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The role of evaluation in SMMEs' strategic decision-making on new technology adoption

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ABSTRACT

The complex nature of small business operations has led to adopting IT as a tool to enhance the productivity, efficiency and growth of Small, Medium and Micro Enterprise (SMMEs). Despite the increased spend on IT, many SMMEs do not understand the importance of IT investment evaluation, which adversely impacts their technology and decision-making ability to realise benefits. The study explores the role evaluation plays in SMMEs' decision-making to adopt the technology, and the ability to evaluate technology potentials thereof. Case studies were conducted, data collected analysed using the thematic analysis, with hermeneutics employed to derive deeper and richer meanings from the findings. SMMEs often base their decision to adopt the technology on speculative and empirical knowledge from personal judgement, communication preferences and individual experiences. Implications of TE potential may lead to the adoption of inappropriate or non-adoption of the technology, with adverse effects on business sustainability.

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Evaluation; decision-making; technology; SMMEs

1. Introduction

SMMEs play a significant role in the economies of countries, stimulating economic growth through increased job creation and innovation (OECD 2019a). Al-Qirim (2007) posits that IT is an important means of sustaining, facilitating and promoting SMMEs' operations. SMMEs need to identify and invest in technologies that assist in increasing the efficiency and development of Business Processes (BP). OECD (2019a) describes IT as a tool that enables SMMEs to steadily develop, enhancing cross-country relationships and transactions in the global world. SMMEs need to identify and invest in technologies that can assist in increasing the efficiency and development of BP. The impact of the technology on organisational performance is visible in the aspects of profitability, efficiency, market value, productivity, quality and competitive advantages. OECD (2019b) emphasises the importance of SMMEs keeping up with current development, stating that there is a gap in the adoption of digital technologies by SMMEs. SMMEs are missing out on the benefits of operating in a global market due to the low usage of digitalisation.

SMMEs need to proactively invest in digital and emerging technologies such as big data analytics, drones, artificial intelligence and IoT apps, amongst others (OECD 2019a). The diffusion of these technologies among SMMEs will improve BPs across all industries. Thus, emphasis should be directed on the knowledge and acquisition of technologies that can be utilised to improve BPs (Govender and Pretorius 2015). The importance of strategic business planning and operations is evident that 70–

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80 per cent of SMMEs in South Africa do not succeed within the first two years (Reynolds, Fourie, and Erasmus 2019). For SMMEs to realise the beneficial impact of the technology, the technology must be BP aligned (Palvalin, Lönnqvist, and Vuolle 2013). Such alignment between business and Technology Evaluation (TE) adoption strategies improves the functionality of business, resulting in increased profits (Love et al. 2013).

Despite many adoption models of the technology, there is still a slow uptake of the technology by SMMEs (Oliveira and Martins 2011). Mittal et al. (2018) reported that in the USA, a study on SMMEs in manufacturing in West Virginia, USA, a low drive was reported towards adopting smart technologies. Eze et al. (2018) argue that in the UK, similar decision-making problems were faced, largely influenced by the fear and uncertainty of acquiring the technology. This situation arises as a result of a lack of planning and evaluation when considering the technology (Reynolds, Fourie, and Erasmus 2019). SMMEs need to plan and evaluate the technology against their business strategy, processes, and adopt innovation as a strategy to overcome technology chasm, and maintain competitiveness (Dyerson, Harindranath, and Barnes 2009). An and Ahn (2016) posit that SMMEs need to be proactive in identifying players within their value chain and take up the associated risks of the new technology. The non-evaluation of the significance and appropriateness of the technology is a challenge as many SMMEs acquire the technology without TE, which leads to practices that endanger the businesses, placing them in a precarious situation (Halicka 2017).

New technology in an organisation involves a broad decision-making process that affects not only the individuals but also the stakeholders. Decision-making process should draw from the technology acceptance models that embrace social, environmental, organisational and governmental factors contributing to the user's perception and acceptance of the new technology (Abulrub, Yin, and Williams 2012). Notwithstanding the factors involved in the choice and adoption approaches implemented, the ability to successfully adopt, integrate and manage the new technology lies largely in the evaluation procedures which lay the foundation for successful adoption and integration (Love et al. 2005; Cragg, Mills, and Suraweera 2010). Decisions on the technology are crucial because of the high capital outlay and degree of uncertainty (Love et al. 2013). The challenges faced by SMMEs are linked to the problems that emanate from the non-TE before adoption (Chan, Chong, and Zhou 2012). As a result of non-evaluation and non-adoption of the technology, SMMEs forfeit the opportunity to gain a competitive advantage and improve the chances of survival of their business (Nguyen, Newby, and Macaulay 2013).

Challenges continue to be the lack of resources and knowledge required for accurate TE to be of benefit to the business (Mittal et al. 2018). Govender and Pretorius (2015) stated that the rationale for technology adoption is no longer based on the perceptions such as cost-saving, ease of use or degree of usefulness in an organisation, but is based on the strategic role the technology plays going forward. Jha and Bose (2016) assert a need for more research in the field of technology adoption in developing economies, to uniquely address the diversity and peculiarity of different geographies in a bid to understand the IT adoption discourse better.

To explore the effect of TE on the decision-making process of SMMEs before the adopting technology, the following questions are asked: (i) What are the evaluation challenges of SMMEs to adopt technology? and (ii) How does TE affect the strategic decision-making of SMME on technology adoption? The objectives of the questions are to (i) determine factors that affect SMME evaluation and choice of technologies and (ii) the significance and contribution of TE towards the decisions SMMEs make on the adoption of technologies. A further aim is addressing the knowledge gap, by proposing a set of practical TE guidelines to improve SMMEs' decision-making on technology adoption.

2. Review of the literature

TE by SMMEs remains a challenge in the context of the developing world. To explore and gain an understanding of these challenges, a review of the literature was conducted spanning online databases such as Google Scholar, ProQuest, EBSCOhost and Emerald. This section starts with a

description and definitions of what is meant by evaluation, then different approaches to evaluation, TE models and methods, the evaluation process, technology investment decision-making, are discussed ending with a summary.

2.1. Evaluation approach

TE is defined as

the process spanning from having no knowledge of the technology, to the situation where the SMME understands and is able to articulate how technology fits the business plan, explain how technology can benefit and create a competitive advantage and can elucidate on how easily the change created by technology be aligned to the business processes.

Evaluation is an integral part of adoption (Schumpeter 1947) in the Diffusion of Innovation (DOI) theory. Schumpeter (1947) acknowledged the role of evaluation by articulating the initial steps that need to be taken when considering the adoption of the technology. These steps lead to the awareness of a need to evaluate the functionality of the technology before adopting or rejecting it. Research has led to the development of adoption models which obfuscated the initial part of adoption, with its importance eroded by many of these models evolving 'into themselves' without recourse to the fundamental steps in any adoption process (Jha and Bose 2016).

Serafeimidis and Smithson (2000) and Haider (2011) argue that TE is complex and important to organisational processes. As such, organisations should adopt the interpretive approach to the entrepreneurial activity which has more relevance to the current business practices and discard the traditional approach on quantifiable metrics. Symons (1993) argues that an interpretive approach tends to seriously consider the experience and history of the organisation in a realistic context. TE would be advanced by using an interpretive approach to determine suitable means (Berghout and Remenyi 2005). This argument is supported by Haider (2011, 1), who posits that 'information systems, therefore, are not objective entities, such that they could be implemented without considering their interaction with technical, organisational, economic, social, and human factors'. Jha and Bose (2016) argue that IS research is largely dominated by a positivist approach. This approach has been challenged in the areas of social research because of the inability to include the elements of uncertainty, external and internal factors, and other forms of contextual considerations of TE for business (Lu et al. 2015). The concept of economic measurement, in solely determining the appropriateness, impact and value of the technology on the sustainability of the business, has been rejected (Feniser et al. 2017).

The evaluation needs to happen before the adoption theories can be effectively applied by SMMEs. The DOI and Technology, Organisation, and Environment (TOE) frameworks are two prominent technology adoption models that acknowledge the essence of decision-making and elements of technology diffusion in an organisational context (Oliveira and Martins 2011). Introducing the technology involves a decision-making process influenced by individual users and a range of other factors. This is in alignment with many of the technology acceptance models that embrace the fact that social, environmental, organisational and governmental factors contribute to the user's perception and acceptance of the technology (Chan, Chong, and Zhou 2012). TE would be suitably advanced by using an interpretive approach to determine suitable means (Berghout and Remenyi 2005). According to Oliveira and Martins (2011), the construct of the TOE framework is based on three contexts, namely: (i) Technological, (ii) Organisational and (iii) Environmental.

Using the TOE framework to analyse the effect of organisational components on decision-making to adopt the new technology indicates that the three factors represent 'both constraints and opportunities for technological innovation' (Dalipi, Idrizi, and Kamberi 2011, 113). The three influential factors describe the way a business identifies the need for the new technology, conducts a search for it, and decides to adopt the new technology. Oliveira and Martins (2011, 112) describe the DOI and TOE frameworks as the only two prominent technology adoption models that are an organisation based and posit that 'the TOE framework makes Rogers (2003) innovation diffusion theory

better able to explain intra-firm innovation diffusion'. In a bid to create a sustainable decision-making framework for Small Medium Enterprise (SME) manufacturers' adoption of robotics, economic, environment and social aspects of the technology were assessed and fully incorporated in the evaluation (Epping and Zhang 2018). The need to factor in mediating elements in the evaluation of the technology is captured by the author's remark

However, sustainability decision-making in manufacturing systems is a complex process, because economic, environmental, and social pillars are linked and their relationships need to be explored in order to make a holistic decision. (Epping and Zhang 2018, 14)

2.2. TE models

Since 1989 the Benefits Evaluation of Systems and Technology (BEST) method, the Information Accounting Framework (INFACC), the Investment Expert System Toolkit (InVEST), IT Investment Appraisal (ITIA), and the Rigorous Appraisal and Processing of Investment Data (RAPID) were introduced, but failed to stand the test of time. The Balanced Scorecard, the Simulation Analysis and the Dynamic Systems Development Methodology (DSDM) are the models most often used (Berghout and Remenyi 2005). In 2005, Berghout and Remenyi identified three models of evaluation that have received the most interest over a period of 11 years, from 1994 to 2005, namely the Balanced Scorecard, the Simulation Analysis and the DSDM. The concept of technology assessment has grown over the years, with other technology decision-making models being developed with different types of adaptation, variations and combinations.

Recent technology assessment models are based on the computational and mathematical tools that are categorised under generic terms such as Multiple Criteria Decision Model (MCDM) and Multiple Attribute Decision Model (MADM) (Mardani et al. 2015). Examples of these models include Interpretive Structural Modelling (ISM), Electre and Quad Serial Interface Module (QSIM). The development of these hybridised and adapted models is largely based on the earlier models such as Analytic Hierarchy Process (AHP), VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR), a multiple criteria decision making model and others (Mardani et al. 2015). These models are based on the quantitative elements associated with the technology, where objective measurements are utilised to determine the financial implications in terms of time and resources (Mardani et al. 2015). The method is used as a ranking and comparison tool for IT projects but is subject to scepticism from the financial managers and supporters of financial models. The failure or inadequacy of the earlier models to address simple and practical guides for SMMEs in terms of technology decisions gave credence to the argument that it is necessary to evaluate the value and benefits of IT in individual contexts in relation to its observable conditions. Various models, using the traditional approach, have been developed for large organisations, with little or no applicability to SMMEs (Palvalin, Lönnqvist, and Vuolle 2013).

Given SMMEs' limited knowledge and understanding of business strategy, Reynolds, Fourie, and Erasmus (2019) argues that it is difficult to utilise the various models of TE in the context of small enterprises. Arguments are made that intangible benefits, uncertainty and other decision factors can be measured only qualitatively (Palvalin, Lönnqvist, and Vuolle 2013). Serafeimidis and Smithson (2000) mention that more attention has been focused on prescribing how to carry out the evaluation instead of analysing and understanding the technology's role, interactions, effects and organisational impacts. Thus, the acknowledgement of the subjectivity, indeterminism and context-dependency of evaluation distances the entrepreneurial approach from the positivistic paradigm and aligns it much closer with interpretivism (Serafeimidis and Smithson 2000, 94). In a study on SMME Maturity model for digitalisation, Wiesner et al. (2018) investigated four existing models and found that no model fully provides the required guidelines to adopt the new digital technology. The authors argue for a new model that contextualises SMMEs and is custom-made to guide decision-making on technology adoption that adds value to BPs.

2.3. The evaluation process of the technology

TE starts with no knowledge or the first knowledge of the technology, to the increased knowledge of technical features and characteristics, to an in-depth evaluative consideration, which results in a logical and predictive conclusion on the suitability of the technology (Cowan and Daim 2011). Surrounding factors, such as environmental, political, cultural and organisational, together with others affecting the business needs, should be incorporated (Landt, Damstrup, and Pedersen 2013). The evaluation should be properly investigated, documented to show the advantages and disadvantages of the potential technology. The result of the impact of the technology on the business over a set period and range of time needs to be identified by the TE (Halicka 2017).

Although the life span and continuing relevance, estimated cost implications, and the expected ROI are important considerations, when the knowledge of the new technology has been obtained, the adaptability, applicability, compatibility and capability of the technology affect the decision to potentially accept, adopt and implement the technology (Dyerson, Harindranath, and Barnes 2009). Love et al. (2005) conclude that the suitability to BP, implementation considerations and organisational development are ranked to justify investment decisions. Whatever the factors involved in the choice and adoption approaches implemented, the ability to successfully adopt, integrate and manage the technology lies in the evaluation (Cragg, Mills, and Suraweera 2010). The integration of the technology with the required technical skills must be in place upon implementation. This should be done before any desired and potential impact on the deliverable products, services and ROI can be realised.

Landt, Damstrup, and Pedersen (2013) posit that to predict the value of the technology, there are four areas of concern namely, Performance, Integration, Penetration and Payback. Furthermore, technologies are put through a comprehensive and rigorous evaluation process where all aspects are incorporated into other applicable factors to determine the most suitable option. The ability to determine, which technology has the potential to deliver the desired result, is a major barrier (Lundmark 2008). It cannot be generally assumed that the technology will be efficient or that efficiency will be guaranteed because of the conditions under which an organisation or individual might reject the technology based on a conservative attitude towards decision-making. As such, many SMMEs are plagued with indecision and bad decision-making due to their inability to evaluate the potential and suitability of the technology before adoption.

2.4. SMME technology decision-making and investment

The evaluation process provides a knowledge base to assist in making and defending informed decisions. Without evaluating the potential of the technology, it is difficult for SMMEs to understand the potential when adopting the technology. Abulrub, Yin, and Williams (2012) and Cowan and Daim (2011) argue that TE procedures need to evaluate each technology and SMME according to their unique context or characteristics. However, the lack of TE before adoption and integration often leads to SMMEs not adopting the technology that can hold a potential advantage. Nguyen, Newby, and Macaulay (2013, 2) state that

the key to this lack of success appears to be a disconnection between vision and execution: organisations do not do enough research and planning before implementing the new technology, often because management is unclear about how and why their firms are adopting IT in the first place.

Decision-makers need to employ a holistic approach to measure and compare the technology in terms of business needs, benefits, cost implications and risk while considering the suitability to BPs, implementation and organisational development to justify investment decisions (Love et al. 2005). TE is a tool that can be leveraged to obtain a competitive advantage in the market (Bloem da Silveira Junior et al. 2018). Ghobakhloo et al. (2011) and Govender and Pretorius (2015), argue that the rationale for technology adoption is no longer based on cost-saving, ease of use, or degree of usefulness in an organisation, but on the strategic role the technology plays and understanding its implication on the business going forward. This is attainable when SMMEs understand the value and ramifications of

the key decisions that can be guaranteed only by the process of TE. Nevertheless, the practicalities involved require a change in orientation on how TE is perceived (Imre 2016).

The more detailed planning and analysis of the new technology, the better knowledge is gained of the potential impact of the technology and its usefulness to the business. On the other hand, the new technology adopted regardless of planning and the factor relationship that exists within the dynamics of evaluating the new technology jeopardises the potential benefit and realisation of the benefits accruable (Aleke, Ojiako, and Wainwright 2011; Halicka 2017). Coates and Coates (2003, 113) describe the effect of non-evaluation as follows: 'The results of this are that we are often unable to see big changes, foresee impending negative consequences or anticipate enormous benefits in the future'. Similarly, Cowan and Daim (2011), as well as Cragg, Mills, and Suraweera (2010), declare that the non-adoption of the technology is often based on the lack of planning and the evaluation of the potential and constraints relating to the adoption and utilisation of the new technology. It has been established that many SMMEs find it challenging to incorporate the technology into the business, while TE remains a compelling factor for technology adoption. Models, methods and frameworks have been proposed to assist in solving the problems of non-evaluation of the technology; however, the challenge starts before the adoption as SMMEs are not equipped to plan for a TE process adequately.

3. Methodology

The research adopted a multiple case study design with a focus on the social construction of reality. This design allows the exploration of a phenomenon to provide a better understanding and knowledge about the cases as they relate to each other (Stake 2006). Yin (2009) states that case studies are a good way of exploring new theories, while also providing a challenge to the existing theories by asking new questions. Thus, the multiple case study design was applied to understand better the perception owners and managers of SMMEs have towards the evaluation and adoption of the new technology in a bounded context. The research methods applied in the study allow the establishment of inherent factors affecting the SMMEs' ability to evaluate the new technology potential and support the call for more geographically dispersed and diverse contextual research on IT adoption (Jha and Bose 2016).

Fifteen SMMEs were non-randomly and purposively selected based on the operational size, function and geographical coverage (Table 1). The business sectors were in the services, manufacturing and financial service providers (FSPs), as defined by the National Small Business Act No. 102 of 1996, South Africa. The selected SMMEs ranged 10–100 employees with an annual turnover of less than 40 million ZAR. The 15 units of analysis selected were geographically located within a 50-kilometre

Table 1. Distribution of SMMEs.

	Industry	Scope of operations	Employees
1	IT and Services	South Africa	30–40
2	Business Services	Cape Town	10–15
3	Media and Communication	Cape Town	10–15
4	Manufacturing	International	90–100
5	Manufacturing	Cape Town	20–30
6	Business Services	South Africa	100
7	Business Services	Continental	8–10
8	Business Services	Cape Town	5–10
9	Business Services	South Africa	70–80
10	Financial Services	Cape Town	8–10
11	Financial Services	Cape Town	5–10
12	Financial Services	Cape Town	15–20
13	Financial Services	South Africa	15–20
14	Financial Services	Cape Town	8–10
15	Financial Services	Cape Town	8–10

radius of Cape Town city centre, Western Cape. The units of observation were decision-makers in the business and technology management sections. The assumption made was participating SMMEs utilise some form of the technology in their business process.

Data were collected using an interview guide with a semi-structured questionnaire using one-on-one interviews (Miller and Glassner 2004). The interviews lasted 45 and 60 minutes. Interviews were recorded, transcribed and given to the participants (Ps) for verification and validity. The data were analysed using a thematic coding system, reading through all data, summarising and taking note of all the similarities in the data, grouped key concepts into categories and themes (Quinlan 2011). The principle of hermeneutics was applied to interpret and derive meanings from the data obtained.

4. Research findings

Twelve Ps acknowledge the importance of TE and the impact thereof on technology adoption. However, it was noted that SMMEs do not have an existing structure or steps to evaluate the new technology. The lack of knowledge required to fully understand the functionality of the technology is evident. Ps accept that there is a need to research continuously and acquire knowledge on modern technologies.

SMMEs acknowledge the importance of informed decisions for the survival of the business. Some Ps (8) state that TE gives a feeling of satisfaction when decisions are based on the relevant facts. Ps are of the opinion that SMMEs risk failing, due to the impetuous and unnecessary investment and regardless of TE. SMMEs act on gut feelings and are influenced by current trends without attention to the functionality and appropriateness of the technology. As a result, SMMEs are left with a feeling of inadequacy when adopting the wrong technology.

SMMEs state that the value technology offers are an influence on the decision to adopt the technology. When describing their experiences of using the technology, SMMEs view the cost of the technology as relative to its potential benefits. Technology gives the ability to deliver quality goods and services over that of competitors, attracting more customers to the business. It remains imperative to recognise that TE provides a better understanding of the technology, contributing to informed decision-making.

The findings extrapolated from the key responses of the Ps, where synthesised and corresponding responses were categorised accordingly, to arrive at a consensus of the major issues (Table 2). The findings were categorised into two themes: (i) Evaluation and (ii) Decision-making.

5. Discussion

5.1. Factors affecting SMMEs in terms of TE

SMMEs are faced with challenges, such as the lack of information and ability, to obtain adequate knowledge of the new technology. They do not understand the implications of adopting the inappropriate technology or the non-adoption of the potentially beneficial technology.

Adoption decisions are based on the speculative and perceived knowledge stemming from personal judgement and individual experiences. Steyn and Leonard (2012) reported that many SMMEs seek the assistance of friends, relatives or other business owners in the initial process of the adopting technology. P8 stated 'I reach out to [the] network of people I know who know about it. I look at suitability, ask people's opinion, and form an impression and base my decision on that.'

Giving the lack of ICT knowledge, SMMEs do not necessarily adopt the suitable technology (Palvalin, Lönnqvist, and Vuolle 2013). According to Buonanno et al. (2005), the decision-making of technology adoption is affected by spontaneous actions, social activities and trends rather than established BP objectives and good TE. The knowledge required to understand the functionality of the technology can be accessed only by asking the right questions about business requirements, adaptability, capability, compatibility and applicability of the technology.

Table 2. Summary of the major findings.

Research questions	Findings	Themes
Research question 1: What are the challenges of SMMEs in terms of evaluation of the new technology?	SMMEs are concerned about their understanding the dynamics and operational design of the new technology and its level of applicability to the business process. The nature of uncertainty surrounding return on the investment made on the new technology by SMMEs is a major source of concern for business managers because they are not able to discern the possibility and weight of risks involved. SMMEs take a conservative stance on the new technology adoption because of their perception of untried technology and the weight of the risk that might be associated with it. The lack of knowledge of new TE limits the ability of SMMEs to evaluate and adopt new technology to support the business. SMMEs often obtain information on new technology potential by consulting informally with their friends and family rather than with professionals and experts in the industry. SMMEs agree to the need for a culture of research and knowledge acquisition of newly available technologies by asking the right questions about the business requirements, technology capability and suitability. SMMEs usually act on gut feeling and are easily influenced by current buzzing trends in the environment without paying attention to the functionality and appropriateness of the technology applicable to their business SMMEs have a need for an evaluation assessment tool to help make informed decisions on appropriate new technology for the business process.	Evaluation
Research question 2: How does the evaluation of new technology affect the strategic decision-making of SMMEs to adopt new technology	SMMEs understand that evaluation of the technology gives a better understanding of the suitability of new technology, contributing towards an informed decision- making. Evaluation of the new technology helps SMMEs to make informed decisions on facts and verifiable information that place the business in a good position of sustainability. The evaluation of the new technology gives a gratifying feeling of enjoying the technology based on the decisions made from relevant facts obtained on the technology. SMMEs do not have a formalised approach or process of identifying business needs that ensure their understanding of how the new technology can meet business objectives and deliver on organisational goals. Small businesses end up failing due to impulsive and excessive buying of the technology regardless of the evaluation of technology for the business process. SMMEs are left with a feeling of inadequacy when they adopt the wrong technology and end up losing money, often not knowing the capacity of the technology they acquired to solving their problems.	Decision-making

SMMEs take a conservative stance on adoption because of their perception of the untried technology and the risk that is associated with it (Mittal et al. 2018). The nature of uncertainty surrounding the ROI on the technology is a concern as they are not able to discern the possibilities and associated risks involved. Nguyen, Newby, and Macaulay (2013) point to risk and uncertainty, resulting in a low technology adoption rate. P3 stated that the difficulty lies in 'understanding the risk associated with technology, the evolving nature of technology and the numerous varieties of technology and solutions'. Kilic, Zaim, and Delen (2015) argued that the challenges of uncertainty, economic conditions and the constant evolving of the technology have an effect on the ability of SMMEs to process and keep up with the advancements. P2 said: 'What I do understand is that technology changes all the time; there is little time to get accustomed to it'.

The evolving nature of the technology causes SMMEs to develop guarded attitudes towards TE and adoption. P5 demonstrated this saying: 'One needs to tread carefully, because there is danger being on the edge. It is sometimes good to wait for the teething problems with technology or releases to be sorted out.' The comments of P7 encapsulate the unwillingness to take steps towards adopting technology 'because of their earlier experience and inability to properly evaluate the technology to make an informed decision. We often sit back and tread cautiously to look how

things play out'. This approach may lead to the inability to leverage the technology or consolidate on its potential (Feniser et al. 2017).

SMMEs lag behind in adopting the early, and are found to keep the, technology for too long or not adopting ones with potential. When the technology is adopted late as a result of stubbornly holding on to their present status, it limits the potential and ability to exert influence on market share. The ability to discern what is appropriate in terms of operations and required investment consideration is only made possible by the process of evaluation. P4 admitted '... SMMEs don't realise the urgency, risks and benefits of having technology in the first place, they later spend a fortune to acquire one which might be inadequate or over board'. This attitude is aligned to Brown and Russell (2007), who found that organisations in South Africa are in the habit of holding back on the technology until they can observe their competitors' success.

Evidence shows that SMMEs do not have the existing structure or formalised directions to evaluate the technology which has been, or is yet to be, incorporated into their businesses. They, therefore, suffered various losses, especially in the early stages of their business. Ps expressed the need for an evaluation tool assisting them in making better decisions on the potential technology.

5.2. The effect of TE on SMMEs' decision-making

SMMEs jeopardise their survival making unnecessary investments in the technology. Rantapuska and Ihanainen (2008) argue that when SMMEs decide to adopt the technology, they often base their decisions on their perception, intuition, etc., without considering operational needs. P6 recounted the experience of the non-evaluation of the technology, resulting in purchasing the wrong technology: '... we didn't have the experience or knowledge about the technology. We failed to measure the relevance and significance of the technology at that time'. I8 stated 'we work by gut feel; we don't do any pre-evaluation of any sorts'.

P7 demonstrates the impetuousness of technology investments, saying 'sometimes we change technology because it's cool, not necessarily more effective or profitable'. This attitude leads to investment losses and the misalignment of resources and objectives. P33 asserted 'people often don't make the right choices because they don't evaluate the right choice, the business ends up failing due to excessive buying and disregard for evaluation'. Serafeimidis and Smithson (2000) argue that the unsuitable technology brings problems of technology mis-match or mis-fit to BPs. Such misalignment presents considerable risk to the business in terms of operations, and the costly nature of the problem impacts the business negatively (Halicka 2017).

The lack of evaluation poses a problem since decisions taken consequently are uninformed, and based on little or no information. P3 said, 'I don't think SMMEs evaluate properly before adoption'. The lack of evaluation of the significance and appropriateness of the technology is shown by P4, stating 'technology feels inadequate because of lack of prior evaluation of its capabilities'. P12 relates 'the inadequacy of the technology costs the company valuable money'. Palvalin, Lönnqvist, and Vuolle (2013) stress that the failure to do TE and the lack of understanding the implications of adopting the technology may lead to the adoption of inappropriate or non-adoption of the potential technology.

SMMEs stated that TE could give them a competitive advantage when decisions are made based on relevant facts, which enables better efficiency in the running of their business. Some of the key points made are 'If evaluation is not done, it cost companies to lose business' (P7). P9 stated 'If they don't evaluate, they wouldn't optimize their BPs'.

5.3. The implication of evaluation on the decision-making of SMMEs

The lack of strategic management skills by SMMEs is made evident by Xesha, Iwu, and Slabbert (2014), who states that 50 per cent of SMMEs' failure in South Africa is as a result of poor decision-making and management capacity. SMMEs need to understand the level of maturity of the

technology and the value of the potential benefit before a decision is made (Kilic, Zaim, and Delen 2015). The advantage of understanding evaluation is the ability to make informed decisions, limiting the risk of adopting the unsuitable technology due to the delays caused by uncertainty.

While narrating their experience of technology adoption, SMMEs have shown the lack of knowledge of the potential benefits of the technology. The Ps agree that operational technology problems are a consequence of non-TE before adopting it. The SMMEs admitted acting on impetuous reasoning rather than verified information. This position supports Rantapuska and Ihnainen (2008), who state that SMMEs often base their decisions on own perception, intuition, trends, attitudes and experience. Aleke, Ojiako, and Wainwright (2011) report that the technology is adopted disregarding the factors and relationship that exists within the dynamics TE. The disregard of TE before adoption often leads to BP failures as the adopted technology does not support the processes in place, creating mistrust and the abandonment of the technology. Such situations are evident in the responses of the Ps, where many losses have been made because of the unsuitability of the technology to their BPs.

5.4. Summary of contribution

Most findings from Table 2 resonate with the extant literature on the barriers of adoption and challenges of the decision-making on a new technology by SMMEs. The major findings reveal that technology decision-making is often a daunting task for SMMEs; as such, Steyn and Leonard (2012) assert that decision-making by SMMEs without proper guidance exposes the business to failure in the adoption process and jeopardises the survival and growth of the business. Therefore, SMMEs' unanimous expression of the need for an evaluation tool to guide TE was one that stood out. SMMEs expressed a feeling of profound gratification when the formalised TE processes are used to adopt the new technology that positively impacts their BP, testifying to the importance of TE. These findings emerged as new expositions in the context of understanding SMMEs' TE in South Africa.

6. Recommendations

Businesses need to plan to incorporate the evaluation and adoption of the technology strategically into the objectives and goals of the organisation. SMMEs must plan strategically for TE as it informs what is currently in use and what is available by identifying the features on offer and what is needed to reach its desired target. It is important to understand the level of technical skills required to implement, enhance and maintain the technology.

A further recommendation is to consider the availability of resources to support the infrastructure needed to run the technology. Ease of training to operate the systems needs to be evaluated. Finally, while evaluating the technology a change management strategy needs to be in place. Good practice and a TE culture among SMMEs will increase the ability to adopt the technology for the benefit of the business.

SMMEs need to establish a functional and standard evaluation practice in their organisations. These practices ensure that the right questions are asked, comparing the features to determine the level of suitability to the business. Requirement analysis need to be done based on the problem to be solved by the technology.

TE should encompass the determination and establishment of key elements such as effectiveness, cost and associated risk, among others, concerning associated factors. SMMEs need to establish evidence of the appropriateness of the technology and its effective utilisation as an advantage over existing ones with lesser cost implications.

To make an informed decision, SMMEs need to use an appropriate evaluation guide or a well-defined process that conforms with their nature of business. Evaluation procedures should be carried out in sequential phases to reduce the risk inherent for the adoption of the technology.

Table 3. TE guidelines for SMMEs.

	Organisational guidelines	External agent guidelines	Economic value guidelines	Technology guidelines
1	Activate or establish a procedural plan for evaluation, including all elements and factors pertaining to the technology.	Conduct research on available technologies with potential application to the business by using the Internet to determine the use in other parts of the world and country.	Determine the cost implications, including the cost of acquisition, maintenance, support, operational skills required and integration with the existing business process (total cost of ownership).	Identify the key features and functions of the technology, including features added to the current version.
2	Secure managerial support and a positive attitude of employees towards the technology.	Liaise with a network of people in a similar industry and existing users with experience and know-how about the technology.	Analyse the various licencing options, including subscription fees as well as fees based on the number of users, transactions or systems.	Determine the applicability to the business process, industry standards and business environment.
3	Assess the operational functions, deliverables and cost associated with the current technology.	Consult professional technology firms with relevant expertise on technical matters and the latest advancements in the industry.	Determine the cost of acquiring skills training and knowledge required by employees and management to operate the technology properly.	Determine the adaptability to the existing business process, current operations and the ability and skills of employees.
4	Determine the current level of employee expertise, technical ability and knowledge of the technology.	Identify potential vendors or outsourcing options and an available market for the technology, request for presentation and demonstration of prototype trial option if available.	Determine the cost of accessing relevant information and the subsequent evaluation of the technology.	Determine the capability of the technology to handle and deliver needed outputs at required times.
5	Ensure that the rationale for the technology improves management effectiveness and organisational coordination.	Subscribe to industry information bulletins, groups and forums on industry-based advancement and development initiatives.	Establish the potential benefits in terms of the value added to the quality of business services and product delivery.	Determine the standard capacity of the technology to manage the required workload and accommodate an increased production volume while performing at a standard level.
6	Pilot the technology for select customers, as part of business promotion for more efficient service and product delivery, to air their views.	Establish industry demand, the type of the technology in use by other competitors, and trading partners.	Determine the difference in the operational level of effectiveness of the productivity and efficiency level on the existing business process.	Establish the technical skills and knowledge required to properly operate the technology to deliver the optimum output.
7	Orientate employees towards familiarising with the technology, to prevent issues such as anxiety, low self-esteem, insecurity and indifference to the use of the technology.	Identify government business support programmes, technology initiatives and grants on technology acquisition.	Determine the ability of the technology to be leveraged in the market place for a competitive advantage.	Determine the availability of the technological infrastructure needed to support the technology operation.
8	Ensure that users of the technology are incorporated as part of the evaluation and adoption process to promote a sense of inclusivity and obtain employee buy-in into the technology.	Explore available options recommended by industry associations and unions.	Identify the potential areas where there is vulnerability or exposure to risk and the potential impact.	Determine the scalability of the technology, i.e. the ability to handle future estimated volume and growth.
9				When applicable, first test the technology for a period of time in the business environment to determine the technology fit and stability of the business.

6.1. TE guidelines

The technology being evaluated needs to be operationally in terms of adaptability, compatibility, scalability, interoperability and reliability to meet the demands of the business while also considering other inherent factors. The following practical guidelines are recommended and are categorised in (i) organisation, (ii) external agents, (iii) economic value and (iv) technology, which adds an expansive dimension to the original TOE constructs as it relates to TE and adoption processes (Table 3).

TE guidelines proposed for SMMEs in Table 3, draw from the underlining factors and challenges expressed by SMMEs as those that inhibit their capacity of TE, in order to adopt suitable technology to improve their business process. Findings from Table 2 reveal an unstructured evaluation process adopted by SMMEs, due to their lack of understanding of a formalised process, the result of which leads to a pervasive adverse effect on non-evaluation and wrong technology adoption. Therefore a practical TE is recommended to assist SMMEs in making better decisions on the potential technology for the BP.

7. Conclusion

The evaluation of the technology should encompass the establishment of key elements and factors such as effectiveness, cost and quality, among others. The suitable choice of the technology involves important decision-making processes in an organisation, which allows an optimum value from their BPs. The implementation step is dependent on the choice made, but it is essential before becoming operational. Possible steps to consider include assembling, configuring to match the BP, testing of functionality, training and conversion of data files to match the format required by the system.

Govender and Pretorius (2015, 11) sum up the importance of an appropriate IT evaluation process, saying: 'ICT adoption clearly provides a means for organisations to realise their strategic objectives, but it is not without risks and challenges if adopted inappropriately'. SMMEs need to be aware of their business environment actively and measure up in terms of technology adoption and active usage of the technology to promote the development and enhance their sustainability and survival in the market. Further studies should be directed towards SMMEs within other industries to build an expansive adoption profile of SMMEs to create a holistic evaluation assessment tool to assist in making informed decisions on the appropriateness and efficacy of the current and future technology.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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