identified in the implementation of digital literacy to attain digital skills and competence (Merkofer & Murphy, 2009):

- There are gaps between higher education and work readiness as it has been identified that employees with specialist skills are very scarce.
- The schooling system does not provide or create the necessary foundation to aid learners to succeed in the digital sphere.
- Gaps exist in the higher education curriculum as the digital skills taught at a tertiary level do not meet the expectations set by the roles they occupy in employment.

It is essential to reduce the effects of these challenges by ensuring that learning is integrated into the wider community by reaching out to people from all age groups, and social-cultural background and linking experts, researchers and participants in a certain field of study that would open other channels of gaining knowledge and enhancing skills.

The Digital Divide

When introducing digital literacy into the broader community, one needs to consider the extent to which a digital divide exists in the community. The digital divide also expands across income groups. When analysing the presence of digital literacy in relation to the digital divide in a society, there are two main aspects to consider, namely: the amount of digital infrastructure that aids internet services and the abilities of community members to use ICTs and internet services. Digital infrastructure, personal computers and digital literacy are requirements for accessing internet. Thus, the lack of digital infrastructure can be illustrated in the levels of internet use and the community's ability to use ICTs and internet services. Research has shown that internet access is not equally distributed among demographic categories such as age, gender, socioeconomic status, ethnicity and geography (Scheerder, van Deursen & van Dijk, 2017). As technology stretches across different societal and population group, digital inequalities change but still exist due fact that having basic access to internet is different from being able to make full usage of opportunities and content available on the internet (Correa, 2016).

This inability to take full advantage of digital content can be referred to as the 'usage gap'. Regular use of computers positively correlates with self-esteem, motivation and problem-solving skills. Youth from low income communities have low success rates in the labour market and this can be correlated to their inability to use, adjust and divert technology-based skills. Computer skills is a requirement in many jobs in today's job market (Wamuyu, 2017). Because of the necessity of digital literacy in today's world, being on the disadvantaged side of the digital divide is devastating to any individual, and efforts needs to be made to ensure digital inclusion for everyone.

The higher education sector across countries see the digital divide as a serious concern, especially as schools are seeking to reach out to underprivileged communities (Buzzetto-Hollywood, Elobaid & Elobeid, 2018). Wamuyu (2017) has suggested that any incentives aimed at reducing the digital divide should carefully consider access, knowledge and content needs. Reducing the digital divide needs a deeper analysis of e-business, e-government, e-learning, e-commerce, and e-participation. Minimization of the digital divide will mean that people will have adequate digital and media literacy that will give people the ability to recognise personal, corporate and political agendas and thus become empowered to speak on behalf of the missing opinions

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and left out perspectives of the community. A domestication approach can be considered to increase the levels of digital literacy within a community. Domestication is defined as the process whereby people interact with ICTs either by rejecting these tools or incorporating them into their daily lives (Wamuyu, 2017). It should be noted that the reason for the lack of digital infrastructure can be due to the lack of constant supply of electricity.

Other factors that create barriers to lower income communities accessing internet use include the fact that internet access is expensive and owning internet access devices is blocked by fear of theft or losing the device. These factors affect the domestication of internet access among the lower income and disadvantaged urban communities.

METHODOLOGY

OVERVIEW OF THE METHODOLOGICAL APPROACH

A systematic literature review was conducted to investigate digital literacy in social media. The systematic literature review method identifies and synthesises all available existing research on a particular topic (Scheerder, van Deursen & van Dijk, 2017). The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) protocol was considered to ensure this review is clear and can be replicated. A systematic literature review is the use of a structured scientific method to collect, critically analyse and formulate answers to a research question at hand. A systematic literature review is a rigorous and clearly documented methodology, which involves a structured and comprehensive search for specific information in line with the inclusion and exclusion criteria identified by the researcher. This reduces any bias that could arise. The process of conducting a systematic literature review involves the researcher identifying the types of information that will be included in the review such as journal articles, book chapters or blogs. Thereafter, the researcher outlines the criteria that will be used to ensure inclusion of potential pieces of work available such as the scope of the review, types of data to be included and the search terms for identifying types of information and any other specifications. The researcher will then read through all the data they have collected and identify themes in each piece of information, stipulating what was excluded and what was included. This in-depth documentation of the process allows the review to be reproduced and updated by another researcher.

Once the researcher has completed reading through the pieces of information, they should relate the information gathered back to the research question by identifying the following:

- What does the information tell us about the topic?
- Are there gaps in the research?
- Are there contradictions in the findings?
- How does the research form a response to the research question?
- Is there a need for further research?
- What are your recommendations
- Were there best practices that can be highlighted

At the end of the systematic literature review, the reader of the review should be able to understand what the researcher did, how they did it and the sense the researcher made of the findings they collected as related back to the research question investigated. In summary a systematic literature review is a review that includes a clear developed research question that makes use of systematic and explicit methods to identify, select, collect relevant research and analyse data from studies included in the review (Van Laar *et al.*, 2017).

SEARCH TERMS

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A comprehensive probe for articles was carried out using the UNISA e-journal library, google scholar, Scopus and the Science Direct database. An initial search by only typing in the search terms was conducted. The search included terms such as '*soft skills'*, '*digital skills'*, '*ICT skills*', '*technology skill*', '*digital skills and social media*', and '*social media and e-skills'*. After searching for these terms, several results that were generated had to be carefully selected and be included in the research for this paper. From this initial search, the common terms that were identified as being commonly used by researchers when writing about access to ICT and the ability to use ICT were: '*digital skills*', '*internet skills*', '*online skills*' and '*21st century skills*'. The terms that were used in the same context as digital literacy were: '*digital competence'*, '*information literacy'*, '*e-skills*' and '*21st century skills*', but their inclusion in the search did not yield any additional results. In terms of searching for the research undertaken in the context of social media, a Boolean search was conducted because a mere search of the phrase '*social media*' did not generate any optimal results. The Boolean string used was '*social media*' AND '*digital literacy*'. This Boolean search yielded results that were included in the research. Additional search strings that were added to the main concept of'*digital literacy*' were: '*South Africa*', '*internet skills*', '*digital divide*', '*digital future*', '*information literacy*' and '*21st century skills*'. These search terms were added to the main concept to ensure the results contained information relating to the main concept.

SELECTION CRITERIA

Multiple search criteria were applied to limit irrelevant research being analysed. The articles selected had to be in the English language and published in an academic journal, published as a book, notes from a conference or a published academic paper. The articles needed to have the search terms included. The criteria the articles had to meet in order to be included was as follows:

- Articles title has keywords '*Digital literacy*', '*Digital Skills*', '*e-skills*', '*social media*', '*21st century skills*'.
- The articles abstract or introduction relates to the research question.

Once these initial criteria were met, further analysis of the full article needed to meet the following secondary criteria:

- Full article relates to research objectives.
- Focus on digital skills factors that are needed for a person to be considered to have adequate digital literacy including both technical and non-technical skills.
- Include correlations between how digital skills are used in the current knowledge- based economy.
- Digital skills in relation to social media
- Articles should be generalised and not focused on a specific profession.

STUDY SELECTION

The research articles that are included as part of this research paper went through three main processes. The first process entailed screening for eligibility the titles of all the articles collected by having the search terms included in the title of the article. Thereafter, the abstracts of each article were read and related to the research question. If at this point the abstract of an article did not relate to the research question, the article was excluded. Lastly the entire article was read to ensure all articles were related to the research question and were eligible. Once the full text was read, a further selection criterion was implemented to make sure all the articles selected essentially answered the research question. All articles that then met the criteria where coded and grouped according to topics that are discussed in the discussion section of the review. The articles were grouped and coded to make sure all the selected articles were related and meet the secondary criteria. In all the articles that were deemed relevant, information about the main

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concepts, related industry, list of digital skills was extracted and grouped into main concepts to allow for the formation of the discussion section. Extracting data was considered as part of the content-analysis process, which enables the creation of an overview of the characteristics of the articles deemed as relevant and included in the research. The content analysis included an analysis of how the main concepts in the articles were synthesised to allow for the list of skills to be defined. The entire selection process followed the PRISMA flowchart, which is summarised in **Figure 1**.

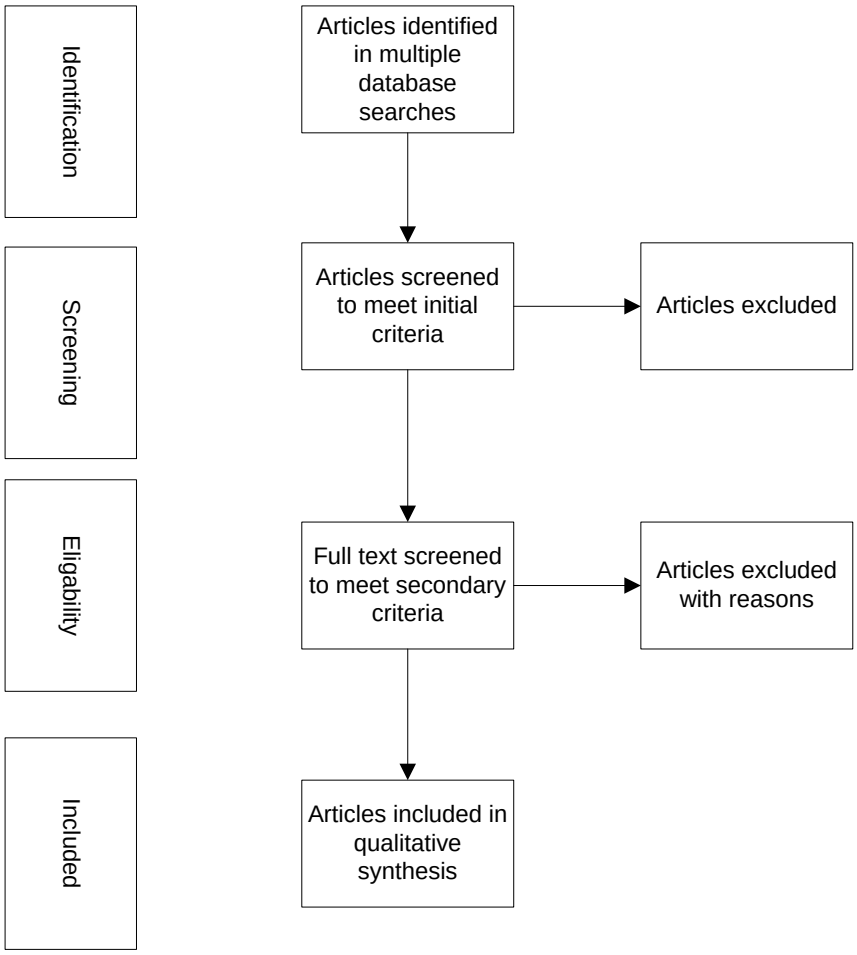

Figure 1: The PRISMA Flowchart

Inclusion and exclusion criteria

The search terms generated a total of thirty-two (32) articles. With restrictions from the first search criteria placed on the title and abstract of articles, twelve (12) of the thirty-two (32) articles did not go past the first screening criteria due to the article not relating to the research question. The twelve (12) articles that did not relate to the research question were excluded since it was deemed unnecessary to read the full text of the articles if they did not relate to the research question. Following the title and abstract screening process, the full text of twenty (20) articles were read; of these, only one (1) article was excluded as part of the second screening process. This sole article was removed as it did not meet the research objectives. The articles that were put through the screening process are presented in **Table 2**.

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Table 2: List of articles

Study Title	Reference	Title has keywords 'Digital literacy', 'Digital Skills', 'e- skills', 'social media', '21st century skills'	Abstract relates to research question	Full article relates to research objectives	Included in research paper analysis
e-Skills Match: A framework for mapping and integrating the main skills, knowledge and competence standards and models for ICT occupations.	Fernández-Sanz, Gómez- Pérez & Castillo- Martínez (2017)	Yes	No	Yes	Yes
E-social Astuteness skills for ICT- supported equitable prosperity and a capable developmental state in South Africa.	Mitrovic et al. (2013)	No	No	No	No
Soft Skills Development Needs and Methods in Micro-Companies of ICT Sector.	Szilárd, Benedek & Ionel-Cioca (2018)	No	Yes	Yes	Yes
Social media, professionalism and higher education: a sociomaterial consideration	Fenwick (2016)	Yes	Yes	Yes	Yes
Skills, earnings, and employment: exploring causality in the estimation of returns to skills.	Hampf, Wiederhold & Woessmann (2017)	No	No	No	No
The relation between 21st-century skills and digital skills: A systematic literature review.	Van Laar et al. (2017)	Yes	Yes	Yes	Yes
South Africa's Quest for Smart Cities: Privacy Concerns of Digital Natives of Cape Town, South Africa.	Tshiani & Tanner (2018)	No	No	Yes	No
Addressing Information Literacy and the Digital Divide in Higher Education.	Buzzetto-Hollywood, Elobaid & Elobeid (2018)	No	Yes	Yes	Yes
Is There a Space for Critical Literacy in the Context of Social Media?	Burnett & Merchant (2011)	Yes	No	No	No
Closing the Digital Divide in Low- Income Urban? Domestication Approach.	Wamuyu (2017)	No	Yes	Yes	Yes
Digital Skills in the Z Generation: Key Questions for a Curricular Introduction in Primary School	Pérez-Escoda, Castro- Zubizarreta & Fandos-Igado (2016)	Yes	Yes	Yes	Yes
Digital skills and social media use: how Internet skills are related to different types of Facebook use among 'digital natives.	Correa (2016)	Yes	Yes	Yes	Yes
Can we teach digital natives' digital literacy?	Wan (2012)	Yes	No	No	No

Table 2: List of articles (Continued)

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Study Title	Author/s and year	Title has keywords 'Digital literacy', 'Digital Skills','e-skills','social media', '21st century skills'	Abstract relates to research question	Full article relates to research objectives	Included in research paper analysis
Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster.	Kaplan & Haenlein (2016)	Yes	No	Yes	Yes
Social media and education: reconceptualizing the boundaries of formal and informal learning. Learning, media and technology	Greenhow & Lewin (2016)	Yes	Yes	Yes	Yes
Examining digital literacy practices on social network sites.	Buck (2012)	Yes	No	No	No
Determinants of Internet skills uses and outcomes. A systematic review of the second-and third-level digital divide.	Scheerder, & Deursen & van Dijk (2017)	No	Yes	Yes	Yes
Social media its impact with positive and negative aspects.	Siddiqui & Singh (2016)	Yes	Yes	Yes	Yes
Origins and concepts of digital literacy.	Bawden (2008)	Yes	Yes	No	Yes
Take two aspirin and tweet me in the morning: how Twitter, Facebook, and other social media are reshaping health care.	Hawn (2009)	Yes	Yes	No	Yes
"21st-Century" skills	Rotherham & Willingham (2010)	Yes	Yes	Yes	Yes
Instant messaging, literacies, and social identities.	Lewis & Fabos (2005)	No	Yes	Yes	Yes
Digital storytelling: A powerful technology tool for the 21st century classroom.	Robin (2008)	No	No	No	No
Changes over time in digital literacy.	Eshet-Alkalai,& Chajut (2009)	Yes	No	No	No
Digital literacy and e-skills: participation in the digital economy.	Bowles (2013)	Yes	Yes	Yes	Yes
Improving digital skills for the use of online public information and services.	Van Deursen & van Dijk (2009)	Yes	No	No	No
e-Skills Match: A framework for mapping and integrating the main skills, knowledge and competence standards and models for ICT occupations.	Fernández-Sanz, Gómez- Pérez & Castillo- Martínez (2017)	Yes	No	No	No

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Table 2: List of articles (Continued)

Study Title	Author/s and year	Title has keywords 'Digital literacy', 'Digital Skills','e-skills','social media', '21st century skills'	Abstract relates to research question	Full article relates to research objectives	Included in research paper analysis
The Role of ICT in Sustainable and Responsible Development: E-Skilling	Twinomurinzi (2012)	No	Yes	No	No
Towards a shared worldview on e- skills: A discourse between government, industry and academia on the ICT skills paradox.	Twinomurinzi et al. (2017)	Yes	No	No	No
E-skills for jobs in Europe: Measuring progress and moving ahead.	Gareis et al. (2014)	Yes	No	No	No
The e-skills landscape in South Africa.	Merkofer & Murphy (2009)	Yes	Yes	Yes	Yes
A framework for e-skills policy- making in South Africa	Sharif (2003)	Yes	No	No	No

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CONCLUSION AND CONTRIBUTIONS

CONCLUSION

The aim of this paper was to conduct a systematic literature review on the existing research undertaken on digital literacy in relation to social media. According to the articles that have been analysed, adequate research has been done to identify what digital literacy and social media are and the respective advantages and disadvantages of these concepts were identified.

Although it was found that different researchers have different definitions for digital literacy, a common theme of digital literacy being a group of knowledge needed to develop and apply digital skills was found across these definitions. The review has also revealed that social media has also been defined, with the various papers explaining the advantages and disadvantages of social media especially in relation to the use of social media platforms in different aspects of life.

In a nutshell, it was found that extensive research has been undertaken and attempts were made to define digital literacy and social media and determine the effects of social media in education. To this end, this review has revealed that social media can lead to innovations in four different areas. Firstly, it was found that social media enables learners to access a wide variety of learning materials in support of their learning and professional development. The wide variety of learning materials that students have access to puts pressure on institutions to improve the quality and availability of their learning material. Secondly social media allows users to create digital content and publish it online, and this contributes to the resources available from which learners and educators can mutually benefit from. Thirdly, social media connects learners to one another, experts and teachers. This allows all three parties to tap into tacit knowledge of their peers and have access to specific and targeted knowledge in the subject of interest. Lastly, social media supports collaboration between learners and teachers on a project or joint point of interest thus allowing a pooling of resources. Extensive research has been undertaken on how social media affects organisations; specific research has also been carried out on how these organizations operate as social media enhances communication within the organisation and between the organisation and its customers. The literature examined has also illustrated how to digital literacy and related concepts are needed when using social media effectively and they also make it easy for people to be aware of the negative aspects of social media platforms. Digital literacy is a particularly important requirement for assisting social media users to understand concerns relating to security and privacy when using social media platforms and for creating an awareness in terms of what personal information to disclose in.

RESEARCH CONTRIBUTIONS

This review forms part of a national research project supported by the National Electronic Media Institute of South Africa (NEMISA). The national project is aimed at preparing South Africa for the digital economy and the 4th industrial revolution. Theoretically, this body of work contributes to the existing knowledge base by highlighting that digital literacy is needed to use social media platforms safely and with awareness of security and privacy concerns. The method used in this paper contributes to the notion that articles need to be related to the research questions and objectives in order for the articles to be beneficial in the application of the knowledge. Practically, this paper highlights the digital divide that exists in society and how his and other gaps can be addressed by developing digital literacy programmes for younger generations and by making it part of the education system.

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RECOMMENDATIONS AND LIMITATIONS

A much more meaningful and relevant contribution can still be made if the topic is contextualised into the African continent. To this end, special attention needs to be paid to current digital literacy levels that exists and how social media in a South African context is being used in society.

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WHAT RESEARCH HAS BEEN UNDERTAKEN CONCERNING E-SKILLS IN THE TOURISM INDUSTRY

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ABSTRACT

Aim/Purpose	This paper seeks to understand the background and impact of e-skills globally, interpret how tourism operates and investigate prevalent literature on e-skills in the tourism industry.
Background	The impact of e-skills in the tourism industry is an issue of significant interest for the industry players as well as researchers. The pervasive vacuum in literature concerning e-skills within the tourism space is yet to be investigated. The paper engages the problem by describing what the status of e-skills within the tourism expanse is.
Methodology	The paper followed a systematic literature review methodology to outline and incorporate evidence from various literature reviews in order to highlight gaps therein
Contribution	This paper help illuminate the understanding of e-skills in relation to tourism
Findings	The major findings of this paper highlight e-skills such as computer handling, web navigation, management of basic databases, information communication (e-mail), online communication (www), and operation of global distribution systems as eminent within the tourism industry
Recommendations for Practitioners	Develop a structured training program which deals with e-skills in the tourism. The training program should produce some form of certification for digital skills in the tourism.
Recommendation for Researchers	Assume a comprehensive analysis of the various levels of e-skills vis-a-vis tourism.
Impact on Society	To address the skills shortage, skills gap and skills mismatch issue.
Future Research	Further work needs to be undertaken by unpacking digital skills in the tourism as far as the ICT practitioner skills, e-Literacy skills, e-Business skills and R&D skills or e-Researcher are concerned.
Keywords	e-Skills, ICT, Tourism, Digital Skills, Technology, Travel

INTRODUCTION

An information society that is self-sufficient, equitable and socially cohesive revolves around current ways of working, living and thinking requires the creation of new capacities for both the workforce and population at large and are linked to the utilization of Information and Technology (ICT) for the building of prosperity and economies that are globally competitive (Mitrovic, Taylor & Wesso, 2012). ICT has been incorporated into almost all functions of society, business and the economy; the success of organizations depends on human resource skills including ICT skills. A lack of e-skills prohibits people from utilizing e-commerce and e-government services so as to fully participate in the information society; the e-skills deficiency compounds social and educational disadvantages and hinders lifelong learning and upskilling (Várallyai & Herdon, 2013). ICT-related skills, which is a broad term for e-skills, accounts for the major part of an information-intensive society and the digital revolution that sustain the potential of transforming economies, stability, and social development (Lanvin & Passman, 2008). For this reason, focus has been placed whether any research has been undertaken on e-skills in the tourism industry.

Many pundits argue that the demands for digital transformation are negated by the lack of skills and effectiveness of the workforce; that is, positions that need scientific and technical skills are simply not filled. At the centre of innovation, employability and productivity, the level of e-skills have been identified as crucial in the broader context of constructing knowledge economies by promoting social inclusion, competitiveness and growth. e-Skills involves an examination of the skills of ICT users (also known as foundation digital literacy), which utilize the devices and technology for the betterment of society. ICT practitioner skills on the other hand are an extension of occupational skills by developing, designing, integrating, managing and supporting the systems thereof. Lastly, the e-business skills involves the exploitation of the innovation that is generated by ICT to enhance capacity and improve business (Lanvin & Králik, 2009). As an enabler for economic growth, ICT has taken the business environment to high levels. In the tourism sector for example, e-commerce empower businesses to reach an extensive audience globally. To this end, travellers and tourists are able to experiment using ICT tools and applications with their travel options and make comparisons of prices prior to making a booking for their travel and thus customized their product in the process.

PROBLEM STATEMENT

The impact of e-skills in the tourism industry is an issue of significant interest for the industry players as well as researchers. The pervasive vacuum in literature concerning e-skills within the tourism space is yet to be investigated. Global surveys indicate that e-skills are generally deficient. The tourism industry is a major macro-economic contributor of many developing countries and tourism is viewed as one of the tools that can be used to access economic, social and environmental opportunities worldwide. In order for the full benefits of the tourism sector to be realised, stakeholders within the tourism industry should therefore adopt a digitisation approach by ensuring that all relevant service providers possess the requisite e-skills.

RESEARCH QUESTIONS

In order to address above-mentioned problem statement, the following research question was posed:

What is the status of digital skills (e-skills) in the tourism sector?

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SUB-QUESTIONS

To clarify the main research question, the following sub-questions were formulated:

- What are e-skills?
- What are the methods involved in the tourism ecosystem?
- What ICTs are employed within the tourism sector?

RESEARCH OBJECTIVES

The principal objectives of this literature review can be described as follows:

- Understand the background and impact of e-skills globally;
- Interpret how tourism operates; and
- Investigate prevalent literature on e-skills in tourism industry.

LITERATURE REVIEW OVERVIEW

E-SKILLS

A preponderance of the Internet and other related ICT technologies provides an opportunity for developing countries to be networked while at the same time generating new industries and sectors. It now widely accepted that ICT plays a major role in addressing issues relating to equity, sustainability and global competitiveness. Therefore, many developing countries require the building of new capacities associated with the use of ICT (i.e. e-skills) in order to exploit the newly emergent opportunities resulting from the ICT related industries.

Defining e-skills

e-Skills are defined as 'The set of skills, knowledge, and concepts that are needed for effective consumption-access, locate, operate, manage, understand and evaluate of e-services (generic government services supplied through the internet to citizens, public and private sector persons) provided in different stages of e-government' (Khan et al., 2010).

Merkofer & Murphy (2009) defines e-skills according to the following levels:

- **Level 1: e-Literacy** – these are skills essential for modern life outside the work environment;
- **Level 2: e-Skills** – these are tools that can be used in the work environment such as sector specific software tools; and
- **Level 3: ICT specialist** – these are specialist technical skills required for ICT enabled industries and other high-end ICT research and development related jobs.

e-Skills capabilities include knowledge, skills and competencies and are classified as in accordance with **Table 1**.

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Table 1: Classification of e-Skills (Mitrovic, Taylor & Wesso, 2012)

Type of e-skills	Description
e-Literacy skills	The most basic use of ICT (e.g. using the internet and email, aimed at employment readiness).
e-Participation and e-Democracy skills	Focused on enhancing participative engagement between government and its citizens to increase self-reliance and equity.
e-Government skills	Strives towards the use of ICT within government in a more efficient and productive way.
e-Business skills	Seeks to increase efficiency and productivity within organizations.
e-User skills	Aims at intensifying the efficiency of people in general for any assignment or duty.
e-Practitioner skills	Focused on enhancing the capacity of ICT professionals in order to manage and support ICT services.
e-Community skills	Focused on communities for building social cohesion in order to resolve societal issues such as crime, education, and health.

Types of e-skills

According to Bowles (2013), e-skills can be categorized into three level types, namely:

- **Foundation or entry level** – individuals are equipped with the necessary ICT skills that they are able to use in their daily lives and work (e.g. acquire skills in the use of a PC, software, device, internet, perform a range of routine activities, sometimes complex and non-procedural using ICT);
- **Extension level** - existing ICT skills are used to further enhance digital literacy. It involves advanced digital skills that can improve productivity; and
- **Strategic level** – this level is related to innovation management and plays a significant role in the competitiveness of business in which high-end ICT skills are deployed in order to meet the strategic requirements and be advantageous to the organization or community.

Figure 1 illustrate the hierarchy of e-skills with e-literacy forming the basic of skills required and Research and Development (R&D) skills at the top of the pyramid.

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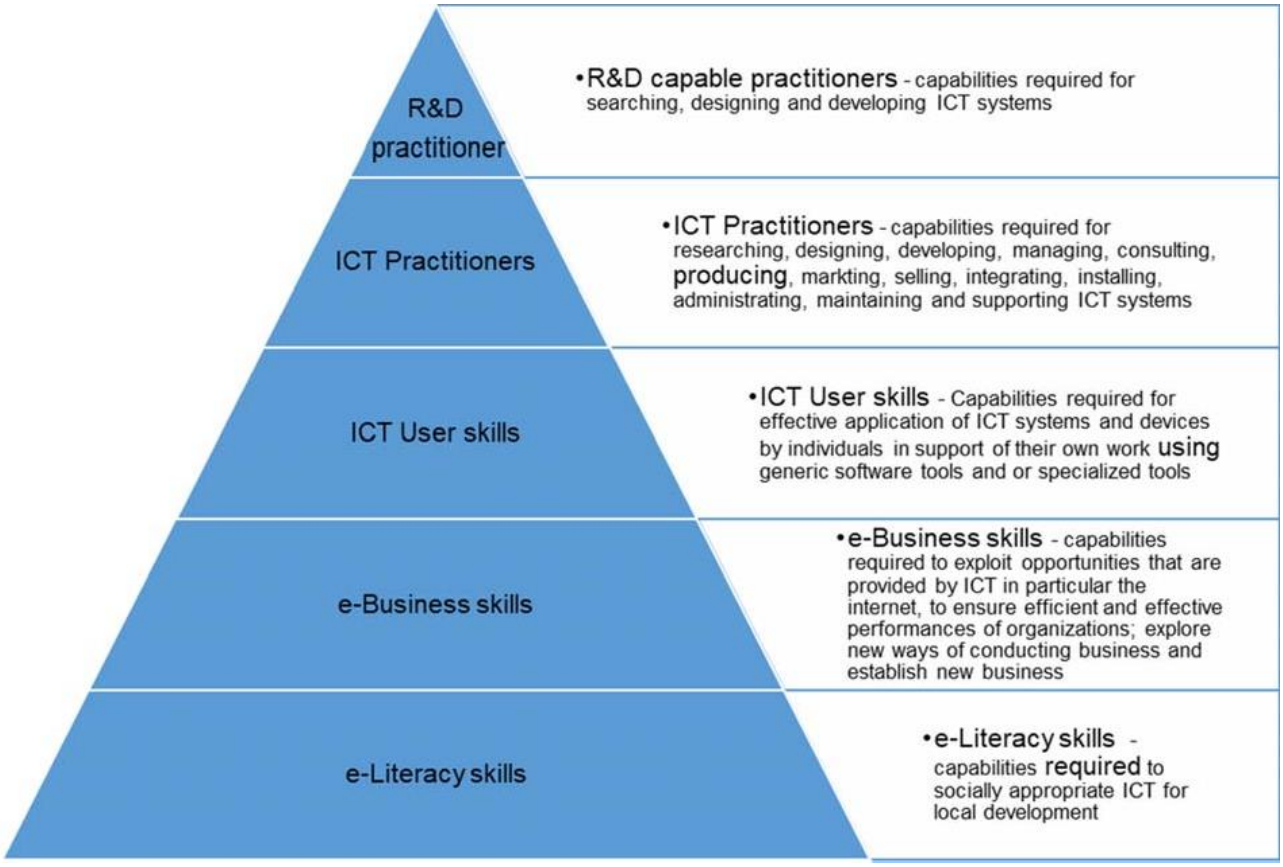

Figure 1: ICT Skills pyramid (de Villiers et al., 2012)

There are differences between the categories of digital skills proposed. The ICT skills pyramid by De Villiers et al. (2012) have included R & D practitioner, which is the category of research skills that is not included in **Table 1** and was developed by Mitrovic, Taylor & Wesso (2012). In this work (see **Table 2**), a new category of e-research skills has been added to the category of skills that was developed by Mitrovic, Taylor & Wesso (2012).

Table 2: Categorization of Digital skills

Category	Description
e-Literacy skills	The most basic use of ICT e.g. using the internet and email, aimed at employment readiness
e-Participation and e-Democracy skills	Focus on enhancing participative engagement between government and its citizens to increase self-reliance and equity
e-Government skills	Strive towards the use of ICT within government in a more efficient and productive way
e-Business skills	Seeks to increase efficiency and productivity within organizations
e-User skills	Aims at intensifying the efficiency of people in general for any assignment or duty
e-Practitioner skills	Focus on enhancing the capacity of ICT professionals in order to manage and support ICT services
e-Community skills	Focus on communities for building social cohesion in order to resolve societal issues such as crime, education, health etc.
e-Research skills	The ability to conduct research on digital skills

Demand and supply of digital skills

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The discrepancy between the demand and supply of an e-skilled labour force is defined as the shortage, gap and mismatch of skills. Skills shortage is described as the lack of skilled people in the labour market; that is, there are insufficient individuals that can perform ICT jobs. Skills gap refers to a shortfall between the competence levels of the current and expected human resources. Put simply, this means the ICT practitioners are not competent enough to undertake certain activities thus resulting in outsourcing, retraining or reorganizing work. A skills mismatch emanates from unsuitable training or misaligned course curricula and is the difference between the graduate or trainee and what the employer's expected competence needs are (Frinking et al., 2005);

Twinomurinzi et al. (2017) have argued that the South African industry is of the view that ICT skills do not match the ICT demand and prioritize the sourcing of resources for new and emerging technologies. It noteworthy that the ICT industry believes that their business is negatively affected by the skills shortage. As the industry and business sectors make attempt to ensure that the entire workforce is digitally literate, the need to cultivate more advanced skills with the adoption of new technologies also increases. In South Africa the ICT industry has a high degree of skills mismatch mainly due to the dynamism of the industry itself, which require individuals with advanced e-skills to operate and/or manage new business applications (Twinomurinzi et al., 2017).

In respect of education, which plays a critical role in the cultivation and supply of e-skills, developing countries such as South Africa are lagging behind due to the quality of the education, especially in the areas of mathematics and science (Merkofer & Murphy, 2009).

According to Frinking et al. (2005), a lack of a definition of ICT skills and the level of skills which are applicable for ICT employment exist (Frinking et al. 2005). Furthermore, it is argued that there is a deficiency of definitions of qualifications that are appropriate for ICT education, and there is no way to support the truth or value of training. The issues that are prevalent concerning e-skills affect educators, trainers, employers and employees. Gender issues address the lack of equal opportunities and whether or not there is an unexploited reserve of skills among women. While offshoring cater for the outsourcing of skills from other service providers, migration deals with the recruitment of immigrants to fill the vacancies (Frinking et al., 2005).

The digital health sector is prone to lack of specific personnel that are proficient in both healthcare and ICT skills such as software development and software engineering) (Rights, 2018). Digitization is not an unfolding phenomena but a reality; and the emergence of ICT (e.g. big data, internet of things, smart devices, cloud computing, mobile technologies) have a massive impact on the labour force, the economy and he workplace. The digital health sector, which is the use of ICT to improve the health of citizens and meet the needs of individuals, is one of the fastest growing sectors in Scotland (Rights, 2018). This sector emanates from a combination of health care services, mobile technology and information technology, which are encompassed in digital products to enable users to manage, track, improve personal health, reduce inefficiencies in healthcare delivery by reducing costs, improving access, personalizing medicine and maximizing quality (Rights, 2018).

Methods of digital skills and acquisition

Mitigation of ICT skills deficiency involves reviewing the existing education and training to provide for relevant ICT skills and proficiency (Rights, 2018). Industry should be involved in the design of curricula in computing, which should also involve sector specific employees more closely in the development of the curricula for ICT skills. This will allow for the improvement of digital skills to cover all levels of education and maximize industrial and work placements to facilitate students' real life experience. Students also need to be exposed to work practices so that they can comprehend the sector skills requirements (Rights, 2018).

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Twinomurinzi et al. (2017) argues that a substantive theory on how to move forward towards a shared meaning of ICT skills needs to be created. Firstly, the theory should touch on appreciating the various levels of reality as far as ICT and ICT skills is concerned. Secondly, it needs to identify the actual boundaries and discuss the differences and contradictions between the sectors (e.g. industry is profit driven and government is national driven). Lastly, attempts should be geared towards ensuring and building new bridges between sectors where all sectors can benefit (Twinomurinzi et al., 2017).

The rapid development in technology has created an e-skills capacity shortage globally, and this shortage has created a challenge especially in developing communities. e-Skilling the citizens of a country for equal prosperity and global competitiveness is not a once-off affair, but a continuous upgrade of skills due to technological advancements. According to Khan et al. (2010), governments in developing countries should improve education programs on a national scale by introducing information and technology (IT) literacy and skills through computers and other technologies to students in order to uplift citizens with basic form of e-skills. Numerous computers with free access to the internet in public buildings such as libraries, hospitals and post offices should also be installed and immediate training on how to utilize the technology should be provided.

The following acquisition methods of e-skills have been listed by Khan et al. (2010):

- Curriculum at all levels should introduce computer subjects.
- Opening digital recreation centres in disadvantaged remote areas.
- e-Government service model should be designed based on mobile phone access.
- ICT training through media (e.g. television, newspaper and other media).
- Customized IT training based on age, gender, occupation and literacy level.
- Joint training programs by government and the private sector.
- Formal on-the-job training.
- Encouraging employees to upgrade themselves in terms of acquiring ICT skills.
- e-Skills competency assessment modules should be developed.
- Compulsory IT skills standards and certification for the recruitment of new staff.

As far as Lazarinis & Kanellopoulos (2010) are concerned, most of the participants that were surveyed specified the various ways of acquiring e-skills such as attending a training program for adults, acquiring the necessary e-skills through secondary or higher education and getting skilled through self-study or taking online lessons.

Despite the whole world going digital, the digital divide has caused those who are digitally disadvantaged to be left behind due to lack of access to ICT as well as the requisite ICT skills. In South Africa for example, an e-skills agenda has been developed to address the shortage of e-skills through the National e-Skills Plan of Action 2010 (NeSPA. The desired outcome of the e-skills agenda is to encourage the creative and innovative use of ICT among communities, organizations and citizens in order to partake in the knowledge-based economy. In the Plan of Action, the following areas of focus have been identified (Twinomurinzi et al., 2017):

- Alignment of the e-skilling agenda with existing developmental policy, both nationally and internationally.
- Cultivation of cross-collaborative research on e-skills across business, government, education and civil society.

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- Improvement of economic access to internet and telecommunications.
- Establishment of a high-level advisory body to nourish the interest of different sectors.

TOURISM

Tourism involves particular activities chosen voluntarily by people who travel outside their home environment and may or may not involve an overnight stay and incur some form of expenditure (Holloway & Humphreys, 2016). Tourism constitutes a particular rhythmic way of "being-in-the-world" i.e. being completely fascinated and absorbed by one's world, reproducing another kind of everyday home away from home (Minca & Oakes, 2011). Tourism consists of 3 elements viz.:

- **Consumption** – this takes over the various stages of the tourism system, and individuals, family consumers and markets characterize tourism consumption
- **Product** – this serves as the experience of the tourism activity
- **Production** – this is the service over different stages of the tourism system by relevant stakeholders such as firms, employees, destinations, governments, hotels, transport sector (air, sea, land) (Cooper & Hall, 2008).

Tourism is the summation of all businesses that supply goods and services to facilitate leisure, pleasure and business activities away from the home environment. It involves people travelling optionally outside of their place of permanent accommodation and is established on a multiplex of infrastructure and physical resources, which gives an advantage to places in which they are located; that is, 'tourism is produced where it is consumed' (Cooper & Hall, 2008).

Globalization of economies has made tourism to be of international significance in that it affects countries at macro-economic level. The creation of tourist products is location-specific and it mostly involves local residents drawing from their culture, attractions and cuisine to deliver the tourism activity at local destinations. Cities have become key players in tourism as a unique habitat for business activity (Zmyslony, 2011).

Tourism is seen as a tool for tackling economic, social, cultural and environmental opportunities in many destinations across the world. Some enterprises would not exist or exist in a diminished capacity if tourism did not prevail. Tier 1 firms, which include the likes of hotels, tour operators and airlines, would not exist in the absence of travel. However, Tier 2 firms such as taxis, car hire firms and restaurants would operate on a miniscule scale (Cooper & Hall, 2008).

Types of Tourism

There are different kinds of tourism such as cultural tourism, medical tourism, and seasonal tourism among many others. Cultural tourism entails the interrelationship between places, cultural heritage and the temporary movement of people (McKercher & du Cros, 2002). Cultural tourism from a business point of view deals with the development and marketing of different attractions for local as well as domestic tourists. According to McKercher & du Cros (2002), the following elements constitute cultural tourism: (1) The Tourism itself; (2) Use of cultural heritage assets (e.g. archaeological sites, castles, galleries, sculpture, festivals, theatre, music and dance, palaces, ethnic communities, churches); (3) The Consumption of experiences and products, and (4) The Tourists.

Cultural tourism, which has its foundation in attractions such as monuments and museums, is seen to be the icon of a flow of global culture that plays a significant role in cultural policy and development. The promotion of cultural tourism ensures the preservation of cultural artefacts, and cultural tourist are able to learn about the culture of a destination (consisting of the beliefs,

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values, ideas, behaviour, way of life, cultural products, artworks, and atmosphere) and obtain new experiences in relation to the form of culture that the tourists come across (Richards, 2001).

Medical tourism on the other hand is the idea of travelling for the purposes of getting specific health care services, and it could be domestic or international. People from less developed communities may travel for highly specialized procedures that are not available in their place of origin. Medical tourism may also include traveling for undergoing a specific procedure that is prohibited by law in one's native country. Unlike travellers choosing a destination based on its beautiful climate and attractions, travellers in medical tourism first decide which treatment they seek and thereafter select the country that provides those services (Stolley & Watson, 2012). Asia is one of the growing regions for medical tourism, and it is estimated that over 1.3 million medical tourists visit Asia annually to seek medical treatment. India has become the country of choice for medical tourism because of its high technology centres and hospitals, inexpensive high-quality medical procedures, complementary and alternative medicine and a tourism industry that is well established. people seek treatment for cardiovascular surgery, eye procedures, dentistry, cosmetic surgery etc. India's highly educated doctors are world leaders in cutting-edge treatments, genetic and stem cell research. Other countries that have enjoyed a significant boom in medical tourism are Malaysia, Singapore, Taiwan, South Korea, Philippines, Latin America, Mexico, Brazil, Costa Rica, Europe, Turkey, and Middle East. Despite the African continent still lagging behind in medical tourism, South Africa remains successful and it attracts medical tourist from the whole of Africa as well as the US and Britain (Stolley & Watson, 2012).

Seasonality in tourism is determined by climate and institutional patterns such as school holidays, calendar holidays, industrial holidays (Lundtorp, 2001). Sports tourism such as the winter olympic games is a good example of seasonality in tourism. Sports tourism is social, economic, and cultural event emerging from the unique interaction of activity, people and place (Melo, 2017). According to Devine et al. (2004), sports tourism is characterized by active and passive involvement in sporting activity, which is participated in an organized way or casually for non- commercial or commercial reasons that require travel away from the home and work locality (Devine & Devine, 2004).

Classification of the Tourism Ecosystem

Tourism services that are mainly provided are travel, accommodation, tour operating, tour guide services, transportation, catering, tourist attractions and recreation (Cetin & Yarcan, 2017).

According to Cooper & Hall (2008), tourism is a system that consist of four elements (source region, transit route, destination region and the environment), which are illustrated graphically in **Figure 2**.

Figure 2: The geographical tourism system (Cooper & Hall, (2008))

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The four elements of tourism are described individually below.

- Source region - this is the original place where the tourists resides and the starting and ending point of the journey; the distribution and promotion channels for the destination herein are the travel agents, the tour operators, the online retailers and transport infrastructure.
- **Transit route** – this is the path through which the tourist must travel across in order to reach their destinations. It consists of transport links between the source region and the destination (e.g. aviation services, bus, train, cruise, ferry, private and car hire services) including transit facilities for food, accommodation and toilets.
- **Destination region** – this is the region that has been chosen by the tourist and forms the fundamentals of the idea of tourism. The destination region consists of facilities and attractions (e.g. accommodation, casinos, retail, theme parks, meeting and exhibitions and local transport).
- **The environment** – this is what encompasses the other 3 regions that give rise to the psychological elements regarding the consumption of tourism, namely the tourists:' (i) decision to travel; (ii) travel to destination; (iii) activities at destination; (iv) travel from destination; (v) recollection of the trip; and (vi) destination on return to permanent residential.

Tour operators as the distribution and promotion channel that form part of the source region, manage and influence the tourism volume, tourist destinations and facilities that are utilized. These players also control activities in other parts of the tourism industry (Tapper, 2001). Tour operators channel most of the money flowing in the tourism industry and consumers express their preferences of various tourism products through tour operators (Tapper, 2001)

Forming part of the transit route, the hospitality industry is comprised of firms that belong to the hotel and restaurant industry (Backman, Klaesson & Öner, 2017). Hospitality is viewed as the cordial and generous reception and entertainment of guests socially or commercially (Keiser, 1998). The airline industry constitutes passenger air transportation which includes scheduled and chartered transportation but excludes air freight transport.

The process of tourism starts with the consumer (tourist) having to make a decision to travel, consideration of the activities at the destination, traveling to the destination and taking part in those activities, traveling back from the destination and making a recollection of the experiences shown in **Figure 2**.

Motivational factors in tourism

Many theories of motivational needs (needs theory) allude to the fact that tourism is viewed as a form of satisfying human need. At an individual level, tourism is noted as a subject of exploration resulting from human inquisitiveness; there are two groups of motivational factors which form the basis of engaging in travel, the drivers of the tourist activity (push factors) and the factors affecting the choice of destination (pull factors).

Table 3: Drivers of tourist activity (Katsoni, International & Iacudit, 2014)

Push Factors	**Pull Factors**
Escape from the world around them	News
Experience an assessment of yourself	Innovation and learning
Relaxation	

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Strengthen family ties	
Social Interaction	
Prestige	

Drivers of tourist activity include escapism (i.e. one escaping from the world around them), relaxation, strengthening family ties by visiting relatives and friends, social interaction, traveling for prestige and also traveling for innovation, learning and business.

The motivation for tourism is categorized by Wohlmuther & Wintersteiner (2014) as follows:

- Leisure tourism (recreation).
- Culturally-oriented tourism (alternative tourism).
- Society-oriented tourism (relatives, club tourism).
- Sport tourism.
- Economy-oriented tourism (fairs, business trips, incentive travels).
- Politically-oriented tourism (conferences, political events).

The appeal to tourism is for recreation purposes i.e. leisure, culturally-oriented, society-oriented, economy-oriented and politically oriented tourism, sports tourism and other motives for tourism.

According to Katsoni, International & Iacudit (2014), factors influencing some of the choices for travel are:

- Physical factors – reduce mental tension and ailments related to living a stressful lifestyle, leisure, sports activities, relaxing;
- Cultural factors – having a desire to know other parts of the globe and to learn their culture, art, religion, tradition and historical monuments;
- Interpersonal factors – meeting new people and comprehending their being, behaviour, visitation of friends and relatives and so forth;
- Status and prestige factors – development of the human personality in general.

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ICTs employed in the tourism sector

ICT has played a strategic role in redesigning the value chain in the tourism industry and the consumers are adapting to the values, lifestyles and new tourism products. Various industries i.e. hospitality sector, entertainment sector, transport sector and other intermediaries require individuals that are proficient in ICT skills and are technically trained to facilitate ICT tools, systems and information sources.

In order to determine the level of e-skills in the tourism industry, in as much as the focus of this research is not on digital tourism, the idea of realizing some of the ICTs employed in the tourism industry is imperative. Digital tourism is the use of digital technologies to enhance the tourist experience or rather the blending of the real world with digital content aimed at boosting the visitors' experience (Benyon et al., 2014). ICT in its widest phraseology refers to multiple communication technologies aligning from digital cameras, internet, cell phone applications (SMS), Digital radio, Wireless (WiFi, WiMAN), GIS, VOIP, Convergence (data, voice, media), GPS (Shanker, 2008)

Advanced technologies are used at destinations to provide customers with detailed information about their locality and provide systems for reservation of accommodation. Global Navigation Satellite System are used to give the position of an object, technologies like GIS (Geographical Information System), GPS (Global Positioning System), DMS (Destination Management System), TIS (Tourism Information System), ITS (Intelligent Transport System), General Packet Radio Services (GPRS) enabled mobile devices handle huge amounts of data and can be useful in enhancing the tourism industry (Shanker, 2008).

The promotion of Virtual Reality (VR) technology and the further development of the tourism industry is quickly giving attention to Virtual Tourism, which is the simulation of an existing location using multimedia elements such as sound effects, text, images, videos and narration. Virtual Reality technologies allow for the creation of unconventional customized tourist products and support the development of new digital environments, which enrich the individual's awareness of the touristic destination before they have real travel. Without the high technology and the people that possess the high-end ICT skills, virtual tourism cannot be generated (Zhao, Ordóñez de Pablos & Tenysson, no date).

The World Wide Web is a system of internet servers that support documents that are specially formatted and used to publish and distribute information about tourism resources of interest such as events, places and accommodation. It has provided more advanced touristic advantages such as e-travel, which is a web-based system that allows users to do route planning, review portals on tourists' feedback, check the availability of flights, rooms and tickets electronically (Berrueta et al., no date).

Smart tourism technologies such as personal blogs, review sites, social media networks, online travel agents and smartphone apps provide substantial technology channels to refine the efficiency transaction-oriented tasks such as reservation and payment (Huang et al., 2017). Twitter as a social network platform promotes the sharing of information, brands, products and services by users, this allows for the electronic word-of-mouth (eWom) to take place and communication to occur in a one to many ratio, which simplifies the dynamics of information sharing (Barbagallo et al., 2012).

Computerized systems such as Computer Reservation Systems (CRS) and Electronic Point of Sales (EPOS) are utilized for caching and retrieving information, and also to transact on matters related to travel and tourism. Global Distribution Systems (GDS), also known as CRS operations, were expanded to travel agents in order to furnish travel information services like real-time availability and price information for hotels, flights and car rental companies. The

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main systems that currently dominate the market globally are AMADEUS, GALILEO, WORLDSPAN and SABRE (Lazarinis & Kanellopoulos, 2010)

Analysis of digital skills in the tourism industry

The role of travel agencies in the bigger scheme of tourism is to collate, organize and interpret large amount of data and provide information, and also give advice in a way that conveys the greatest exciting travel experience and best value for the customer (Lazarinis & Kanellopoulos, 2010). Lazarinis & Kanellopoulos (2010) has correlated the e-skills required in the travel and cultural promotion agencies in Greece and the ECDL ICT certification as follows:

Essential digital skills required in undertaking ICT tasks or e-task encompassed in the daily activities within the professions of:

- **Travel agencies:**
  - the ability to operate Computer Reservation Systems (CRS) or Global Distribution Systems (GDS) as mentioned above, as a sales channel, in order to conduct transactions that are related to travel as a whole.
  - the need to know the operation of the dominant GDS so as to support a level of integration between various functions within travel agencies (e.g. inventory control for tour operators, integrated point of sale systems and payroll systems).
  - familiarity with future e-platforms such as mobile devices, portable communication devices, interactive TV, web technologies applied to the travel industry.

- **Cultural agencies:**

  In the digitization and presentation of cultural objects, people working in this environment should have the basic computer handling abilities and also:
  - have the ability to utilize computer or high-tech devices for inserting data or searching for information
  - manage online museum presentations and serve e-visitors

Software categories of **information tools** used among participants in their daily activities within the travel and cultural agencies, which are depicted in **Figure 4**, are as follows (Lazarinis & Kanellopoulos, 2010):

- Windows or similar system
- Word processing
- Spreadsheets
- Databases
- Presentations
- Internet
- Email
- Specialized tools

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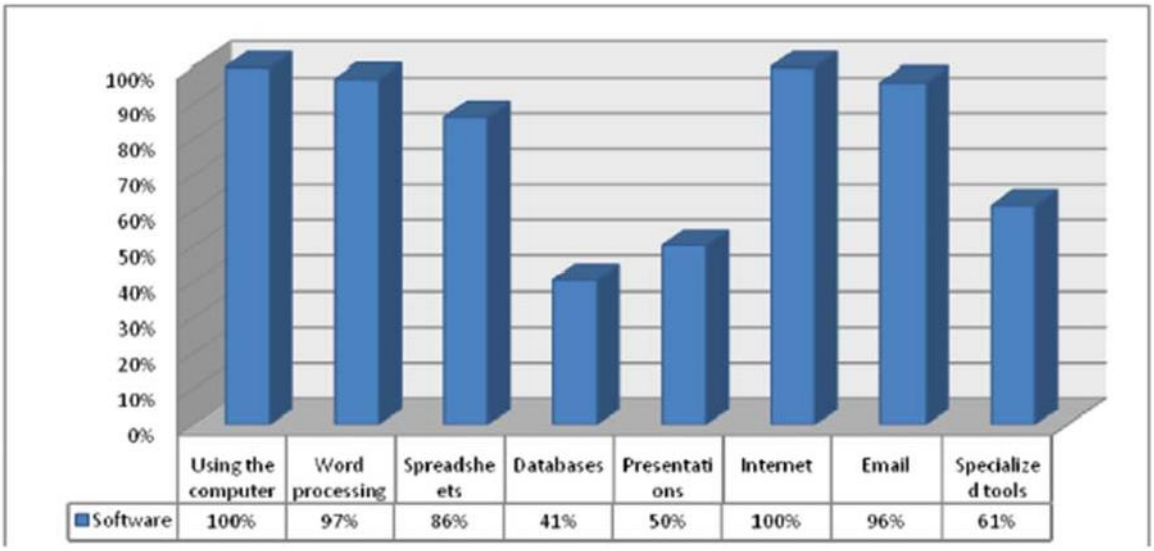

Figure 3: Utilization of different information tools - (Lazarinis & Kanellopoulos, 2010)

From **Figure 3**, it can be observed that all participants make use of computers with a dependency on Windows (mainly to start other tools) and tools such as Word processing (WinWord), spreadsheets (Excel), internet browsing (Internet Explorer) and email (Outlook) or other freeware programs. Over 70% of the participants use Microsoft products to perform their tasks. However, people working in travel agencies do not develop databases or use MS Access (specific tools) to develop simple databases. Instead, they rely on ready database applications to carry out their e-tasks. In addition, most employees do not make presentations to clients; and the functionality offered by tools like MS PowerPoint is used to the minimum (Lazarinis & Kanellopoulos, 2010).

Certification for digital skills

According to Weiss et al. (2005), the aim of e-skills certification is to implement Pan-European standards to make IT qualifications comparable at a European level. ICT training as well as education play a significant role in employment and in the sustainability of a professional career within the ICT labour market.

Weiss et al. (2005) argues that ICT certification refers to the acknowledgement of conformity to standards and is granted to individuals by ICT industry stakeholders in order to attest that the holder of such certification possess the “right to title”. Without ICT certification, the transparency of qualifications is not sufficiently tested and, as a consequence, a lack of labour mobility is created (Weiss et al, 2005).

In various industries, especially the ICT industry, e-skills certification is required in order to execute and encourage high standards amongst ICT professionals, practitioners and end-users. Certification provides credentials that arise from a non- compulsory evaluation process to ensure that the knowledge or skills of individuals in specific fields are objectively assessed and verified against predetermined skill standards. Therefore, certification authenticates whether or not a person meets the performance specifications described in various job profiles as recognized by stakeholders in the industry such as. Microsoft, Cisco and CompTIA (Weiss et al., 2005).

Accreditation as a means of determining the quality of standard in measuring competence and credibility in a specific domain, has been adopted by bodies such as the Charted Institute of

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IT formerly known as the British Computing Society (BCS) and the American Accreditation Board for Engineering and Technology (ABET). Both these bodies ascertain the accreditation of tertiary ICT skills, with the former focusing on a vast range of ICT skills such as the basics such as computer literacy and more specialized ICT skills curriculum that encompass mathematical applications and computer science (Twinomurinzi et al., 2017). The latter focuses on the learners, environment, content and curriculum of the ICT academic programmes and categorizes ICT skills curriculum as belonging to Computer Science, Information Systems and Information Technology.

- **ECDL ICT Certification -** ECDL is the European Computer Driving License programme that is supported by national professional societies that integrate professional and academic competence. ECDL aims to define ICT skills autonomously from hardware and software vendors. The purpose was to have ECDL adopted by many countries within the European Union (Lazarinis and Kanellopoulos, 2010). The EDCL certificate attests to a level of competence in basic skills relating to the use of a computer such as browsing the internet, querying a database, preparing a spreadsheet, editing a document with a word processor. The EDCL certificate consists of seven modules, which describe in detail the concept and ability that each candidate should understand (Lazarinis & Kanellopoulos, 2010). These modules are as follows:
    - Basic concepts of information technology
    - Using the computer and managing files
    - Word processing
    - Spreadsheets
    - Databases
    - Presentations
    - Information and communication (WWW and e-mail)

    The percentages of the concepts and skills of the EDCL modules that were needed and applied by the travel agencies' personnel are illustrated in **Figure 4**. Half or 51% of the concepts of the Information Technology (module 1) were recognized by participants; in other words participants were to some extent familiar with the basic concepts of information technology, which forms part of the module 1 syllabus. It was discovered that 36% of the functions offered in module 2 of the EDCL syllabus (which deals with "using the computer and managing files") were not useful to the employees as some staff were not utilizing the advanced operations such as the creation of expanded folders and navigation, file searching and file copying (Lazarinis & Kanellopoulos, 2010). A noticeable observation occurred with module 5 (which deals with databases); 56 % of participants do not use databases or less than half of the participants utilized databases. In general, the tasks that required the use of word processing, spreadsheets, e-mail software and web navigation were common functions performed daily in that environment.

    An examination of the percentages shown in **Figure 4** illustrates the link between the tasks performed by staff and the tasks depicted in the EDCL modules; which bring us to the fact that there is a correlation between EDCL ICT certification and the level of e-skills required by staff in the travel and cultural promotion agencies when carrying out their duties as investigated by (Lazarinis and Kanellopoulos, 2010).

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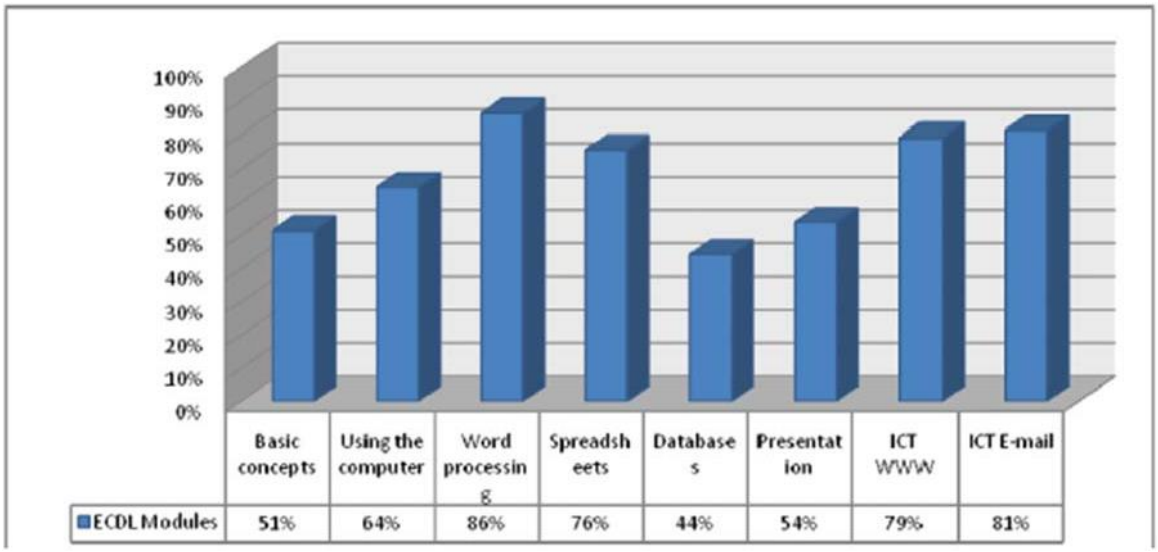

Figure 4: Correlation of e-tasks and EDCL (Lazarinis & Kanellopoulos, 2010)

Tourism educations system

The main aim of this research is not centred around the system approach in tourism education. However, there are factors that are crucial to this study that justify their inclusion in the section on tourism education. According to Singh (2018), the tourism education system consists of parameters such as input, process and output and are schematically represented in **Figure 5**.

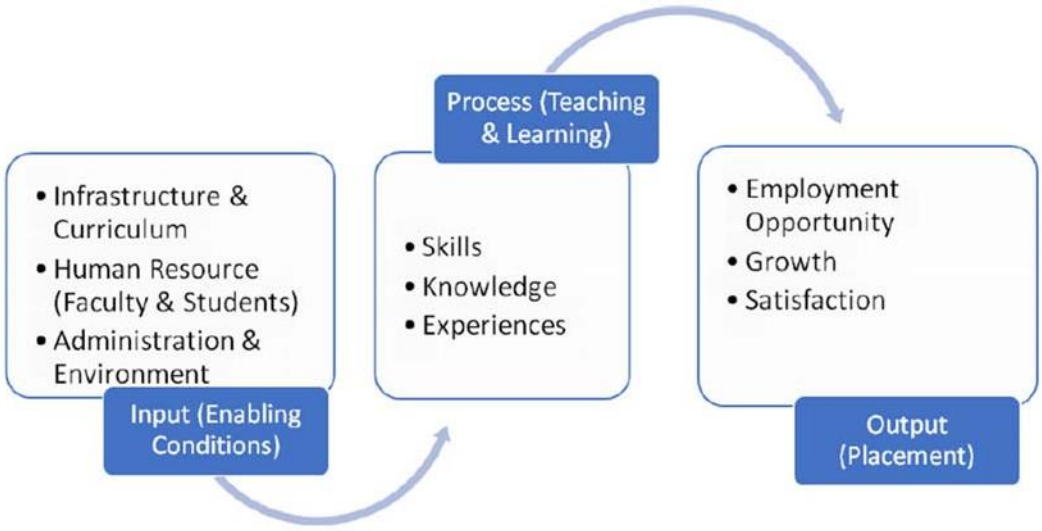

Figure 5: The 'systems' model for tourism education (Singh, 2018)

The education system parameters mentioned above are described individually as follows:

- **Input** – consists of people, information and resources; in other words, what is required for the tourism education system (e.g. students are required to learn, teachers are also required to teach, the administration is also required for the management of the education system, there has to be a curriculum and instructional material to be followed and some infrastructure and classroom facilities are required to be used).

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- **Process** – consists of the activities of teaching and learning within institutions, namely the management of teaching and learning activities and skills/knowledge/experiences provided to students by teachers in the tourism education.
- **Output** – refers to the results of the tourism education system in the sense that it will create employment opportunities for the students who have completed their studies, growth in job and industry and lastly satisfaction in job and industry.

Singh (2018) have stated that the tourism education system constitutes certain variables under the input, process and output components, and these are illustrated in **Table 3**.

Table 3: Variables of a tourism education system (Singh, 2018)

Input	Process	Output
Infrastructure and Curriculum: Building and other infrastructures, Multimedia classroom, Library facilities, Books and journals, course curriculum, lab facilities	**Human skills:** interpersonal skills, leadership skills, communication skills, networking skills, negotiation skills, teamwork and empathy skills	**Employment:** Placement Salary, Preferred job and Job location offered
Human Resource (students & faculties): Qualification of faculty, industry experience of faculty, quality of students, intake vs students strength, teachers & students attitudes towards teaching and learning	**Technical Skills:** Computer handling, Internet browsing, Online Communication, Reservation & booking, Statistical analysis, Database management, and GPS & Mapping skills	**Satisfaction:** Job, Salary, Work, Industry satisfaction
Administration & Environment: Student faculty ratio, general administration, industry interface, proximity to job market, government approach towards tourism education	**Conceptual skills:** Critical thinking, Decision making, Problem solving, Creativity, Research, and Monitoring	**Growth:** Job enlargement Career enlargement Salary growth Industry growth

Key to this study is the technical skills mentioned in **Table 3**, which are offered as part of the tourism education. A comparative analysis of the technical skills mentioned by Singh (2018), together with the pyramid on ICT user skills described by De Villiers et al. (2012) (see **Figure 1**) and the ECDL ICT certification modules and software categories of information tools used in the travel agencies described by Lazarinis et al (2010) reveal similarities in terms of the digital skills presented. The analysis has led to a compilation of the e-skills described in Table 4, which basically illustrates a convergence of the ECDL ICT certification, technical skills offered in the tourism education system, digital skills applied and information tools used in the travel and cultural agencies as well as the essential e-skills required in the tourism domain.

Table 4 depicts the common functionalities pertaining to e-skills obtained through various platforms i.e. the ECDL ICT certification, the e-skills required in the travel industry as well as technical skills obtained as part of the tourism education system. All the functionalities coincide to produce the essential digital skills required in the tourism as follows:

- Web navigation or Internet browsing
- Computer handling or basic concepts of IT and using the computer and

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managing files, word processing, spreadsheets and presentations.

- Online communication or information communication (-mail or WWW).
- Database management.
- Reservation and booking or ability to operate Global Distribution Systems (GDS)

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Table 4: Digital skills in tourism

ICT User skills (as per definition) - de Villiers, 2012	**Information tools - categories of software used in travel agencies -Lazarinis, 2010**	**EDCL ICT certification –Modules - Lazarinis, 2010**	**Technical skills - Singh, 2018**	**e-Skills required (travel & cultural agencies) - Lazarinis, 2010**
Capabilities required for effective application of ICT systems and devices by individual in support of their own work using generic software tools and or specialized tools	1. Windows or similar system 2. Word processing 3. Spreadsheets 4. Databases 5. Presentations 6. Internet 7. E-mail 8. Specialized tools	1. Basic concepts of Information Technology 2. Using the computer & managing files 3. Word processing 4. Spreadsheets 5. Databases 6. Presentations 7. Information and communication (E-mail and WWW)	Computer handling Internet browsing Online communication Reservation and Booking Statistical analysis Database management GPS and Mapping	Common functions include: Web navigation, word processing, spreadsheets, email software and also the: 1. ability to operate Global Distribution Systems e.g. AMADEUS to conduct transactions in the travel industry 2. familiarities with future e-platforms such as mobile devices, portable communication devices, interactive TV, web technologies applied to the travel industry 3. utilization of computer or high-tech devices for inserting data or searching for information

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RESEARCH METHODOLOGY

This research follows a Systematic Literature Review (SLR). Systematic review approaches are utilized to minimize partiality that may exist in a review and outline and amalgamate the evidence that emanated from the research in order to highlight gaps therein. The process and requirements of a systematic literature review are delineated by (Okoli & Schabram, 2010) in 8 steps as follows:

i. **Purpose of literature review** – the purpose of this review is to obtain as many articles as possible relating to the topic "tourism and e-skills" in order to enable the researcher to deduce from literature areas that have been and have not been covered by current literature.

ii. **Protocol and training** – this creates procedures to be followed when conducting the research literature review and ensure that there is consistency when the review is performed. This step identified the papers relevant to the topic and listed them under a heading in bullet point form according to the key search terms used.

iii. **Searching for the literature** – this involves using the key search terms described above, most papers that met the research question were included and those that did not (e.g. those written in a different language and very old article) were excluded.

iv. **Practical screen** – this is referred to as screening for inclusion and involves explicitly stating the studies that were considered for review. The step explains the criteria that was used and how the screening of the articles was assessed. Papers that were identified were tabulated and all the abstracts were browsed to determine whether the papers answered the review question or not. Papers that were screened for inclusion were sourced from books, journals, conferences and other publications. Most papers defined e-skills, what tourism is, where tourism takes place, the motivation for tourism, the stakeholders of tourism, how tourism works and the seasons during which tourism occurs.

v. **Quality appraisal** – this is referred to as screening for exclusion and it clarifies in detail the criteria that was used to determine which articles are inadequate. The number of papers downloaded did not exceed 10 per search string. Therefore, content that was not applicable to the research question was eliminated through reading their abstracts for relevance and reviewing of the titles. Publication languages was restricted to English. All papers that were found to be too technical in terms of the various technologies used in tourism were excluded. Articles older than 20 years were also eliminated.

vi. **Data extraction** – the extraction of data from each study or article, relevant information should be extracted systematically as this will form the basis for the material to be used in the systematic literature review. The articles should be carefully read in order to understand the point of view generated by the author. In addition, relevant data should be obtained and key terms that support the literature review should be used.

vii. **Synthesis of studies** – the analysis step entails synthesizing facts extracted from the studies using qualitative, quantitative or mixed techniques. The aim here is to make complete sense of all the studies. In this step, a combination of all the important aspects from different articles that relate to the topic were summarized.

viii. **Writing the review** – a report on the research review was written in detail (following the principles of writing a research article), and new findings were highlighted thus to allow the same results to be reproduced by other researchers in the future. During the compilation of the SLR, the topic on tourism was explained adequately by answering the "who", "why", "when", and "what" of the tourism and e-skills.

As shown in **Table 5**, a basic classification framework (qualitative approach) was developed in order to categorize the articles in terms of relevance to this study. The context of the analysis covered the whole world and was not specific to regions and/or countries. The focus was on

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digital skills in relation to tourism and not e-skills in general. All sectors of the tourism industry were covered and the practicality of ICT skills in the tourism was investigated.

Table 5: Classification and framework for analyzing studies

Classification	e-Skills	Tourism
Context	Global	Global
Focus	Digital skills as main theme; Tourism as the support theory	Tourism as main theme; e-Skills as the support theory
Sector	Tourism	Hospitality tour operations Transportation (Air, Sea, Land); Travel Agencies
Practices	Technical aspects: ICT user skills ICT user skills ICT practitioner skills e-Business skills e-Literacy skills e-Research skills	Technical aspects: ICT user skills
Origin	International	International

A total number of 41 papers were downloaded of which 18 were discarded based on the exclusion criteria that was adopted for this study. To this end, most articles were found to be too technical and covered the Information and Communication Technologies used to improve services in the tourism industry. The marketing of tourism is a topic that is sufficiently covered in literature. The following 23 papers were assessed and were used to conduct this study:

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Table 6: Articles used in the systematic review

Reference	Article Title	Summary of findings	Citation
Backman, Klaesson, & Öner (2017)	Innovation in the hospitality industry: Firm or location?	This paper clarifies the hospitality industry as a revenue and employment generator and the role the hospitality industry plays within the tourism sector	1
Barbagallo et al. (2012)	An Empirical Study on the Relationship between Twitter Sentiment and Influence in the Tourism Domain	The article aims to test the impact that social media has on tourism and information sharing	1
Benyon et al. (2014)	Presence and digital tourism	The paper introduces digital tourism and the various ICTs involved in digital tourism	1
Berrueta et al. (no date)	The Web of Data and the Tourism Industry in Digital Culture and e-Tourism	Web of data focuses on the distribution of data and how the tourism industry can benefit from the opportunities thereof	1
Bowles (2013)	Digital literacy and e-skills: participation in the digital economy	The paper identifies digital skills set and the proficiency levels needed to successfully access and use ICTs and internet	2
Cetin & Yarcan. (2017)	The professional relationship between tour guides and tour operators	The article classifies tourism services and the role tour operators play	1
Cooper & Hall (2008)	Contemporary Tourism: an International Approach	The paper categorizes elements of the tourism ecosystem and how tourism works.	4
Devine & Devine (2004)	The politics of sports tourism in northern Ireland	The article dwells on the politics behind sports tourism as a complement to other types of tourism ventures	2
Frinking et al. (2005)	The Supply and Demand of e-Skills in Europe	This paper illustrates the demand and supply of e-skills and the issues relating to educators and employers.	2
Holloway & Humphreys (2016)	The Business of Tourism	A break- down of tourism, from the definition of tourism, to the stakeholders; the industries involved are also described.	1
Huang et al. (2017)	Smart tourism technologies in travel planning: The role of exploration and exploitation	This paper describes smart tourism technologies (STT) and explains how they can benefit the tourism industry.	1

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Table 6: Articles used in the systematic review (continued)

Reference	Article Title	Summary of findings	Citation
Katsoni, International & Iacudit (2014)	Cultural Tourism in a Digital Era	Illustrates factors influencing why people travel, i.e. the motivation or drivers of tourism.	2
Keiser (1998)	Hospitality and tourism: A rhetorical analysis and conceptual framework for identifying industry meanings	The article defines the hospitality industry and how it operates	1
Khan et al. (2010)	e-Government skills identification and development: toward a staged-based user-centric approach for developing countries	The article defines e-skills and suggests some of the acquisition methods of digital skills.	3
Lanvin & Králik (2009)	e-Skills : Who Made That Big Dent in My Flat World ? Growing Worldwide Demand for E-skills	This article emphasizes the importance of e-skills and the scarcity thereof. It also defines e-skills in accordance with the types of e-skills available as well as the e-skills gap that exist.	1
Lanvin & Passman (2008)	The Global Information Technology Report: Building E-skills for the Information Age	This papers defines e-skills, how e-skills can be acquired and the demand and supply of e-skills within travel agencies and compares them to those acquired through ICT certification.	1
Lundtorp (2001)	Chapter 3 - Measuring Tourism Seasonality	This article focuses on the seasonality around tourism; that is, how different seasons give rise to certain types of tourism.	2
Merkofer & Murphy (2009)	The e-skills landscape in South Africa	This paper touches on the supply and demand of e-skills and how government can support the development of e-skills in collaboration with the education sector.	2
Minca & Oakes (2011)	Real tourism	The article defines what tourism is and it also describes the various forms of tourism.	1
Lazarinis & Kanellopoulos (2010)	e-Skills and ICT Certification in Greek Cultural and Travel Agencies	This article describes the different e-skills available within the cultural and travel agencies of the tourism industry.	1

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Table 6: Articles used in the systematic review (continued)

Reference	Article Title	Summary of findings	Citation
Mitrovic, Taylor & Wesso. (2012)	Systemic Approach to e-Skilling in South Africa	This paper defines e-skills and provides an in-depth description of various types.	4
Okoli & Schabram (2010)	Working Papers on Information Systems A Guide to Conducting a Systematic Literature Review of Information Systems Research	This articles provides the steps involved when undertaking a systematic literature review.	1
Rights (2018)	Review and Analysis of the Digital Health Sector and Skills for Scotland : A Report by the Digital Health and Care Institute in Partnership with Skills Development Scotland	The paper describes the scarcity of e-skills from a digital health sector perspective.	3
Shanker (2008)	ICT and Tourism : Challenges and Opportunities	The article describes the different ICTs employed in the tourism environment.	2
Singh (2018)	A Study on the Application of System Approach in Tourism Education with respect to Quality and Excellence	The paper highlights the tourism education system and the different skillset within tourism education also including e-skills.	7
Tapper (2001)	Tourism and socio-economic development: UK tour operators' business approaches in the context of the new international agenda	Paper talks about tour operators and the role they play within the tourism industry.	2
Twinomurinzi et al. (2017)	Towards a shared worldview on e-skills: A discourse between government, industry and academia on the ICT skills paradox	This article highlights the disconnect between the government, academia and industry as far as e-skills are concerned.	5
Várallyai & Herdon (2013)	Reduce the Digital Gap by Increasing E-skills	This paper emphasizes the lack of e-skills among societies and the impact the digital gap has on education.	1
Weiss et al. (2005)	e-Skills Certification in Europe Towards Harmonisation	The article focuses on digital skills certification as a means to encourage high standards among ICT professionals.	3

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Table 6: Articles used in the systematic review (continued)

Reference	Article Title	Summary of findings	Citation
Wohlmuther & Wintersteiner (2014)	International Handbook on Tourism and Peace	The paper describes and categorizes the drivers of tourism.	1
Zhao, Ordóñez de Pablos & Tenysson (no date)	Virtual Tourism	This article highlights the evolving technologies employed within the tourism space.	1

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DISCUSSION AND CONCLUSION

Given the significant role that digital skills play in the tourism industry, it is important to understand the ICTs employed in tourism as well as the tourism ecosystem. In this study, the classification of tourism, the motivational factors of tourism and the different types of tourism including relevant stakeholders were explored. As far as ICT is concerned, some of the technologies used within the tourism domain were analyzed. Lastly, the status of e-skills in tourism was investigated.

e-Skills in the tourism industry is one aspect that has not been given adequate attention in so far as current literature is concerned. Literature on digital skills in tourism is too few and far between and does not cover the topic in detail. It is evident form the literature review that was undertaken in this study that only e-skills in relation to the travel and cultural agencies, which are components of the entire tourism ecosystem, has been covered. There is simply not enough evidence highlight the existence of digital skills in other sub-sectors of the tourism industry such as tour operations, hospitality and tourist transportation industries. Most articles tended to dwell on ICT and the potential advantages and benefits that can be derived for the tourism industry (Shanker, 2008). In addition, the technologies that brought about or can potentially bring about improvements in the tourism industry are also mentioned (Huang et al., 2017). However, at the level of **ICT User skills**, which are "capabilities required for effective application of ICT systems and devices by individual in support of their own work using generic software tools and/or specialized tools" (De Villiers et al, 2012), there are common functions that are undertaken within the tourism industry that involve the following e-skills mentioned by Lazarinis & Kanellopoulos (2010) and Singh (2008):

- Web navigation or Internet browsing
- Computer handling or Basic concepts of IT and using the computer and managing files; word processing, spreadsheets, presentations
- Online communication or Information communication (E-mail or www)
- Database Management
- Reservation and booking or ability to operate Global Distribution Systems (GDS)

This study has revealed that there is a high probability that a training program that is well structured and culminates in some sort of ICT certification is significant and can improve or increase the level of e-skills in relation to tourism and the enhancement of the sector.

FUTURE RESEARCH

Further work needs to be undertaken by unpacking digital skills in the tourism as far as the ICT practitioner skills, e-Literacy skills, e-Business skills and R&D skills or e-Researcher are concerned.

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THE ROLE OF E-SKILLS IN THE CREATIVE INDUSTRIES: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Aim/Purpose The primary aim of this paper is to explore research undertaken (or lack thereof) with respect to e-skills in the creative industries.

Background The creative industry is greatly affected by ever changing ICT landscape. In the past few years, the extensive use of ICT has rapidly impacted the creative industry, and this has led to an increase in the demand for high levels of e-skills in the creative industry. The posed primary and secondary research questions are aimed at addressing this issue.

Methodology A systematic literature review (SLR) method was used to collate and analyse the requisite data. The three main types of research paradigms, namely positivism, interpretivism and critical exploration were also applied. This research report followed an interpretive research paradigm.

Findings

- Technology has transformed the way business is conducted in creative industries.
- There is an increased demand for professional e-skills in creative industries.
- Digital skills are essential in the 21st century.
- There is a lack of e-skills in creative industries, especially in developing countries.
- Digital characteristics associated with 21st century skills still remains to be adequately defined.

Recommendations for Practitioners Focus on applying and improving digital skills for personnel involved in creative industries.

Recommendation for Researchers The 21st century is the digital era. Therefore, digital skills relating to creative industries should be researched in more detail.

Impact on Society Other than increasing the general knowledge globally in respect to ICT skills in creative industries, this research has exposed the need for e-Skills training in creative industries especially in the digital sector. Developing countries at large (e.g. South Africa) stand to benefit by having a better understanding of the impact the lack of e-skills has on their creative sectors.

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Future Research	A gap in the e-skill research at a global level was identified. Future research and development strategies aimed at improving e-skills in creative industries to address the current digital growth is therefore recommended.
Keywords	e-skills, digital and creative industries.

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INTRODUCTION AND BACKGROUND

ICT and related artefacts are progressively being incorporated into many facets of our professional, social, and personal lives (Stahl et al. 2016). The internet is part of our lives. Increasing social network interaction, online digital media innovation and usage, including cloud and mobile computing makes the worldwide web a thrilling and attractive environment for certified and casual education as well as funfilled communication. Digital technology changes the way individuals learn, communicate and, access information and services (Warrell & Jacobsen 2014). Today ICT's can be found in almost all aspects of our lives, and they are extensively used in social media, in the economic sector as well education and business environment (Zuppo 2012). This technology will keep evolving requiring new skills sets and thus creating an ongoing demand for ICT skills (Twinomurinzi et al. 2017). Computer technologies are commonly associated with enhanced productivity and have opened avenues of communication worldwide (Zuppo 2012). Due to the fact that we are now living in an economic era reliant on education and compelled by increased international advancements in ICT, electronic skills (e-skills) is of utmost importance (Twinomurinzi 2012).

The creative industry is greatly affected by ever changing ICT landscape. Creative industries research has been in existence since 1990 (Moore 2014). However, in the past few years, the extensive use of ICT in the creative industries has rapidly impacted this industry, and this has led to the digital age of cultural trades coupled with creativeness (Irjayanti & Mulyono 2017). In the last twenty years, the creative economy has developed very rapidly. The creative industry is a diverse field that is interrelated to creative networking, communications and festivals (Moore 2014).

Extensive research has been carried out in the digital sector. However, digital technology as a facilitator of institutes, businesses and creative processes as well as the negative impact on recognised practices of creative production and usage is seldom openly discussed in research involving the digital sector (Mangematin et al. 2014). The effect of creative industries on local and countrywide economies has been reinforced by the fast growth of novel developments in media and ICT systems, which have revolutionised media usage and conduct all over the world (Mietzner & Kamprath 2013). Such revolutionised media usage has had a huge effect on the individuals employed in the creative industry. Moreover, the deficiency in accessing related industry technology has posed a challenge within creative entrepreneurs as the trend for business success continues in the competitive world market (Irjayanti & Mulyono 2017). Traditional and innovative activities have somewhat changed from individually created art made for market use towards industrial mass manufacturing and consumption commonly noticed in current times. Individuals linked to creative industries are increasingly adopting a contemporary business-like approach (Purnomo & Kristiansen 2018). ICT in the creative industries is increasingly becoming a vital contributor to the global economy since novelty and creativeness enables access to global markets, especially the industrialised countries (Irjayanti & Mulyono 2017).

Digital technology has transformed the way business is conducted in creative industries (Li 2017). The 21st-century digital skills are essential for organisations to innovate and compete in the global creative economy. Even though these skills are fundamental, the digital

characteristics associated with 21st- century skills still remains to be adequately defined (Van Laar et al. 2017).

PROBLEM STATEMENT

e-Skills such as digital skills and technology relating to the creation of policies and business models in the creative industry is not fully researched (Li 2017). Lately, the extensive use of ICT in creative industries has transformed the industry into the digital era (Wu 2017). Although there is plenty of information regarding the creativeness and available skills in the creative industries, very little data is focused on innovative research technology (Benghozi & Salvador 2015). Many technologically advanced countries have slowly embraced the digital and network environment of the creative industry, thus opening the creative market to worldwide communication, business and exchange of cultural and creative artefacts. No matter how advanced the technology gets, the ethnicity, traditions and historical data remains with that country (Wu 2017). However, with the digital age rapidly paving the way for new ways of developing creative industries, is the world taking full advantage of this technology? Although developed countries such as the USA and UK have generally stepped up their commitment to ICT's, the same cannot be said for some Southern African countries. A question that arises is: "to what extent has South Africa (SA), in relation to the rest of the world, embraced digital technology in the creative and cultural industries?"

Nowadays, researchers are studying the effects of the digital phenomena on many facets of the media (Wu 2017). The digital tools have changed the way business is being conducted in the creative economy (e.g. the way movies, cartoons, comic books and advertisements are made). Enterprises have become more competitive in the global market (Wu 2017). With the exchange of creative and cultural information using the easily accessible internet, the content transferred may change or give a different intended message. Although many individuals and organisations use the worldwide web for online trading and in the process trade across many different creative sectors, the cultural differences unavoidably create some sort of intermediation (Benghozi & Paris 2014).

In order to remain globally competitive, Southern African countries such as South Africa will have to embrace the digital age that affects its creative industries. Local government intends to change its policy and assist in recognising the need for a creative economy. However, South Africa faces challenges such as openness to various perspectives and debates from the international environment pertaining to the improvement of its creative clusters. Added to that are the matters of employment, poverty and local people's involvement in cultural and innovative projects (Gregory 2016).

The main research problem facing creative industries especially in developing countries is the lack of e-skills development. Research question and sub-questions have therefore been formulated in order to define and address the research problem.

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RESEARCH QUESTIONS

In order to address the above-mentioned problem statement, the following research question was posed:

> *What research has been undertaken concerning e-skills in the creative industries?*

RESEARCH SUB-QUESTIONS

The following sub-questions were formulated with the view to address the main research question.

- What are the latest trends regarding e-skills in the creative industries?
- To what extent has e-skills impacted the creative sectors?
- What remains to be researched?

RESEARCH OBJECTIVES

In order to adequately address the research question posed in the preceding section, the key research objectives were formulated. In this vein, the principal research objectives of this literature review are to:

- Discover trends in e-skills requirements in creative industries and related creative sectors (Irjayanti & Mulyono 2017).
- Research e-skills from a Southern African perspective, particularly South Africa.
- Demonstrate the subject matters of concern that needs to be brought to light for further research in the digital era (Bridgstock 2016).
- Investigate the impact of the digital era on South African creative industries.

The intention is to establish trends in e-skills requirements in creative industries and related creative sectors that have increased rapidly over time due to the increased interactions of humans with technology (Irjayanti & Mulyono 2017). In addition, research on e-skills from the global, Southern African and South African perspectives will be investigated. The research will also highlight opportunities for further research that may impact e-skills of individuals in the digital era in the creative sectors globally. For example, skills required for prosperous digital media experts (Bridgstock 2016) and the impact of the digital era on South African creative industries will be explored.

LITERATURE REVIEW OVREVIEW

The novelty and creativeness emanating from creative industries can potentially provide access to global markets such as the industrialised countries, and adoption of ICT in creative industries is therefore increasingly been favoured as an important contributor to economic growth (Irjayanti & Mulyono 2017). Digital technology has transformed the way business is conducted in creative industries (Li 2017). Digital innovative media was created from the internet and related technologies. Besides the changes in the media itself, the key drivers of communication are new such as web based application, collaborative frontends, innovative electronic mail applications, mobile applications, P2P networks, gaming and program controlled frameworks (Booyens et al. 2013).

However, creative industries are faced with problems, especially issues that mainly affect the capacity to embrace technology (Irjayanti & Mulyono 2017). Many sectors are as a result hugely affected by these problems. For example, the media and computer gaming sectors has

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forced the industry to look at new and improved skills set so as to keep up with the global demand (Bouters et al. 2016). To this end, the broader concept of e-skills in creative industries coupled with ICT skills, digital skills and technology affecting information and communication were explored by firstly examining the creative industry's thematic area (Bouters et al. 2016). Thereafter, the trends and effects of e-skills in the relevant sectors from a global economic and South African perspective were examined by highlighting the specific impact of digital technology in South Africa's creative sectors.

CREATIVE INDUSTRIES

The terminology 'creative industries' first surfaced in the 1990s. Currently, there is still not a conjoint agreement on the description and cataloguing of creative industries (Purnomo & Kristiansen 2018). The characterisations of creative industries differ from one state to another (Moore 2014). Creative industries are therefore comprehended in diverse ways in diverse situations (Berg & Hassink 2014). Proponents of creative industries indicate that the core fundamentals required in the industry are individual creativeness, ability and invention (Purnomo & Kristiansen 2018) including the use and exploitation of intellectual property. Similarly, Demir (2018) has mentioned that creative industry stems from knowledge, talent and creativeness. The cultural sectors, under the umbrella term "creative industries", are also under the spotlight from national and worldwide policy makers. However, with the high intake of cultural items, global ICT advancements and the growing influence to domestic economies, the significance of creative industry has evolved as a critical policy-creating sector aimed at metropolises and urban managements. The influence of change in creative industries will affect the economy (Moore 2014). Creative industries can be categorised according to specialty, local culture, geographic nearness, and relations through an organised structure. Exploration in creative sectors are largely concentrated on local culture and geographic awareness (Berg & Hassink 2014).

Another approach to the creative sector is also understood as a transitory process whereby people and non-human artefacts are combined on a short term employment contract basis, which leaves individuals constantly searching for newer projects in order to earn an income. As a result, a continuous process of redefining the acquisition of skills and proficiencies remains the main focus that researchers are beginning to explore in recent times (Nasta et al. 2016). Quantifying novelty within the creative industry remains a tough task that is equal to describing what makes creative industries 'creative' (Fleischmann et al. 2017).

DEFINITION OF CREATIVE INDUSTRIES

Different definitions of creative industries cultivate a diverse understanding of the specifics of creative industries and what facets ought to be incorporated in the subject matter of creative industries (Kontrimiene & Melnikas 2017). The definition of creative industry and its related sectors were updated by the Department of Culture, Media and Sport (DCMS) in 2015 and are now categorised as marketing, structural design, painting together with the antiques market, handcrafts, design, style, movie and cinema, music, performance arts, publication, software, TV and broadcasting, audio-visual and computer games (Fleischmann et al. 2017; Demir 2018). The cultural industry is defined as activities that conglomerate the design, manufacture and marketing of artistic materials, which stem from ethnic roots and are normally comprised of printing, publication, radio and TV, film and drama, and crafts (Moore 2014).

The United Nations Educational, Scientific and Cultural Organization (UNESCO 2017) have combined the creative and cultural industries and describes them as structured industries where products, services and undertakings associated with a cultural ethos are created, mimicked, marketed, disseminated and/or designed to make a profit. However, the United Kingdom (U.K) is known to be amongst the forerunners that found it essential to focus on the different creative sectors. The DCMS defined creative industries in which people's creativeness, expertise and abilities as the core resources that have the possibility to generate

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wealth and work via the establishment and usage of intellectual property. Besides the UNESCO, UK and the DCMS definitions of creative industries, policy and protection of intellectual property were prepared by globally recognised institutions such as WIPO (World Intellectual Property Organization) and the United Nations Conference on Trade and Development (UNCTAD) (Demir 2018). **Figure 1** shows the various sectors that are linked to creative industries.

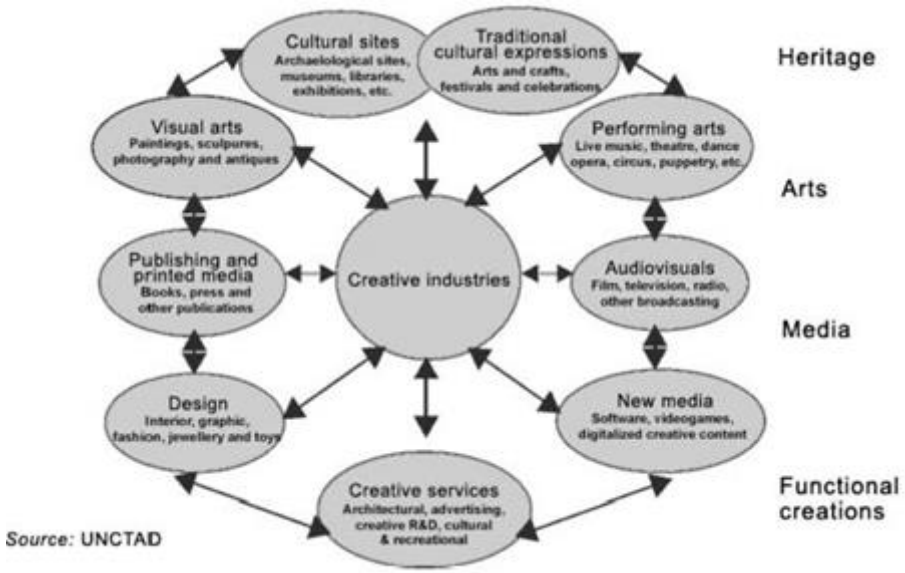

Figure 1: UNCTAD model of the creative industries (UNCTAD, 2018)

According to UNCTAD, creative services have four key components and two secondary groups, namely: (1) Advertising; (2) Architectural design services; (3) Innovative exploration and improvement; and (4) Individual, traditional and leisure services. The fourth component is divided further into two secondary classes, namely: TV, radio and interrelated amenities; and related individual, ethnic and entertaining services (Gouvea & Vora 2018).

In summary, the definition of creative industries can be characterised and investigated together as a comprehensive multiplicity of creative actions and events of historically unwavering long-term customs and as a modern created sector of a contemporary economy (Kontrimiene & Melnikas 2017).

CREATIVE INDUSTRIES IN OTHER COUNTRIES

Creativeness is imperative for the economic development of developing countries (Demir 2018). Taiwan is amongst many cities that is rapidly growing their traditional and creative industry. This is noticed in both the exponential increase in the amount of companies (now at 62,264 companies) and the generated 780,442 Taiwan dollars (NT$) in yearly transactions for provincial growth (Ministry of Culture, 2015). A detailed breakdown of the diverse creative industries sectors indicates that the advertising sector constitutes 22.58% of the entire amount. The contributions of the other creative sectors were as follows: handcrafts (20.76%), publication (14.42%), digital sector (10.44%), most liked music and ethnic content (6.85%), architectural projects (4.75%), local artefacts development (4.75%), and the acting and dramatic arts (4.32%). With a contribution of 84.85%, local and creative businesses are categorised as SMEs; these businesses have restricted resources and need government assistance together with managerial education to grow their individual tailored intangible properties (Horng, Chang, & Chen 2016). Put differently, cultural and innovative organisations will go through demanding circumstances and must increase their educational and societal worth in order to strengthen their continuity (Liu 2018).

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Ever since the 1990s, the United Kingdom has increased research in creative industries and related sectors. Possessing access to broader markets with emergent ICT infrastructures in the associated sectors coupled with the growing stake in global markets and global Gross Domestic Product, creative industries in the UK have dominated areas of commercial activity countrywide (Demir 2018). An analysis of the industry in 2013 shows that the music sector in the U.K generated almost 5.5 billion pounds per annum in earnings and almost one hundred thousand jobs. Another example where the creative industry showed strong earnings is the U.K.'s fashion sector, which generated almost 20.9 billion pounds amounting to 1.7% of the country's Gross Domestic Product (Gouvea & Vora 2018).

The creative industries of countries in the Asian region (e.g. India and China) that have huge markets are comparable to those of Japan and South Korea, which recently made huge investments in their creative sectors. In particular, prominent sub-sectors such as publishing (newsprint and magazines) and gaming have recently attracted more attention in these countries (Demir 2018).

Europe is the second best regional performer in terms of income earned by the creative industries. With a total of 43 creative metropolises and 116 cities that consider culture and creativity as drivers of their development, Europe is acknowledged by the United Nations Educational, Scientific and Cultural Organization Creative Cities System as the leading trend setter in global modern-day arts.

The American mainland is the third biggest commercial region in relation to the creative industries. Countries such as Canada, the United States, Argentina and Brazil are regarded as leading countries in creative industries. Lhermite, Blanc & Perrin, (2015) have reported that, in total, creative markets in America has generated approximately 6.6 million jobs. Advancements in information and communication technologies are the major contributors of the creative industry based value-added products. A noticeable daily growth in the creative sectors has been a common feature of world trade markets (Demir 2018).

In the past five years, the significance of creative industries for Turkey's economic sector at both local and national levels has attracted a lot of research interest. Turkey's policy makers have also focused their attention to improve Turkey's creative footprint (Demir, 2018). Research into the creative sectors associated with Turkey's ecological element covers has been undertaken at micro and macro levels. Lazzeretti, Capone & Secilmis (2016) has established that the Mediterranean creative industries of Turkey, Spain and Italy are vanguard industries, with Turkey experiencing a rapid creative industry growth that contrasts those of Spain and Italy. Yilmazdogan, Secilmis and Cicek (2015) have disclosed that the creative industries are not merely concentrated in large metropolitan cities such as Istanbul and Ankara, but have over-spilled all over Turkey. This demonstrates a potential for Turkey to develop and expand the creative industries to the entire country (Demir 2018). However, Istanbul remains Turkey's main centre of the creative and other industries. The growth of various creative segments in Istanbul revolves around the establishment of a core and native policy schemes, which is associated with creative industries and the implementation of the requisite strategy by high market demands and efficient risk management (Demir 2018).

Due to its all-inclusive policy and strategy of working with all creative sectors, the city of London is one of the leading creative economies (Demir 2018). Berlin also established a design and policy development framework following a thorough analysis of the various creative sectors and sub-sectors, which resulted in an awareness of how to meet growing demands locally and eradication of trade catastrophes that have a direct impact on intermediate and future progression in these sectors (Demir 2018).

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A heritage related creative industry sector is very prominent in the western parts of Ireland. Although consisting of a variety of cultural activities, this sector contributes to the creative economy of that area. The western part of Ireland also hosts a worldwide popular arts festival that is spiced with an abundance of locally flavoured arts and cultural celebrations (Collins et al. 2018). Ireland's creative technology sector provides employment to many of its citizens. Under 40% of respondents are individually managed operations that are mainly linked to digital media or web designing sub-sectors compared to the software design enterprises which hire more than 50% of the citizens (Collins et al. 2018).

Creative industries in Africa have remained buoyant during periods of recession, and the music sector in Africa has more than doubled from 2002 to 2008 (De Beukelaer 2014). Beirut has put in place city policies that are geared towards boosting its cultural sector in urban areas. Burkina Faso has openly stated that its cultural industries form part of its economic development strategy. In the UNDP Human Development report (2013), South Africa was listed from amongst southern developing countries that showed exceptional progress in its creative economy (De Beukelaer 2014). In fact, the creative industries of South Africa have been acknowledged in policy charters (Gregory 2016). The innovative media sector is regarded as the new growth sector and is therefore the most promising economic prospect for developing countries such as South Africa (Booyens et al. 2013).

Many countries around the world have embraced the contribution of creative industries and are therefore planning new ways for enhancing this industry and creating an awareness on the role of ICT in creative industries. Countries that do not meet the research and development and modernisation requirements for creative industries may fall prey to the creative divide, which threatens to reduce their chances of growing their creative economies (Gouvea & Vora 2018). As a developing country, South Africa has made an effort to meet current standards in global innovative economies whereby creative industries have become progressively significant (Booyens et al. 2013).

SOUTH AFRICAN CREATIVE INDUSTRIES

Recently, particular attention has been paid to policy development for the South African creative industries; South Africa is striving to enhance its knowledge in creative sectors to reach levels found in developed countries (Gregory 2016). In 1998, a report from the Departments of Arts and Culture and Science and Technology listed four primary sectors in the South African creative industries namely: music, film and television, and craft and publishing. Although various policy structures are in place for these sectors, most of the policy initiatives has been focussed on the movie and television sector (Visser 2013). Booyens et al. (2013) have recognised creativity, high-technology and small and medium businesses as important components for the South African creative industries.

Although still confronted with many domestic challenges, the small, medium and micro enterprises (SMMEs) are crucial contributors to the South African economy. Special focus has been placed on media enterprises as these businesses are part of the new media concept (Booyens et al. 2013), which has showed vibrancy and growth in technological innovation adopted from related creative segments (Visser 2013).

Johannesburg, Durban and Cape Town are considered South Africa's core creative metropolises. Johannesburg is the leader in creativity and economic progress with Durban in second place. Cape Town is seen as an emerging player in the film industry, with Johannesburg having the highest number of employees in this sector. The movie industry has become a huge attraction in South Africa and this has led to the creation of specialised skill related to the media (Visser 2013). Although the media industry is now widely recognised as an emerging and new industry, the National Film and Video Foundation (2011) has reported the challenges faced by this sector. These challenges include restricted funding, lack of

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dissemination and facilitation amenities, limited educational opportunities, a general lack of skills and screenwriters and movie theatres, (Visser 2013) and a lack of enthusiasm for creativeness (Booyens et al. 2013).

Booyens (2011) has indicated that South Africa is generally lacking in research, development and innovation. Also, it is well known that very few bursaries are available for students in the creative industries and tourism sector (Visser 2013). The tourism sector as defined to include music, art and crafts, traditional foods, history and actualities of settlement life (Booyens & Rogerson, 2015).

GLOBALISATION OF CREATIVE INDUSTRIES

Developing countries are more accommodating when it comes to fresh ideas, ICT and innovations; this could however be due to the fact that manufacturing operations of many international companies are based in these developing countries (Kontrimiene & Melnikas 2017). ICT's are continuously connecting countries globally, and this has in turn opened doors for developing countries to trade worldwide (Booyens et al. 2013). However, a rapid growth of the creative industries and related sectors has affected the recent problems of globalisation by creating huge increases in product consumption and the demand for innovative products. Distinguishing attributes of creative industries such as creativeness and innovation, which can be showcased through arts and culture and technology, are a very powerful stimulus for economic growth. For this reason, increased usage of creative products and new media is proliferating (Kontrimiene & Melnikas 2017).

CREATIVE INDUSTRIES CHALLENGES

There are many challenges associated with the creative industries that have to be analysed very carefully, particularly at the policy making and implementation stages. This will impact various creative sectors and exports, however it is safe to say that not all sectors can be analysed at one time. It has to be done as and when researchers does it (Gouvea & Vora 2018). Phenomena such as merging, digitalisation, and globalisation exacerbates problems being faced by the creative industries of developing and evolving economies even further. While the creative industry is a research, development and innovation intensive industry, many developing countries do not have the capacity to undertake such research (Gouvea & Vora 2018).

ELECTRONIC SKILLS

According to Katunga (2013), e-skills includes ICT, digital, electronic literacy and/or computer skills. E-skills is used as a broad term that incorporates various types of ICT associated skills. There is no globally accepted deifinition of e-skills (Beyers & Koorbanally 2010). Frinking et al. (2005) has classified e-skills as the expertise required to project, create, maintain and drive information and communication technology related systems. Also associated with electronic skills, is the knowledge and capacity to apply ICT skills to identify and take advantage of all available business opportunities (Katunga 2013). E-skills and the requisite skills are required by the general public in their work places and everyday lives in order to take advantage of societal and economic opportunities emanating from the digital economy (Bowles 2013).

INFORMATION AND TECHNOLOGY (ICT) SKILLS

A skill is regarded as acquired knowledge that is executed with the aim of achieving the desired result with the least amount of time and effort. Simply put, a skill is vast experience that is used in its related application. ICT is comprised of communication media and artefacts such as computers, the worldwide web, printing devices, handsets, faxing equipment, radios, television sets, video and audio equipment, all of which require specific skills for their operation (Katunga 2013). e-Skills training will therefore be required to prepare individuals to successfully use ICT (Katunga 2013).

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Very often South African Small Medium and Micro Enterprises (SMME's) cannot make complete use of ICT due to the lack of e-skills. As a result, SMME's are generally unable to take advantage of electronic business support that is available via ICT. The previously disadvantaged areas in SA also lack basic ICT user skills such as keyboard, word processing and electronic mailing skills (Katunga 2013).

Today ICT can be found in almost all aspects of our lives. As it keeps on evolving, ICT will require new skills sets and an ongoing demand for ICT skills. Many professionals in both local and international institutions continue to quantify and analyse trends relating to ICT skills (Twinomurinzi et al. 2017). A shortage of ICT skills affects many industries worldwide, and obtaining proper information and communication skills internationally as well as in Southern Africa remains a challenging task. The business sector has pointed out that qualified students need various types of skills sets, which are often not taught at academic institutions that offer ICT training (Caltiz et al. 2014).

DIGITAL LITERACY SKILLS

e-Skills are underpinned by digital literacy (Bowles 2013). Digital literacy or digital skills means the skills applied to ICT's artefacts such as computers and the worldwide web (internet). The Internet is so widely used (socially or commercially) by many people around to an extent that it is now an essential and integral part of the digital world (Bowles 2013). Not enough research has been undertaken to determine the forms of digital capabilities of diverse types of digital projects (Helsper, 2012). Digital literacy is a highly sought after skill in the 21st century, especially in the media sector (Bridgstock 2016). Digital information is a vital building block of the global market, more so in the service industry (Collins et al. 2018).

RESEARCH METHODOLOGY

RESEARCH DESIGN

The collection or analysis of any data is always preceded by a research design. The research design ensures that all the data and evidence that has been collected enables the researcher to effectively answer the formulated research question, in a convincing way (Wahyuni 2012). Put differently, a research design is basically a framework created for the sole purpose of answering the research question (and by extension addressing the research problem) in a coherent and logical way. Similar to a research design, a research paradigm is also led by a research question.

Research Paradigm

Research paradigms consists of essential assumptions and philosophies on the perception of the world that works by way of structured reasoning that directs the conduct of the investigator. The two main deep-thinking dimensions to differentiate current research patterns are ontology and epistemology. Ontology can be defined as an individual's perception what constitutes reality. Epistemology is the views on the method used to produce, comprehend and apply the information considered as admissible and justifiable (Wahyuni 2012). According to Myers & Klein (2011) and Goldkuhl (2012), the three main types of research paradigms are follows:

- **Positivism** – a positivist study follows the concept of the universalist approach of science, which refutes any essential changes concerning natural and social disciplines (Myers & Klein 2011). Variables remain unchanged in striving for enlightenment and likelihood (Goldkuhl 2012). Similarly, positivism can be defined as ascertaining the researcher's official standpoint. Besides identifying variables and the associations amongst them, the directives of formal rationality and experimental analysis must be met (Hovorka & Lee 2010).

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- **Interpretivism** - interpretive research is intended to design a comprehensive explanation of the subject matter (Goldkuhl 2012). Interpretivist investigators will choose a topic that exposes exclusive perceptions or actual implications of social phenomenon (Wahyuni 2012). Qualitative research is frequently linked to interpretivism (Goldkuhl 2012).
- **Critical Exploration** - the objective of critical exploration is to change these isolated and preventive social circumstances. Therefore, the critical research ideology is different compared to positivism and interpretivism (Myers & Klein 2011). This research report follows a more interpretive research paradigm.

Methodology Approaches

There is a distinct difference between research methodology and research method. From any analogy point of view, a methodology can be understood as a plan, whereas a method is the steps involved in the execution of the plan. Research can be qualitative or quantitative (Wahyuni 2012). Qualitative research can be defined as a growing, inductive, explanatory and realistic method of studying phenomena such as people's social circumstances and developments in their natural environment (Yilmaz 2013). It is aimed at exposing and understanding an individual's life experiences through descriptive terms. Qualitative research is not restricted to one method or field of study. Qualitative philosophies focus on "quality" rather than "quantity" (Yilmaz 2013). On the other hand, quantitative research gives details of the phenomena using numerical information. This information is examined by applying mathematically-based techniques, particularly statistics by testing the philosophy of the study (Yilmaz 2013). The difference between qualitative and quantitative research is that qualitative research is centred on a constructivist epistemology that studies a thorough description of the phenomena from the perceptions of the individuals. The qualitative model views the relationship between the researcher and the phenomenon as inseparably (Yilmaz 2013). In contrast, quantitative research is centred on objectivist epistemology that measures reality in a fixed period of time. It highlights the measure and examination of phenomena based on a model that is analytical and result driven. The quantitative method views the researcher and the phenomena separate and independent (Yilmaz 2013). In recent years, there has been a significant growth in the focus on qualitative research in information systems (QRIS) (Goldkuhl 2012).

Different methods are applied in research. Amongst the methods used are case studies, interviews and systematic reviews. In this research report, the systematic literature review (SLR) method will be applied. The SLR is therefore discussed in detail in the following section.

OVERVIEW OF SYSTEMATIC LITERATURE REVIEW (SLR)

For the research to be undertaken on e-skills in creative industries, a systematic literature review that includes a literature review of the thematic area (i.e. creative industries) will be undertaken. The following sub-sections provide an in-depth description of the SLR process.

Definition of SLR

Since the 1990s, a systematic review has been acknowledged as a genuine research methodology (Dickson et al. 2013). The SLR has been used in the medical field as well as education and a variety of disciplines due to its meticulous approach in amalgamating research data (Moher et al. 2015). Systematic literature reviews are intended to discover, evaluate and combine the best accessible evidence in relation to an explicit research question, providing information and evidence-based answers (Dickson et al. 2013). The SLR will explicitly state the objectives, systematically find information that meets the criteria, assess the legitimacy regarding results of the comprised studies and finally produce answers in a systematic format as well as the combination of the attributes and results of the research

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(Moher et al. 2015). A systematic literature review is a form of a secondary study (Kitchenham 2004).

Reasons for Adopting SLR

Amongst the numerous motives for doing a systematic literature review, Kitchenham (2004) describes the commonly known reasons as:

- To synthesise obtainable research evidence related to a topic (e.g. to summarise the empirical evidence of e-skills in creative industries).
- To ascertain gaps in the existing research data in order to recommend areas for future enquiry.
- To offer a framework to properly record new research undertakings.

Besides the above stated reasons, SLR may be applied to scrutinise research findings that either support or oppose academic theories or can help in generating new theories (Kitchenham 2004).

Importance of SLR

A literature review that does not have depth and justifiable has not much scientific worth. The fundamental reason for conducting a systematic literature review is for synthesising existing research in a way that is justifiable and accepted as fair (Kitchenham 2004). Systematic reviews are regarded as the finest 'gold standard' (Dickson et al. 2013). The SLR follows a well-defined search criteria and allows other researchers to evaluate the comprehensiveness of the search.

Characteristics of SLR

There are some key features that make the SLR different from traditional reviews (Kitchenham 2004). A Systematic literature review:

- begins with outlining the review protocol which identifies the research question including the processes to be followed in compiling the SLR.
- is centred on a pre-defined search criteria in order to find ample and applicable data.
- explicitly records the search strategy allowing the reader to evaluate the comprehensiveness of the search.
- needs clear defined inclusion and exclusion criteria to review every possible searched result.
- states the data requirements and quality criteria for all searched results.

The Process of SLR

The SLR process entails many distinct tasks. There are other recommendations on the review process that are mentioned in the Cochrane Reviewers Handbook (Higgins & Green, 2008). However, this document gives a summary of the processes by Kitchenham (2004) as three key categories, namely: planning, conducting and reporting. These processes are discussed individually in the sub-section that follows.

- ***The Planning Stage in SLR*** - The requirement for a systematic literature review stems from the researchers need to synthesise information relating to a particular topic without bias (Kitchenham 2004). A high level description of the process in the planning stage is necessary. To this end, the planning stage involves:
    - **Identifying review requirements** - before pursuing the SLR, researchers must confirm the SLR is definitely needed by investigating if there are reviews already done using the relevant search strategy and clearly fate the SLR objectives (Kitchenham 2004).

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- **Creating the review protocol** - the review protocol explicitly fates the techniques implied in doing the SLR. This pre-defined procedure will assist in the reduction of researcher biasness (Kitchenham 2004).

Implementation of SLR

After the review protocol is decided, the implementation stage begins (Kitchenham 2004). A brief description of the main processes in the conducting phase follows. The implementation stages involves:

- **Search process** - the objective of this step is to identify papers that relate to the review question in an unbiased manner. A search strategy must be created and adopted. These search approaches are typically done repeatedly. Researchers should strive to keep away from publication bias, which may cause the SLR to be one-sided. Following the search strategy will avoid publication bias. Using a reference manager is a requirement to manage documents and also as a system for recording searched artefacts. Amendments to the search criteria must be recorded and justified. Unprocessed searched outcomes ought to be stored for likely re-evaluation (Kitchenham 2004)
- **Study selection** - the purpose of the study selection is to ascertain relevant artefacts that directly relate to the review question. Both inclusion and exclusion criteria based on the RQ that must be understood properly and allows for studies to be categorised appropriately. The study selection method contains several levels. The selection process must be approached in a liberal manner to ensure artefacts not acknowledged by electronic and manual search will not be included due to their titles and abstracts. Once all full text documents are searched, the inclusion and exclusion criteria must be applied prior to the generation of final results. It will be beneficial to keep a record of materials that were not included with comments. For an individual researcher, it is advised that inclusion/exclusion documents be deliberated with a group of experts (Kitchenham 2004).
- **Study quality assessment** - in this stage, the retrieved studies are quality checked to reduce bias and to ensure superior internal and external validity (Kitchenham 2004). This is done by using a suitable quality measurement tool (Dickson et al. 2013). The tool is a simple list of factors that must be checked against every document in order to achieve the required quality (Kitchenham 2004). The key elements for measuring quality (i.e. bias and internal and external validity) are described in **Table 1**.

Table 1: Key elements is quality (Kitchenham 2004)

Term	Synonyms	Definition
Bias	Systematic error	A tendency to produce results that depart systemically from the 'true' results. Unbiased results are internally valid.
Internal validity	Validity	The extent to which the design and conduct of the study are likely to prevent systematic error. Internal validity is a prerequisite for external validity.
External validity	Generalizability, Applicability	The extent to which the effects observed in the study are applicable outside of the study.

- **Data extraction and progress monitoring** - the main goal of this stage is to create data extraction forms that precisely record all information retrieved from the searched process. The retrieval process will outline sets of numerical values; this is essential in when summarising the searched results (Kitchenham 2004). The

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information is stored in the form of tables with key data about each paper (Dickson et al. 2013).

Key information to be included in electronic data forms include:

- The primary research question and any additional questions.
- Quality assessment measures.
- Name of artefact.
- Data retrieval date.
- Title, author, journals, publication information.
- Comments section.

Duplications at this juncture must be avoided (Kitchenham 2004).

- **Data synthesis** - in this step, the extracted data is collected, arranged and the results scrutinised (Kitchenham 2004; Dickson et al. 2013). Either a narrative or quantitative synthesis approach can be adopted. Data must be presented in a table format. The information in the tables must display likenesses and dissimilarity amongst searched results. To evaluate if a SLR is possibly susceptible to publication partiality, funnel plots are used (Kitchenham 2004).

Reporting the SLR

The last step in a SLR is to write up the findings (Dickson et al. 2013), and this must be done in a very effective and accurate manner, usually in the format of a thesis or journal article (Kitchenham 2004).

SLR EXECUTION

This section describes the execution of the systematic literature review. There are a number of the steps involved is doing systematic literature reviews. The systematic review procedure has the following nine steps (Dickson et al. 2013):

Step 1: Performing scoping searches, identifying the review question and writing your protocol.

Step 2: Literature searching.

Step 3: Screening titles and abstracts.

Step 4: Obtaining papers.

Step 5: Selecting full-text papers.

Step 6: Quality assessment.

Step 7: Data extraction.

Step 8: Analysis and synthesis.

Step 9: Writing up and editing.

Figure 2 is an example flowchart supported by PRISMA showing the 9 stages for conducting systematic reviews (Pati & Lorusso 2018).

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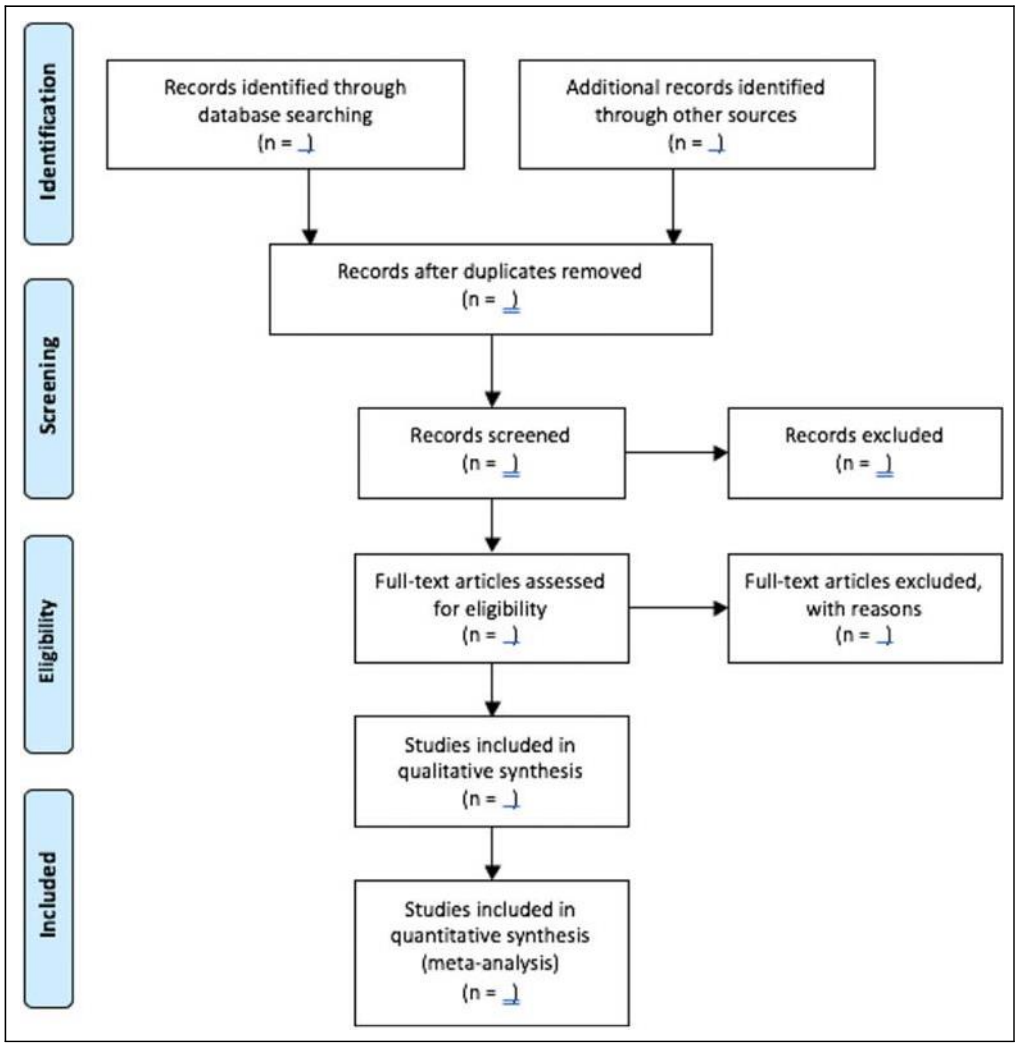

Figure 2. *Flowchart by PRISMA* (Pati & Lorusso 2018)

The steps used in this review have been adopted from Kitchenham (2004) as mentioned in section titled "*Process of SLR*".

Planning the Literature Review

Step 1 is meant to identify the need for research and research question. The purpose of this SLR was detailed in section 5. In this report, research questions are listed in sections 3 and 4. In creating the SLR protocol, literature searches where undertaken from April 2018 to July 2018 in the English language. The SLR was limited to articles published between 2010 and 2018. The following keywords were used in the search for studies that relate to the research questions: "ICT", "e-skills", "digital skills", "technology" and "creative industries". The data sources that were used to search for articles were Google Scholar and UNISA library. It was deemed not necessary to perform searches in other electronic databases since Google Scholar and UNISA library included articles from various electronic databases. The current search strategy will be applied and modified if necessary to avoid research bias.

Inclusion and Exclusion Criteria

Study selections were performed according to inclusion and exclusion criteria listed as follows:

- **Inclusion criteria:**
  - Articles directly related to the research questions.
  - Journals, conference proceedings and reviews that are interconnected to the

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topic and research questions.
    - Studies that explained creative industries.

- **Exclusion criteria:**
    - Artefacts that did not relate to creative industries.
    - Studies not written in English.
    - Duplications.

CONDITIONING THE LITERATURE REVIEW

This section describes the search strategy and the selection of papers. The pilot search began on Google Scholar using the keywords listed in the section titled "*Planning the Literature Review*". The identified articles where downloaded for initial screening. After a brief analysis of the search results, it was discovered that the pilot search did not generate many relevant articles. Although many articles were about creative industries, very few articles detailed e-skills in creative industries. Therefore, the search was broadened to include the following terms and keywords: "digitalisation"; "digital multimedia"; "information technology"; and "creative industries in South Africa". Articles generated from the second search were also downloaded for evaluation. An analysis of these articles also revealed very similar results as the first search, and this lead to the search been conducted using UNISA library resources with the help of a librarian. The results of the UNISA library search was conducted on 07 June 2018.

After conducting the UNISA library search on 07 June 2018, 50 articles were generated and downloaded and titles that matched or made reference to the keywords and thematic area were identified. These articles were screened by first reading the abstract and sub-headings before applying the review protocol of inclusion and exclusion criteria. Filtered artefacts were downloaded into a reference manager. More detailed information including an analysis of articles generated from the search are presented in the next section.

ETHICAL CLEARANCE PROCEDURES

This study was part of a broader research project, and ethical clearance was obtained at the School of Computing.

DATA ANALYSIS AND RESULTS

DATA EXTRACTION

After applying the inclusion and exclusion criteria and the SLR method (Kitchenham 2004), a total of 35 papers were used for the SLR. A brief description of the research articles used in the SLR of the thematic area (i.e. creative industries) is presented in **Table 2.**

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Table 2: Summary of articles utilized in the SLR

#	Year	Authors	Title	Basic summary
1	2012	Twinomurinzi, H	The Role of ICT in Sustainable and Responsible Development	The article addresses the importance of e-skilling in developing countries, specifically the efforts undertaken in South Africa. Also the challenges and areas of changes in the future for creative industries.
2	2012	Zuppo, C.M	Defining ICT in a Boundaryless World: The Development of a Working Hierarchy	This paper intends to establish the use of ICT in different creative sectors and shows the benefits globally in economic and sustainability.
3	2013	Booyens, I., Molotja, N. & Phiri Z., M	Innovation in High-Technology SMMEs: The Case of the New Media Sector in Cape Town	The case study examines innovative technology in new media sector in Cape Town with limitations and possible solutions.
4	2013	Bowles, M	Digital literacy and e-skills: participation in the digital economy	The document discusses digital skills and its role in the world economy and how to improve this e-skill.
5	2013	Dickson R., Cherry, M.G. & Boland, A.	Carrying out a systematic review as a Master's thesis	The document discusses the concept of systematic reviews with its methodology and processes.
6	2013	Katunga, N	Understanding the Role of e-Skills in the Utilization of Electronic Small Business Development Support Services	The journal investigates the influence of e-skills, internet and access of e- support or lack thereof in South Africa. Also government's role in developing e-skills. The findings has exposed gaps and future research in improving access and up-skilling.
7	2013	Mietzner, D. && Kamprath, M	A Competence Portfolio for Professionals in the Creative Industries	ICT technologies and e-skills required for creative professionals. Findings shows the requirements for increased competency levels.
8	2013	Visser, G	The Film Industry and South African Urban Change	Analysis of South Africa's film industry and government's role in improving it. There is a lack of skills and knowledge about the film industry.
9	2014	Benghozi, P.J. & Paris, T	The cultural economy in the digital age: A revolution in intermediation?	The internet and digital effect on the cultural economy. The findings may give rise to stability in this sector

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Table 2: Summary of articles utilized in the SLR (continued)

#	Year	Authors	Title	Basic summary
10	2014	Berg, S.-H. & Hassink, R	Creative industries from an evolutionary perspective : A critical literature review	Evolutionary geography and historic perspectives in creative industries. Findings reveal very few studies done systematically.
11	2014	Caltiz, A.P., Greyling, J.H. & Cullen, M.D.M	South African Industry ICT Graduate Skills Requirements	This study focused on the requirements of ICT graduate skills in South Africa and the future needs.
12	2014	De Beukelaer, C	Creative industries in “developing” countries: Questioning country classifications in the UNCTAD creative economy reports	The authors suggests that a more balanced method be used in evaluating countries as different policies should be applied to different developing countries in creative industries. Findings reveal variances in classifications of countries and a re-look is necessary.
13	2014	Mangematin, V., Sapsed, J. & SchuBler, E	Disassembly and reassembly on digital technology and creative industries	Effects of digital technology on creative industries has affected businesses. Findings demonstrate the profound effects of ICT across the world.
14	2014	Moore, I	Cultural and Creative Industries concept – a historical perspective	Innovativeness in European creative industries sectors. Findings reveal that creative industries must be view in conjunction with digitalization.
15	2014	Warrell, J.G. & Jacobsen, M	Internet research ethics and the policy gap for ethical practice in online research settings	This journal address the policy gaps and complexity of internet research and ethics around internet use.
16	2015	Benghozi, P.-J. & Salvador, E	How and Where the R&D Takes Place in Creative Industries? Digital Investment Strategies of the Book Publishing Sector	This paper looks at research and development in the book publishing sector. Challenges of not aligning with relative growth in digital innovation.
17	2015	Moher, D. et al.	Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P)	Reporting guideline for systematic review protocol according to Preferred Reporting Items for Systematic reviews and Meta-Analyses for Protocols 2015 (PRISMA-P) checklist.
18	2016	Bouters, L. et al.	Identification of skills gap in cross-media design and production in the creative industries at EU-level	This article describes the skills demand in Europe as a crucial factor due to increased digital innovations in the creative sector.
19	2016	Bridgstock, R	Educating for digital futures: What the learning strategies of digital media professionals can teach higher education	This article relates to universities in Australia preparing student for the 21st Century digital demands. Findings reveal that universities lack in its strategy and must find better ways to cope with the digital era.

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Table 2: Summary of articles utilized in the SLR (continued)

#	Year	Authors	Title	Basic summary
20	2016	Nasta et al. , L., Pirolo, L. & Wikstrom, P	Diversity in creative teams: a theoretical framework and a research methodology for the analysis of the music industry	Exploring team diversity in the music industry and setting the pace for future exploration by providing a theoretic framework that can be applied
21	2016	Stahl et al. , B.C., Timmermans, J. & Mittelstadt, B.D	The Ethics of Computing: A Survey of the Computing-Oriented Literature	Surveys academic research regarding ethics, technology and related methodologies in the computing field.
22	2017	Fleischmann, K., Daniel, R. & Welters, R	Developing a regional economy through creative industries: innovation capacity in a regional Australian city	About growing the creative industries in Townville, Australia into regional areas and the confusion related to innovative technologies.
23	2017	Irjayanti, M. & Mulyono, A.A	Implementing Technology in Creative Industry (Benchmarking Study in Developed Countries)	Identifies the methods used in developed countries to increase productivity in creative sectors of developing countries. Findings show the specific models should be applied to the relevant sectors to achieve growth.
24	2017	Kontrimiene, V. & Melnikas, B	Creative Industries: Development processes under contemporary conditions of globalization	Growing the creative market globally by addressing specifications and issues in the current era also related to exports and services. Findings reveal the need to standardize creative approaches.
25	2017	Van Laar, E. et al.	The relation between 21st-century skills and digital skills: A systematic literature review.	Compares the 21st century skills to digital skills requirements and how to improve the knowledge in digital skills. Findings showed the core and contextual skills needed at a global scale.
26	2017	Li, F	The digital transformation of business models in the creative industries: A holistic framework and emerging trends	How digital technologies affect business in creative sectors. Three new themes were mentioned for future research.
27	2017	Twinomurinzi, H. et al	Towards a shared worldview on e-skills: A discourse between government, industry and academia on the ICT skills paradox	The global standpoint dealing with the dynamics of ICT skills in South Africa between academics, government and industry and the theory of reaching consensus by adopting trans disciplinary approaches
28	2017	Wu, X	Research on computer interaction design and digital creative industry	Computer design in the digital creative sectors specifically in the art design. Findings reveal improvement in the multimedia sector due to innovative digital technology.

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Table 2: Summary of articles utilized in the SLR (continued)

#	Year	Authors	Title	Basic summary
29	2018	Collins, P., Mahon, M. & Murtagh, A	Creative industries and the creative economy of the West of Ireland: evidence of sustainable change?	Improving the creative industry on Ireland and how it fits into the global market.
30	2018	Demir, O	Looking forward for Istanbul's creative economy ecosystem	This study compares Istanbul's creative economy to other European cities. Planning and policy development plays a crucial role in growth of the creative industry.
31	2018	Gouvea, R. & Vora, G	Creative industries and economic growth : stability of creative products exports earnings	Explores creative industry exports and findings reveal huge differences in export approaches between countries. R&D is the driving force in creative industries.
32	2018	Gregory, J.J	Creative Industries and Urban Regeneration – The Maboneng Precinct, Johannesburg	Discusses policy frameworks and urban regeneration in South African creative industries with particular reference to Johannesburg.
33	2018	Liu, C.H.S	Examining social capital, organizational learning and knowledge transfer in cultural and creative industries of practice	Probing societal investment, structured education and knowledge transferal in practical creative industries.
34	2018	Pati, D. & Lorusso, L.N	How to Write a Systematic Review of the Literature	This article gives a step by step approach on doing systematic reviews
35	2018	Purnomo, B.R. & Kristiansen, S	Economic reasoning and creative industries progress	The paper examines the factors that blur the understanding of creative industries from rational and creative-intuitive view.

Table 2 shows the different topics researched in creative industries for the period 2012 to 2018. Although various aspects of the creative sectors appear to have been addressed, the overall findings reveal that e-skills, specifically digital skills in creative industries, are yet to be researched.

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As shown in **Figure 3**, the number of research articles that were collected and used for the SLR are categorized further according to the publication year. **Figure 3** shows an upward trend in published articles from year 2015 to 2018, which indicates an increased focus in creative industries.

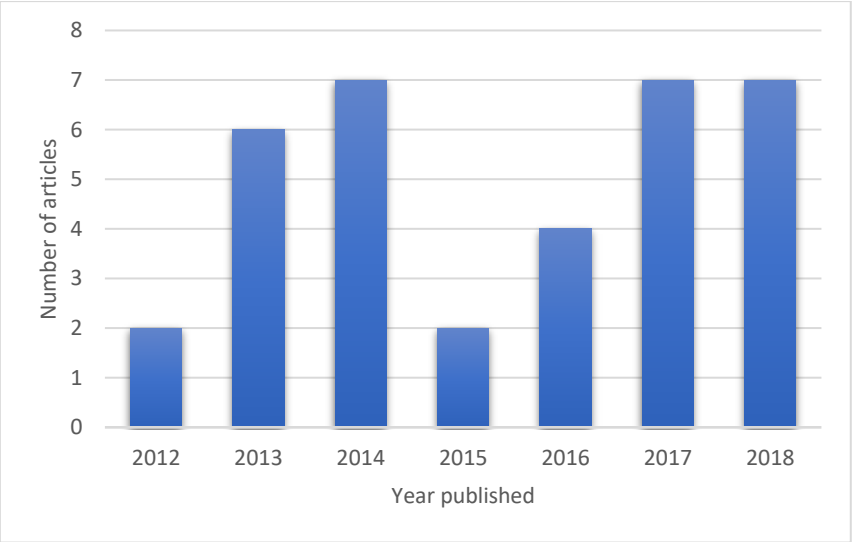

Figure 3: Number of research articles

DATA EXTRACTION

Qualitative exploration was performed on the extracted data. Following an consideration of the inclusion and exclusions criteria, a literature review relating to ICT skills in creative industries was undertaken. The academic documents were analysed by one person for relevant information.

DISCUSSION AND CONCLUSION

The initial pilot search did not generate any material relating to e-skills in creative industries; relevant articles were only generated after the search was broadened using related keywords. Although results emanating from the SLR enabled the research question to be answered, additional research still needs to be conducted to address the gap identified by the SLR on e-skills in the creative industries. Globally, developing countries seek to improve the policies surrounding creative economies and the same is evident in South Africa. Current trends show that the South African government needs to focus on capacitating and thus improving the creative sector with e-skills and funding. Challenges of lack of ICT skills are currently being experienced in the South African film, music and cultural sectors because digital innovations have increased the demand for technologically advanced individuals.

Although it was possible to acquire, through the SLR, substantial data about the creative industries and its related sectors, a gap in the e-skill research at a global level was identified. Future research and development strategies aimed at improving e-skills in creative industries to address the current digital growth is therefore recommended.

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THE ROLE OF E-SKILLS IN LITERACY

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ABSTRACT

Aim/Purpose	The aim of this systematic literature review is to investigate whether any significant research has been undertaken in the area of e-skills in literacy
Background	One of the challenge of the e-skills agenda is the ability to use ICT devices for meaningful purposes, which is often referred to as e-literacy or digital literacy. This paper highlights available research that has been conducted in the area and subsequently identify any gaps that should be taken into consideration for future research.
Methodology	The methodology adopted for the study is based on the systematic literature review approach.
Findings	A total of 324 articles were downloaded from 4 databases, and only 12 articles met a previously designed inclusion criterion. The study found an adequate existence of articles with regards to the use of ICT devices and applications as well as access to ICT infrastructure.
Recommendation for Researchers	Researchers can use this paper for future research in the area of e-skills in literacy.
Impact on Society	The findings of this paper have huge impact on society since gaps that need to be addressed for society to be in line with the fourth industrial revolution have been identified.
Future Research	Future work could be undertaken that is focused on the following identified gaps: • Digital literacy around the topic of cloud computing. • Collaboration of different stakeholders (government, communities and industry) in addressing ICT access in rural areas. • Different ways in which digital literacy can be measured.
Keywords	e-literacy, digital literacy, ICT literacy, e-skills, e-government, ICT devices, ICT access.

INTRDOUCTION

The revolution of digital technology, which has presented many opportunities to many communities, has generally enhanced the lives of citizens across the globe. The beneficiaries of opportunities range from general citizens, businesses to government services (Mitrovic, 2010). For example, South African citizens can apply for smart identification cards using government online services thus leading to a reduction in the amount of time the citizens spend on queues when applying at government offices. Such benefits can only be realised when digital technology devices, systems and applications such as personal computers, mobile phones, internet, tablets and others are utilised. As a pre-requisite for accessing government services such as the one described above, it is of course important that citizens have access and the requisite e-skills to use computers, internet and e-government services. The issue of digital literacy cannot be overemphasized since access to these technological

devices does not automatically translate into citizens accessing these services as having acquired the requisite e-skills (Deursen & Dijk, 2009)

Lack of e-skills, specifically e-literacy or digital literacy, prevent citizens from leveraging on these digital technology opportunities. Challenges relating to lack of digital literacy are particularly prevalent in rural areas where there is little or no access to digital technologies such as smartphones and computers (Mohamed *et al.*, 2012). Where digital technology is available, communities are more likely to benefit if they have the necessary literacy levels required for the operation of such digital technology. Such type of literacy is referred to as digital or Information and Communication Technology (ICT) literacy. Digital literacy, which is common in rural areas where there is limited or no access to ICT infrastructure is the main limiting factor when the subject of e-skills is the presenter.

This study seeks to investigate various research studies that have been undertaken with the aim of addressing he role played by e-skills in the digital literacy. The investigation will be conducted through a systematic literature review methodology.

PROBLEM STATEMENT

An e-skilled and empowered digital citizenry in South Africa is a means of ensuring social and economic readiness for the fourth industrial revolution, which will, in part, be driven by digital innovations. Prepared citizens are considered to be better equipped to take advantage of digital entrepreneurship and economic opportunities such as those brought about through radical economic transformation. New ICT solutions such as those experienced in shared digital platforms can similarly result in economies of scale in marginalised communities. Case studies and models that portray the collaborative ethos between government, industry and other sectors to partner with rural communities are particularly encouraged.

The introduction of new ICT solutions is more likely to give the communities an opportunity to have easy access to the outside world and learn new things through digital technology. One such opportunity is the acquiring of knowledge and skills using ICT systems and devices, which are referred to as e-skills or digital skills. Skills acquisition through ICT devices emanates from various challenges arising from communities not leveraging on digital technologies. One of the challenge of the e-skills agenda is the ability to use ICT devices for meaningful purposes, which is often referred to as e-literacy or digital literacy. In addressing the digital literacy challenges, it is therefore vital to understand available researches that has been conducted in the topic area and subsequently identify any gaps that should be taken into consideration for future researches or work.

AIM, OBJECTIVES, RESEARCH QUESTIONS AND DELIVERABLES OF THE RESEARCH STUDY

AIM OF THE RESEARCH STUDY

The aim of this research study is to conduct a systematic review of the literature relating to e-skills in literacy.

RESEARCH OBJECTIVES OF THE STUDY

The main objectives of this research study are therefore to:

- Collate relevant literature relating to the area of e-skills in literacy.
- Use the literature collated to determine the type of the research that has been undertaken in the area of e-skills in literacy.
- Use the literature collated to identify gaps in the area of e-skills in literacy.

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RESEARCH QUESTION

The key research study question that is derived from the problem statement that this research study seeks to address is as follows:

What research has been undertaken concerning e-skills in literacy?

DELIVERABLES

The deliverable of this research will be a systematic review report identifying the research undertaken and gaps with the topic of e-skills in literacy.

LITERATURE REVIEW

With the digital transformation evolving worldwide, it is imperative that South Africa takes advantage and uses the technology to enhance the knowledge of entrepreneurs and marginalized communities. Several research studies have been conducted globally with the aim of addressing challenges that are faced when implementing e-skills programmes. One such challenge is literacy within different communities and individuals. The context of e-skills in the literacy can be discussed as the ability to use ICT devices and digital technology for meaningful purpose (Shopova, 2010). Before delving into the type of ICT user skills required to drive the digital transformation agenda, it is important to define what e-skills is.

WHAT IS E-SKILLS

E-skills, which is also referred to as digital skills or ICT skills, is very broad concept and does not really have a standardized definition as it encompasses various skills sets (Frinking *et al.*, 2005). Several researches have defined e-skills using various elements that constitute the e-skills framework (Frinking *et al.*, 2005). The following elements are used by Frinking *et al.* (2005) to define e-skills:

- **ICT user skills:** the ability by individual to effectively operate ICT systems.
- **ICT practitioner skills**: the capability required to design, develop and sell ICT systems.
- **e-Business skills**: The capability to explore different opportunities that are presented by the availability of ICT systems such as internet.

In South African e-skills agenda, e-skills is defined as the "*the ability to develop and use ICT within the context of a knowledge environment and associated competences that enable the individual to participate in a world in which ICT is a requirement for advancement in business, government and civil society"* (Mitrovic, 2010).

Furthermore, e-skills agenda in South Africa has been categorised in different levels in order to give a clear understanding of what constitutes e-skills (Twinomurinzi, 2012). These elements consist of the following (Twinomurinzi, 2012):

- **e-Literacy Skills:** This refers to the basic literacy required to use ICT devices and systems for purposes such as internet browsing, sending and receiving emails, online learning and others. Some of the ICT devices mentioned above include computers, tablet and mobile phones.
- **e-Participation and e-Democracy Skills:** This set of skills are mainly focused on providing citizens with an opportunity to improve their engagement with government on issues affecting them.
- **e-Government/Governance Skills:** These set of skills are used in government ICT

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and have capabilities to allow citizens an opportunity to use government online services to improve service delivery.

- **e-Business Skills:** This refers to skills used in a business organization with the aim of increasing efficiency and productivity using digital technologies.
- **e-User Skills:** This set of skills is focusses on enhancing the way people use ICT devices for any given task.
- **e-Practitioner Skills:** This is focussed on enhancing the capabilities for ICT professionals such as ICT support staff and developers.
- **e-Community Skills:** This type of skill is focussed on encouraging community members, and it is aimed at building social cohesion that will result in providing solutions to challenges faced by the local community such as, but not limited to, crime, health and education.

ICT User Skills

The definition of ICT user skills encompasses individuals, devices and software applications that are being used to attain such skills. The ICT user skills can be categorised as basic ICT skills and specialist ICT skills. Whereas basic ICT user skills include the ability of the individual to operate programs such as word processors and general office software, specialist skills focuses on systems analysis and programming of software required to operate in different industries (Barker & Gardiner, 2007). Basic user ICT skills are usually acquired through attendance of courses or through self-learning. These ICT user skills can be acquired by everyone in the community ranging from young, old and disabled people (Morris & Brading, 2007). Users with basic ICT user skills have a higher chance of adopting new ICT technological skills Callum & Jeffrey (2013) such as operating mobile phones and computers.

WHAT IS LITERACY

Literacy is generally understood as the individual's ability to read and write However, literacy can also be extendend to the ability of an individual to understand the information being presented (Lankshear & Knobel, 2008). The concept of literacy has been in existence for many years. In addition to the ability to read and write, Harste (2003) has indicated that learners shall also have visual-text literacies that will enable them to write down what is in their mind. The idea of literacy is currently being used with reference to education and knowledge of specific fields (Horning, 2007). Literacy can be seen as a human right whereby all individuals are capable of acquiring it depending on their area of interest such as music, computers, art, and others (Keefe & Copeland, 2011). Bawden (2001) has indicated that several types of literacies, including Information literacy, digital literacy, computer literacy, exists. While information literacy involves an individual's ability to retrieve, process and use information that is being presented, digital literacy on the other hand comprises the capability to use software and hardware that are used in the digital environment.

Digital Literacy

The definition of digital literacy is not much of different from the general definition of literacy, which entails the ability to read and write. The major difference between the two definitions lies in the fact that digital literacy involves the ability to read and process information using digital technologies and formats (Lankshear & Knobel 2008). The digital literacy concept is also described by Eshet-alkalai (2004) as the "Survival skill in the digital era". Chetty *et al.* (2018) have described digital literacy as the skills that are required for individuals to operate digital media as well as processing and retrieval of information. This type of literacy empowers individuals with the necessary knowledge to allow them to use digital technology for meaningful purposes such as networking through social media networks and participation in e-learning courses.

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Today's discussions on digital literacy are based on an individual's ability to use computers and digital devices for a meaningful purpose, which is then termed e-literacy (Lankshear & Knobel, 2008). For individuals to be digitally literate, they are also expected to know how to find relevant information within the digital devices and applications. Some of the ICT devices include mobile phones, computers, reproduction media and digital library resources. Some challenges that are faced with the concept of e-literacy or digital literacy include the ability to measure the individual's literacy level (Chetty *et al.*, 2018), whether individuals should be taught digital literacy Ng (2012) and the inability to access digital devices (Ferro & Helbig, 2007).

The context of digital literacy also includes the literacy levels of those who are assisting or teaching learners within the digital environment space (Hakkarainen *et al.*, 2001). For example, a system that uploads questions and assignments for students to complete shall be understood by teachers or administrative clerks responsible for doing that task.

A scan of the literature has revealed that the following categories that have a direct influence on digital literacy level and community members.

- **Use of ICT devices, software and systems** – applies to the literacy levels required to use ICT devices, software and systems.
- **Access to ICT devices** – applies to having access to ICT devices and systems; this has proven to be a challenge, especially in rural areas.
- **Teaching and assisting learners using ICT devices and software** – refers to professionals responsible for assisting learners with ICT works (e.g. teachers and admission clerks).
- **Digital literacy intervention** – refers to different courses designed to improve the digital literacy level of communities.

Other forms of Literacy

Other forms of literacy include:

- Photo-visual literacy – ability of individual to learn by reading visuals (Ng, 2012).
- Reproduction literacy – ability of individuals to utilise digital tools to edit and manipulate existing materials (Ng, 2012).
- Cyberliteracy – ability of individuals to use the internet and interpret the information that is provided through the internet (Mackey & Jacobson, 2011).

In the section that follows, the research design and methodological approaches adopted for investigating the research problem that was formulated are presented.

RESEARCH DESIGN AND METHODOLOGY

OVERVIEW OF SYSTEMATIC LITERATURE REVIEW

Systematic literature review is conducted with the aim of identifying and analysing all available research that has been undertaken that are relevant to the subject matter (Kitchenham, 2007). A stand-alone Systematic Literature Review (SLR) is deemed to be a much more rigorous process that seeks to identify and evaluate all the work that are published by different researchers on a selected topic (Okoli & Schabram, 2010). The main purpose of conducting the SLR includes:

- Identifying all the researches in the given topic area or research question (Kitchenham, 2007).
- Identifying any gaps and contradictions in the literature (Kitchenham, 2007).

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- Providing new research activities that twill address the gaps and resolve any contradictions.

To ensure that the SLR is written to perfection, Kitchenham (2007) suggests that SLRs be undertaken in three main phases, namely:

- The planning phase;
- Conducting the review; and
- Reporting of the review.

The various tasks that need to be completed during the three stages are discussed briefly in the section that follows.

The Planning Phase

The planning phase is undertaken as follows:

- This phase shall clearly highlight the reason why the review is conducted.
- The review protocol that shall be followed is being developed

Conducting the Review

The following steps followed when conducting the review process.

- All research studies that have been undertaken are being identified;
- The primary research studies are selected;
- Quality assessment of the research study is undertaken;
- The collected data is extracted and monitored; and
- The data is synthesised.

Reporting the Review

Once the Systematic Literature Review is concluded and all the research studies relating to the subject matter has been identifying and analysed, some form of reporting needs to happen. Therefore, this stage of the Systematic Literature Review involves reporting on what has been found in different research studies that were included in the review.

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RESEARCH METHODOLOGY

The research methodology adopted in this study is a Systematic Literature Review. This methodology follows a systematic process of identifying research gaps within the given areas. The research is based on exploring already published articles and journals sourced from different databases. The research method that was adopted for this study followed the following process:

a) Prepare the protocol – The first part of this methodology is the review protocol as it gives guide as to how the systematic literature review shall be structured and conducted.

b) Conducting the article and journal search – Articles are searched using the defined string that is in line with search terms and research question provided.

c) Data extraction – During this process, data will be extracted from all included studies.

d) Results analysis – data collected is analysed at this stage

e) Discussion and Conclusions – This stage attempts to f provide full discussion that will also highlight any gaps that are available,

SYSTEMATIC REVIEW

The systematic literature review will be conducted focussing on e-skills that involves the use of digital technology.

Inclusion Criteria

The following inclusion criteria was adopted for this review.

- Primary studies that are focussed on the e-skills/digital skills and literacy.
- Articles and journals that are related to e-skills/digital skills and literacy.
- All publication covering the period 2008 to 2019
- All studies that are conducted in academic, industry and conferences.
- Participants from all age groups
- Full text of the journal article in question shall be available
- All studies should have been written and reported in English

Exclusion Criteria

For purposes of this literature review, the following materials were not considered:

- All articles that do not address e-skills and literacy.
- All newspaper and blog articles.
- Articles and journals published before 2008.

Information Sources

The articles or journals used for this review were sourced from several databases, which are as follows:

- Google scholar – https://scholar.google.co.za/
- UNISA EBSCO host – http://0-eds.b.ebscohost.com.oasis.unisa.ac.za/eds/search
- IEEEplore – https://ieeexplore.ieee.org/Xplore/home.jsp

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- Proquest – https://0-search-proquest-com.oasis.unisa.ac.za/

Search Terms

To satisfy the research question stated above, the following search terms were used:

- Information Communication technology (ICT)
- ICT Literacy
- ICT Skills
- Digital literacy
- Digital skills

Initials articles search

Initial searching of articles was performed using the above-mentioned search terms in order to attain an overview of what the different databases have in this topic area. With the use of these search terms, the results returned from different databases were, as indicated in **Table 1**, in the range of millions.

Table 1: Results of the initial articles search

Databases	Number of articles returned
Google scholar	2 880 000
UNISA Ebsco host	1 394 510
UNISA Proquest	1 494 320
IEEE Xplore	1 683 237

Actual articles search and selection

The search string was modified to focus on the terms that are more specific to the topic area under review. The new string was modified as follows:

“e-skills” OR “Digital Skills” AND ‘’Literacy’’

The terms were placed within hyphens to ensure that the search results were based on the full term instead of separate terms. Search string was used in the UNISA EBSCO host, UNISA Proquest, IEE Xplore and Google Scholar databases. The latest search using the above string was performed on the 13th October 2018. The string resulted in a total of 324 articles from the above-mentioned databases. The articles resulting from the search string were downloaded from these databases and imported into Endnote X9 to allow the removal of duplicates and conducting of an abstract screening. The process for the selection of the articles is highlighted in **Figure 1**.

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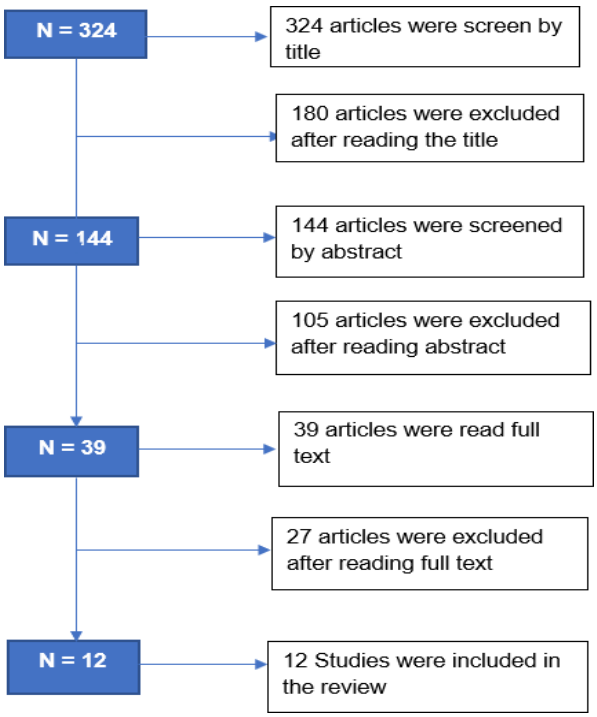

Figure 1. Data selection process

Data Extraction

Data was carefully extracted from the selected studies and presented in the form of a table containing the following information per study, *Study details, Objectives, population, methodology and primary outcome.* The information extracted is summarised in **Table 2**.

SUMMARY OF INCLUDED STUDIES

A total of 12 studies were included for the review. Results of included studies are summarised in **Table 2**.

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Table 2: Summary of studies included in the review.

#	Study	Objectives	Focus area		Population	Methodology	Primary Outcome
1.	Miwa *et al.* (2018)	The objective of the research was to establish if student's perception has changed in after attending Digital literacy course.	Digital literacy intervention course	1D	Open University of Japan elderly students	Quantitative	The outcome of this study shows that a digital literacy course has improved ICT skills of the students. Furthermore, the study has found that the skills for those who continued to use internet and computers has improved.
2.	Nanda and Ramesh (2012)	Objective of the study is to assess ICT literacy of teachers and practitioners who work in the field of Disability	Teaching and assisting learners using ICT devices and software	1C	335 Teachers and Practitioners who work in the field of disability	Quantitative	The results show that majority of disable people require special assistive software programs. Most of the teachers who were interviewed have little or no ICT skills required to use those programs although 87% of respondents were found to be computer literate.
4	Ikolo (2012)	The purpose of this study was to assess the possibly of gender difference in the computer literacy.	Gender difference		Clinical medical Students in Nigeria	Quantitative	The study found that, there is not much of gender difference with regards to the use of computers. It was also found that male students spend most of their times on the computer playing games, office applications and internet as opposed to female who spend most of the time for office applications.
5.	Bansode & Viswe (2016)	The objective of this study was to find the ICT literacy levels within the library professionals.	Teaching and assisting learners using ICT devices and software	2C	149 Library Professionals working in Jaykar library, Savitribai Phule Pune University, India.	• Quantitative. • Survey method was used to collect data.	The paper found that although library professionals are competent with using computers, training on digital literacy is required mostly for specialized software and tools.
6.	Mohamed et al. (2012)	The objective of this study is to examine the importance of ICT skills in bridging digital divide between rural and urban areas.	Access to ICT devices and software	1B	585 Students in Malaysia rural areas. Age group of the students is 13- 19 years.	Quantitative. Survey questionnaire was used to collect information.	The study found that access and usage of ICT devices is still a challenge in a rural resulting in lack of ICT skills and literacy. The results also showed that about 79% of participants do not own a computer device resulting in the shortage of ICT skills.

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Table 2: Summary of studies in the review (continued).

#	Study	Objectives	Focus area		Population	Methodology	Primary Outcome
7.	Tijjani et al. (2017)	The purpose of the study was to assess how ICT can be utilized to empower rural women farmers in Rivers state	Access to ICT devices and software	2B	120 rural women farmers in Rivers State, Nigeria	Quantitative. Questionnaires were used to collect data.	The outcome of the study suggests that lack of ICT devices in rural areas has a high contributing in shortage of e-skills and literacy.
8.	Ng (2012)	The objective of the study was to investigate whether undergraduate students can adopt unfamiliar technologies in their learning.	Use of ICT devices and software	1A	53 Undergraduate students at University of South Wales, Australia.	Quantitative and qualitative.	The outcome of the study suggests that majority of the participants are comfortable in using new or unfamiliar technologies. However, study also found that a digital literacy course can provide participants an opportunity to use technologies for meaningful purposes.
9.	Castilla et al. (2018)	The objective of the study was network navigation capabilities in elderly people in rural areas.	Digital literacy intervention course	2D	46 Elderly people (60 to 76 years)	Qualitative. Questionnaires were distributed to the participants.	The primary outcome of the study has found that with the intervention of digital literacy course presented to learners, the ICT skills has improved.
10.	Shopova, (2010)	The purpose of this study was to evaluate the skills and Digital literacy of students in use of new technology	Use of ICT devices and software	2A	60 first year and second year students.	Qualitative	The findings of the study found that 76 % of participants are more comfortable in using ICT devices and applications.
11.	Adeoye (2017)	The study evaluates the level of digital literacy in Nigerian undergraduate students	Use of ICT devices and software	3A	595 students	Qualitative	The study found that majority of students can use ICT devices
12.	Deursen and Dijk (2009)	The objective of the study was to evaluate the ability for Dutch citizens in using government online services.	Use of ICT devices and software	4A	109 Dutch citizens	Qualitative	The study found that majority of Dutch citizen have skills to use basic online services. The study of found although majority of participants have ICT usage skills, only 62 % found to have a better information skill.

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RESULTS AND ANALYSIS

It is evident from the reviewed studies that several research studies have been conducted in the area of e-skills in the literacy. In most of these studies, attempts were made to relate e- skills and literacy in a variety of ways. The reported studies covered range of elements that has an impact on e-skills and literacy. These elements were extracted from the studies and categorized in accordance with **Table 3**.

Table 3: An illustration of the number of articles generated per study category

Category	Category Number	Total number of studies
Use of ICT devices, software and systems	A	4
Access to ICT devices and systems	B	2
Teaching and assisting learners using ICT devices and software	C	1
Digital literacy intervention	D	1

It is noteworthy that at least one of the studies by Ikolo (2012) identified involved an investigation of gender differences in e-literacy, something which was not initially specified as a category. The study found that there is a difference between female and male in respect of ICT literacy. Apparently, males and females ICT users use computers for different reasons. For example, it was found that men mostly use computers for playing games whereas women prefer mostly acquiring softer skills such as Microsoft (MS) package (Ikolo, 2012).

ANALYSIS OF STUDIES

Access of ICT devices

Access to electronic devices remains a key in acquiring e-skills. Of the reviewed articles, two studies by Tijjani *et al.* (2017) and Mohamed *et al.* (2012) have investigated the relationship between digital literacy and electronic device access. Furthermore, the studies highlighted that lack of access to ICT Infrastructure in rural areas was described as the most contributing factor to e-illiteracy and shortage of ICT skills. Study reported by Tijjani *et al.* (2017) have found that only 25% of the sampled population uses computers thus resulting in ICT literacy in that specific population. However, other challenges in rural areas such as lack of electricity and funds to acquire ICT devices are among the reasons why most rural people in the rural areas do not own ICT devices. Mohamed *et al.* (2012) have found that 76% of participants in rural areas do not own computers and/or smartphones.

Ability to teach and assist learners using electronic devices to acquire e-skills

Two of the reviewed studies have investigated the ICT literacy requirements for professionals that work with learners (Nanda & Ramesh, 2012; Bansode & Viswe, 2016). These professionals include teachers, library workers and practitioners working with disability students. Both studies seem to share the view that there is a need for professionals to be digital literate so that they will be able to assist learners. In addition, it was found that professionals are exposed to computer programs such a MS Office resulting in majority of them being computer literate (Nanda & Ramesh, 2012; Bansode & Viswe, 2016).

Interventions required to address e-skills shortage

Two of the studies have investigated the intervention required to address lack of digital literacy skills within individuals and communities as a whole (Ng, 2012; Castilla *et al.*, 2018). Ng (2012)

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found that digital natives students[1] have the capability of using unfamiliar technologies such as social networking, video games and internet as basic ICT skills not necessarily for meaningful purpose. Following their attendance of the digital literacy course, the students were much more empowered and skills to use digital technologies for meaningful purpose such as e-learning. Castilla *et al.* (2018) also found that elderly people from rural areas are generally fearful towards technology and have to attend digital literacy sessions for them to be comfortable with the of ICT software and hardware systems.

Use of ICT devices and software

Use of ICT devices and software can be regarded as a gateway to digital literacy. It is quite clear from the different studies mentioned in the literature reviewed that lack of basic skills that allows people to use ICT devices can be a huddle in terms of digital literacy. In this review, five articles have investigated the use of ICT devices and software by users from different generational groups ranging from youth to adults. The study by Castilla *et al.* (2018) found that elderly people had basic ICT skills that allows them to use ICT devices and software, however the majority of them were reluctant to use these skills because of fear of technology. However, this was only improved after attending the digital literacy course. On the same note, Ng (2012) found that undergraduates students who possess the ability to use ICT devices do not necessarily use them for meaningful purpose. Similar sentiments were expressed by Deursen & Dijk (2009) who found that the majority of survey participants have basic ICT skills but cannot use these skills for meaningful purposes. The other two studies have found that participants were comfortable using ICT devices and applications (Adeoye, 2017; Shopova, 2010).

DISCUSSION

This systematic literature review investigated the research studies undertaken with the focus on "e-skills in the literacy". The results from the review suggest that there is a lot of research that has been undertaken in this area, with lot of the research being focussed on the use of ICT systems and devices that are used to acquire such skills. Without access to these ICT devices, people will find it difficult to use the systems and can this could potentially result in a ICT illiteracy. Most of the studies reviewed are of the view that both access and use of ICT devices are huge contributors to the process of attaining e-skills. Other studies have also argued that having access to ICT and use of ICT are not enough to guarantee that individuals will be digitally literate. Some studies suggest the introduction of digital literacy courses to ensure that those individuals with basic ICT skills are able to use their ICT skills for meaningful purpose such as online learning, searching and processing of useful online information.

The use of new ICT technologies more especially in rural areas remains a biggest challenge according to reviewed studies. These studies found that access to ICT devices and application in rural communities has been identified as a problem, resulting majority of rural areas communities lack digital literacy. Some of these problems are caused by lack of basic infrastructure in rural areas such as electricity and ICT devices (Tijjani *et al.*, 2017). To mitigate these challenges, a collaborative initiatives amongst the relevant different stakeholders is recommended in order to establish awareness programs on digital technology and digital literacy. It is not clear from the studies that have been reviewed how shortage of e-skills and lack of digital literacy should be addressed in rural areas.

GAPS IDENTIFICATION

In the current systematic literature review, several researches have been undertaken in the topic of digital literacy. As shown in **Table 4**, a gap identification strategy that is based on the

[1]Digital native students is referred to those students who are brought up in the age of digital technology such as video games and smartphones.

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categories elaborated on Digital Literacy section of the Literature Review was undertaken.

Table 4: Gaps identification

Study	Category	Research Area	Research devices	Possible gaps
1A, 2A,3A,4A	A	- University students - Citizens	- Computers - Internet - Mobile phones	With the cloud technology taking the centre stage, some of the skills possessed by the users might need to be reviewed. This opens a potential of digital literacy research that has to with cloud technology.
1D, 2D	D	- Elderly people in rural areas. - University students		Possible gaps include a research whereby digital literacy course can be presented to rural area community more especially the ones with no access to ICT devices.

The current literature has laid a good foundation for further research in the area of e-skills in the literacy. Not many articles have mentioned the measurement of digital literacy. In the case of rural areas, it is vital to understand how digital literacy can be measured instead of simply just distributing questionnaires to survey participants.

CHALLENGES AND LIMITATIONS

The current systematic review has some limitations. The research question provided was very broad and this made it difficult to search for relevant articles. This was experienced during the first search of the articles whereby the search generated millions of records. This limitation was however minimized by reviewing the research question by breaking it down into smaller parts. This was also complemented by revising a search string that resulted in the few number of articles generated. The review was also limited to only available research studies undertaken; this does not give an opportunity to study any new information outside available research studies.

CONCLUSION

It can be concluded that a lot of research has been undertaken in this area of e-skills and literacy. The research studies undertaken include the type of ICT devices and systems used in the process of attaining e-skills, access to ICT devices, ability to use devices ICT devices and users of ICT devices. Individuals with access to computers have a high level of digital literacy since they use ICT devices for different reasons on a daily basis. These individuals are either at universities, urban areas or computer colleges. A lack of access to ICT devices in rural areas should be addressed by different stakeholders including government, local communities and the industrial sector. Such an approach will ensure that the benefits brought about by new ICT solutions are enjoyed by everyone and not only communities located in urban areas.

FUTURE WORK

Future work could be undertaken that is focussed on the following identified gaps:

- Digital literacy around the topic of cloud computing.
- Collaboration of different stakeholders (government, communities and industry) in addressing ICT access in rural areas.
- Different ways in which digital literacy can be measured.

Opportunities also exists for future research studies to address the measurement of digital

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literacy. This will provide a more accurate picture on the actual digital literacy levels of categories of individuals within the various communities.

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CREATIVE TRANSFORMATION: THE IMPACT OF DIGITAL AND TECHNOLOGICAL DISRUPTION WITHIN THE CREATIVE INDUSTRY

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ABSTRACT

SA has enjoyed continued ICT investment post 1994. As communication technology evolved, investment took the form of policy reforms through ICASA, liberalization of communication markets, funding smart centres and government centres with specialized focus like The National Electronic Media Institute of South Africa (NEMISA) and The South African Centre for Digital Language Resources (SADiLaR). While this type of diverse investment has gone a long way towards advancing digital readiness, a key lacuna is the effective convergence between creative practice in the new media industries, technology and innovation. Ideally in these creative industries (advertising), a dynamic fusion of evolving technologies and creative advertising has potential to meet some of the complex demands of the Fourth Industrial Revolution (4IR).

A desk research method was employed as this research paper serves as a precursor to a larger study and thus no fieldwork was necessary at this stage. Online news and research databases were used in order to explore the early industrial revolutions and their effects on the creative industries. In addition, relevant sites illustrating international examples were consulted as key benchmarks for the South African context.

Keywords: Multimedia, ICT, Innovation, Technology, Disruption, Interaction Design, New Media, Advertising, Human Centred Design, Fourth Industrial Revolution (4IR).

Research Question:

> *How can the convergence of creative practice and technology lead to innovation and effective output in the creative new media industries?*

Sub Question:

> *What is the potential of this innovation for the creative industries (advertising) in meeting the complex demands of 4IR?*

INTRDOUCTION

With the technologies of the Fourth Industrial Revolution raising expectations of efficiency and productivity, along with concerns of constant disruption, no entity can remain competitive with a business as usual approach (Fahoum:2019). Francis Bacon in his *Aphorismus* (1620), famously observed that the three inventions of gun powder, the compass and the printing press would change social and productive relations in the world. He indicated that scholars would do well to study the force, effect and consequences of these conspcious inventions which have come to represent the military force, mapping and communication respectively. The paper attempts to review these forces as they emerged out of or stimulated the early revolutions.

THE FIRST INDUSTRIAL REVOLUTION (1IR)

According to Crafts N (1996: 197), technological change is central to the years, 1760-1830, a period to which Thomas Ashton (1948) attached the label "the first industrial revolution". The Industrial Revolution (1IR), also known as Industry 1.0, was the transition from hand production methods to machine production. This revolution gave rise to innovations in Textiles, Steam Power, Iron Making, the Invention of Machine Tools and Printing, although Guttenberg invented a commercial printing machine by 1450.

According to Musson AE (2008: 411), 'the nineteenth century witnessed remarkable changes in print media production'. The manufacturing of paper, the development of ink and woodblock printing led to the maturity of the printing press. It was transformed from a hand operated press into a full cast iron printing press. As a result, this doubled the size of the printing area and the output of the old style press. The use of steam power for running the printing press and the replacement of the printing flatbed with rotary motion cylinders radically altered the design of the printing press. The steam powered rotary printing press allowed for millions of copies of pages to be printed in a day. Mass production of print output flourished after the transition to rolled paper as this allowed the printing press to run at a faster pace, resulting in the print platform as a popular communication medium. Together with Guttenburg's press and the 1st industrial revolution's optimisation of a steam powered press, enabled a dramatic increase in distribution of knowledge products, which the first wave of Guttenburg's bible disrupted the central authority of the Roman Catholic church in Europe. As per Bacon's prediction, this invention had a profound effect on the aristocratic and religious hierarchy in Europe.

In the second instance, the capacity for mass printing served as the incubation of the early coffee house public sphere later articulated by Habermas. This kind of discursive gathering mostly originated as a result of wealth generated through the industrial revolution in the non-aristocratic class who at this point, did not have full rights. As they converged in these social spaces, wealthy non-aristrocrats debated the range of rights that they needed to acquire in order to solidify their class position as the modern bourgeoisie.

Thus, this mix of conditions created the climate for profound social change, changes in productive relations and marked the origins of the suffragette movements who pioneered women's rights.

THE SECOND INDUSTRIAL REVOLUTION (2IR)

According to Mokyr (1998:1), 'The Second Industrial Revolution accelerated the mutual feedbacks between science and technology'. The Second Industrial Revolution (2IR), also known as Industry 2.0, resulted in the growth of Electricity, Petroleum and Steel. Hughes (1998), further argued that the consequence of changing production technology was the rise of technological systems. Applied Science and Telecommunications in the form of Chemistry and Metallurgy, the development of the first telegraph system and the telephone respectively, demonstrate further revolutionized methods of communication during the 2IR. Wiring of the world during Victorian culture was demonstrated when Cyrus Field constructed the first transatlantic

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telegraph cable. Furthermore, Taylorism[2] and Fordism[3] led to connectivity and mass production during the 2IR.

According to Mokyr (1998:12) 'Through experimentation, another invention that had an impact on media during the 2IR was the typewriter'. A natural revolutionary progression from this invention was the linotype machine which cast and set a whole line, at a type using a keyboard. Lino type machines were primarily used to layout newspapers and books. However, the introduction of analogue television and radio became the de facto communication medium to manage a complex mass consumer popular culture during this era. Interestingly enough, Chambers (1986) argues that, 'The projections of mass media during this era was seen as a reproduction of disruption', such as photographs of skinheads, street fights, football hooliganism, racist attacks that challenged the norm. Comparatively, during the era of the 4IR, we at present also experiencing disruptive engagements, but from a technological perspective.

THE THIRD INDUSTRIAL REVOLUTION (3IR)

The Third Industrial Revolution (3IR), also known as Industry 3.0, or the Digital Revolution stimulated the development of computers, cellular phones, Information Technology and the convergence of Internet Technologies and Renewable Energy to create a new infrastructure. The advancement of the Internet in the era of 3IR gave rise to the use of multimedia technology, and the use of CD-ROMS for multimedia data storage. Despite this, visual multimedia elements for the online platform remained static. They could most certainly be more accurately described as 'evolutionary' rather than 'revolutionary' (Inglis; Ling; Joosten: 2002). The use of hypertext and hypermedia on static web pages was the only form of online interactivity. While this was crucial for the rise in Internet adoption as it supplanted the library search engine, streaming video via the internet remained in its infancy and was a rare novelty.

According to Inglis; Ling and Joosten (2002:8), 'Producers of interactive multimedia wanted to deliver their products via the web, but at that point this development was too recent to achieve the outcome'. The only form of innovative interactivity was developed on touch screen kiosks using Macromedia's Director software. However, this was not an approach that was used extensively in the creative industry. This approach entailed saving files on CD ROM and then "snail-mail" distributed via the CD ROM. Basic interactive output was achieved through creative multimedia design and Lingo coding language. Lingo was a standard in Macromedia Director, a software application that allowed for interactivity, a key feature of this era that shifted the possibilities of creative production, as users could now interact, produce and contribute. This was the birth of the attention economy and commodification of leisure, which disrupted authentic labour practices.

THE FOURTH INDUSTRIAL REVOLUTION (3IR)

Developments within the 3IR transitioned into the Fourth Industrial Revolution (4IR) or Industry 4.0. 4IR is the current developing environment whereby disruptive technologies such as The Internet of Things (IoT), Robotics, Virtual Reality (VR), Data Science and Artificial Intelligence (AI) are rapidly changing society. Although 4IR is growing out of the 3IR, it is considered a new era due to the explosiveness of its development and the disruptiveness of its technologies. De Quetteville (2019: 24), clearly describes the following innovative and disruptive examples, 'All the biggest tech companies are investing time and effort in the augmented hearing sector, because in-ear computers, commonly known as hearables, will be in a prime spot next to your brainperfect to deliver information and advertising'.

Augmented Vision is gaining momentum, and extensive research is being under taken on "Brain-

[2] Taylorism was advocated by Frederick Winslow Taylor. He considered it to be management's duty to identify ways in which costs could be accounted for precisely, so that efficiency could be improved.
[3] Fordism is the application of Henry Ford's faith in mass production run by autocratic management.

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Machine Interfaces". According to Professor Jose Milan (2019), 'Brain Machine Interfaces (BMI) can be a second level of cognition'. In 2018, Professor Milan unveiled with Nissan, technology that allows a smart car to read a driver's brain signals to anticipate actions like braking. Forrester (2016) reiterates that 'all companies are now in the data business. In order for organizations to more fully tap into their data, they will have to use cognitive technology to analyse it (Taub: 2016). Cognitive technology will sift through all of an organization's data, understand it, learn from it and draw conclusions. The International Data Corporation (IDC) predicts that by 2020, 50 percent of all business analytics software will include prescriptive analytics built on cognitive computing functionality and services embedded in new apps. This means that Cognitive Data will be the outcome of leveraging an organizations data to the maximum and abstracting real time information to help make better decisions for business. Thomas Davenport (2016), Director of Research at the International Institute for Analytics notes three companies, Bosch, General Electric and Toyota that are implementing the path of Cognitive Data. According to Computer Weekly, over 89 percent of telecom executives believe cognition will have a critical impact on their future business. In insurance, 96 percent of insurers plan on investing in cognition capabilities. Embracing this new era of technological disruption is clearly evident in the theme for the World Economic Forum 2019 in Davos: "Globalization 4.0: Shaping a global architecture in the age of the Fourth Industrial Revolution". Furthermore, Kodama (1992) confirms that technologies are increasingly morphing into new fields such as Mechatronics, Optronics and Bioinformatics due to the rapid interest in Artificial Intelligence and Big Data respectively, which makes creative industries as a logical extension. According to a World Economic Forum report titled 'HIGHER EDUCATION NEEDS DUSTING OFF FOR THE 21st CENTURY' by Michael E. Hansen (27 March 2018), Hansen points out that 'Our world is only at the start of a massive, long term disruption cycle. New technologies are set to bring even more change therefore it is not an overstatement to compare the change ahead with the arrival of electricity'. The creative industry (design and advertising) needs to embrace and adapt to technological disruption in order to prevent becoming disenfranchised.

CREATIVE INDUSTRIES IN THE ERA OF THE FOURTH INDUSTRIAL REVOLUTION

At present, the new media sector is considered an innovative growth sector which holds potential for emerging countries (Booysens, Molotja, Phiri, 2014). Creative industries are increasingly attracting the interest of academics and policymakers around the world. The reason for this, according to Potts J (2009: Innovation: Management, Policy and Practice Volume 11, Issue 2, August 2009), in 2006, the UK government's Department of Culture, Media and Sport, recent decades have witnessed a period of global structural change in economic systems marked by the sustained rise of the creative industries as a source of employment, exports and value added. This trend points in the same direction of a shifting knowledge-base of modern economies. The creative industries have captured attention. Policy enthusiasm is also directed in many countries towards developing knowledge-intensive or high-technology sectors. For example, in the UK, the creative economy agenda has been driven by evidence of the creative industries' contribution to economic growth. This is evidenced by the over 60% Gross Value Added (GVA) in 2007 and around 8% of the UK economy. Significantly this figure is comparable with the financial services sector, Cunningham S (2006: Platform Papers, No.9, July 2006)**.** More creative and new media industries have grown faster than other sectors in the UK. South Africa could use these statistics as a motivation to develop similar models that effectively synergize the local creative and technology sectors in order to remain sustainable and competitive in a digitally advancing society on a global scale.

According to Cunningham S (2006: Platform Papers, No.9, July 2006), within the context of the Fourth Industrial Revolution, the creative economy is about much more than culture and the arts. It embraces digital interactive multimedia, digital innovation and the interaction designers, who focus on human centred design, contributing towards the digital revolution in sectors such as banking, finance, transportation, socialization and entertainment. The result is efficient user engagement and experiences between the user/audience and the technology. Although the

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creative industries somewhat embrace the aforementioned areas, the explosion of digital disruption and innovation for audience engagement within creative advertising is certainly limited in South Africa. This is demonstrated in the static advertising output that we are exposed to whether it is in retail point of sale, above the line or below the line advertising campaigns. According to Liebenberg, S (2012: 244), South Africa lags behind the USA and much of Europe in the introduction of digital billboards, a platform for disruptive digital advertising. A good case study on innovation and disruption with technology can be effectively demonstrated in the use of surveillance technology for a British Airways digital billboard advert in 2014 that tracks nearby British Airways flights and displays the flight data on a digital billboard in Piccadilly Circus, London. As a flight passes overhead Piccadilly Circus, the video on the interactive digital billboard displays a little boy pointing up towards the sky as the aircraft passes by. The detailed information of the flight and its actual destination and arrival time is displayed on the billboard besides the little boy in real time. This unique engagement has created much discussion with the brand ultimately benefitting.

Morphing creativity and technology must be seriously considered, yielding engaging and enduring experiences for the consumer. This merger is becoming an enabler for the creation of innovative experiences on a global scale, which can be interactive, augmented or virtual. An example of this nature occurred in 2014 when advertising agency AMV BBDO in the United Kingdom embarked on a campaign for Pepsi MAX[4]. Augmented Reality (AR) Technology was used to make commuters at a bus shelter on Oxford Street in London believe that they were looking through the glass around the bus shelter, but they were really looking at live video feed on a High Definition (HD) screen with 3D animations and special effects. What the commuters viewed were augmented UFO'S flying towards them, and wild animals charging towards the shelter just to name a few scenarios. Video was mixed using a camera hidden within the structure of the shelter, with prepared special effects. Everything the camera sees had to line up directly with the street. Measurement was critical because the creatives needed to know where to place the graphical visual effects within the frame of the scene to augment reality. The installation involved a camera and 65inch full High Definition (HD) screen installed into the shelter, which was connected to a computer running Windows 7. Within 7 days the video had received over 4,7 million views on you tube and had more than 24 000 shares, demonstrating the impact on audience viewership when creativity and technology is morphed for developing engaging consumer experiences. The Stride gum's Gumulon campaign is another effective example, clearly demonstrates Crofut's view. The output was an augmented game controlled by chewing. Chew-control technology tracks your mouth with your mobile device's front-facing camera, to ensure that the augmented character in the game moves each time you chew." In this example, creative conceptualization coupled with technology was the result of innovative customer experience while using a mobile phone.

According to Pete Crofut, (2014) "the ad experience of today needs to be about great content and look less like the static image ads of the past. A good example is the digital transit advert for Apolosophy Hair Products in a subway in Sweden. The same concept was leveraged to create an awareness for childhood cancer. In the case of the Apolosophy brand, a digital video of a model graces the digital transit screen platform, using augmented reality. The billboard screen was fitted with ultrasonic sensors that track when a train is about to reach the station. As the train reaches the platform, the model's hair on the digital screen is blown into her, creating the effect that her hair is blown as a result of the approaching and departing train. For the campaign to create an awareness for children with cancer, the model is replaced by a teenage girl. As the train approaches, her hair is blown vigorously. However, after a few seconds, her hair falls off revealing her baldness. The effect of the blowing hair is augmented within the digital billboard to create a real time and impactful experience.

[4] *https://www.youtube.com/watch?v=Go9rf9GmYpM*

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As consumers virtually engage using multiple devices, creatives must seamlessly move "across" or co-exist between smartphones, desktops and tablets. This demand or requirement is seemingly daunting, and creatives inexperienced with HTML 5 and the coding needed for such content. This is due to the fact that in the past, HTML coding supported online content on a web browser and multimedia elements could be generated via software applications such as Macromedia Director. However, HTML 5 was developed especially for coding for mobile and tablet browsers, which included the support of multimedia elements for these platforms.

Flew (2002: 15), suggest that "A better case for supporting artistic and creative activities may arise from a better understanding of the relationship between information, knowledge and creativity, and the ways in which sustained technological and economic innovation is accompanied by social, cultural and institutional innovation that promote innovation and risk taking". Furthermore, academics, and practicing specialist have to be thought and innovative leaders in the field. In order to prepare the creative industries for the 4IR, which includes graduates from creative design departments, there has to be collaboration with other areas of specialization such as the technology, programming and engineering. Therefore, it will be beneficial to establish Multidisciplinary departments for research and practicality within tertiary institutions ensuring that students gain a deeper understanding of how the various elements can be integrated. A multidisciplinary approach to learning within universities can better prepare graduates to be more innovative, confident and sustainable in the 4IR.

A good example of creating innovative audience experiences by adopting a multidisciplinary approach in creative industries (fusing technology and creativity) is demonstrated by advertising agency Ogilvy Brasil for the development of a touch sensitive dress for their Schweppes campaign in 2018 to elevate the #MeToo movement. The "Dress for Respect" tracked how often women have been groped and harassed. Researchers embedded the dress with sensor technology that tracked touch and pressure.

Each time the women wearing the dress were touched without consent, the interaction was sent via Wi-Fi to a platform that transformed it into data. The information was then relayed to a visual system to allow researchers to track harassment in real time. During the course of the night, researchers confirm that they saw a heat map version of the dress lighting up in areas where the women were grabbed, mostly on their back, arms and buttocks. This approach is testimonial to the changing landscape of the Creative Industries in the era of Industry 4.0.

EMBRACING AND SIMULATING FURTHER DEVELOPMENT FOR INNOVATIVE DISRUPTION IN CREATIVE INDUSTRIES

Chapain *et al* (2010) looked at the innovation capacity of creative industries and found that creative industries are more innovative than many high-innovative sectors. Therefore, creative industries, especially in advertising, have the potential to create impactful user experiences to inform. This is effectively demonstrated in a 2014 Volkswagen Public Service Announcement (PSA)[5] to show the dangers of texting while driving in a Hong Kong cinema theatre. The audience's pre-show activities was disrupted by a virtual accident using virtual reality technology. The audience watched the screen as a person got into the car and started the engine. The PSA was augmented from the driver's point of view allowing the audience to only see the steering wheel and the road. A location-based broadcaster was used to send text messages to the audience after capturing their mobile numbers on purchase of their movie tickets. As the audience took their phones out of the pockets and bags to check their messages, the car on screen abruptly swerves into a tree and the windscreen is cracked. A text message then appears on screen confirming that mobile use behind the steering wheel has become the leading cause

[5] https://www.youtube.com/watch?v=5Gtio4V1L3o

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of death. The audience appears shocked by the virtual experience. This PSA has already amassed over 11 million views on you tube. According to the International Transport Forum's (ITF) Road Safety Annual Report, South Africa has one of the highest road crash rates in the world, with around 25% of those crashes caused by the use of mobile phones while driving. In the group's 2017 report, it noted that there were 25,2 deaths per 100,000 population attributed to car crashes in 2016. If similar innovative campaigns were created in SA, the possibilities to create 'what if' scenarios using innovative technology such as augmented reality and virtual reality could very well be a tremendous benefit in order to create awareness with deep impact, and hopefully reduce the rate of accidents as a result of texting while driving.

Interestingly, Gassmann (2006: 224), further reiterates that 'with the rapid shift of many industry and technology borders, new business opportunities arise. For example, the multimedia industry brings together firms active in diverse sectors such as hardware, software, telecommunications, information and entertainment'. The synergy of creative and the technology industries gives rise to further innovative solutions that enhance other critical sectors such as tourism, agriculture, education and the transfer of information in general. Furthermore, Cooke P and De Propris L (2011:4) stated that, "creative industries are competence and scientific launching pads that create technological externalities across a set of related sectors". These technological platforms are crucial enablers of regional economic growth. They support the development of sectors which benefit from each other in a virtuous dynamism, further fostering a symbiotic partnership between creative agencies and technology start-ups and stimulating an innovative entrepreneurship culture for creative industries in SA. For example, Virtual simulations of South Africa (SA) could be developed for tourism purposes to give the potential tourist to an augmented glimpse of major cities. Innovative capabilities in skills enhancement could also be developed for small emerging farmers using technology, multimedia elements coupled with characteristics of The Internet of Things (IoT) such as smart monitoring of livestock, fruit and vegetables, distribution platforms and augmented and virtual reality content to visualize informative content for the user.

CONCLUSION

According to Abbasi (2017: 40), "our experiences and understandings of the world are increasingly being filtered by multiple layers of digital environments, transforming all aspects of our lives". With the advent of the Fourth Industrial Revolution (4IR), the exigency for innovative new media solutions to accommodate Information, Communication and Technology (ICT), disruption has become a requisite rather than a prerequisite in order to remain competitive. In order for creative studios in South Africa to remain competitive in a digitally disruptive era, legacy thinking patterns that stem from popular culture must be reviewed. Priority must be given to the establishment of multidisciplinary departments at tertiary institutions and adopt a User Centred Design approach to output, enabling graduates to meet 4IR challenges in an integrated manner. Most education systems were built for the needs of the 20th century. Education in general has not been designed to deliver the skills needed for the disruption ahead, particularly in the creative industry. The answer to this problem according to Hansen's March 2018 World Economic Forum report titled 'HIGHER EDUCATION NEEDS DUSTING OFF FOR THE 21st CENTURY' is the "software" approach, similar to tech startup companies whereby educators must be allowed to innovate, fail fast and be rewarded for ideas that make a difference. They must be given carte blanche to tear down the old barriers that haemorrhage thinking disruptively. If we do not, then the result will be the similar casualty of the music and film industry inflicted by the iPod, Spotify and Netflix. Research and practical projects at universities must encourage students how to integrate technology to disruption. Therefore, it is critical for us to develop a deeper understanding of the relationship between creativity, technology and, the knowledge and information that derives from this relationship to further stimulate innovative development within the creative industries in South Africa. This can be accelerated and piloted through institutional innovation, if institutions are led by thought leaders, forward thinkers and appropriate experts in the field to embrace the fusion of technology in creative practice.

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