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**EVALUATION OF THE USE OF ICT IN THE
MANAGEMENT OF SECONDARY SCHOOLS: THE
MASHISHILA CIRCUIT IN MPUMALANGA**

Aubrey Kamalizeni

MANCOSA

aubrey.kamalizeni@mancosa.co.za

Karuguranan Naidoo

University of KwaZulu-Natal

Naidoo82k@ukzn.co.za

ABSTRACT

In this information and communication technology (ICT) era, any business transaction can now be effectively and efficiently carried out to realise organisational goals. The rationale for this paper is that despite the realisation that support is provided by the Department of Education through the purchase of ICT infrastructure, these resources remain underutilised and therefore become obsolete. Thus, this study aimed to evaluate the use of ICT in the management of secondary schools in the Mashishila Circuit, Mpumalanga, South Africa. A quantitative research method is used to analyse data. In order to achieve this objective, the researcher employed purposive sampling, where 77 respondents from senior management teams (SMT) were drawn from the Mashishila Circuit, which had a total population size of 152 staff members. The researcher collected data using a questionnaire that was tested to generate relevant data.

The results of the study reveal that there is sufficient evidence to suggest that ICT for management is being used in some secondary schools of the Mashishila Circuit, but the number of users is insignificant. It also revealed that several factors negatively impact on the senior managers' willingness

to use ICT for management in schools. These are dealt with by the various authorities, including the Department of Education (DoE) and education officers. The study recommends future enquiry that deals with an integrated system incorporating school management with the education district and regional offices, through comprehensive training and empowerment, specifically focusing on the use of ICTs in the management of secondary schools. The study also recommends the use of COBIT and ITIL software in secondary schools to enhance the use of ICT in management.

Keywords: innovation, ICT, secondary school management, technology

1. INTRODUCTION

The use of technology as a resource for controlling school leaders can safeguard their individual benefits, as well as the welfare of other stakeholders, such as the learners, to effectively accomplish the performance goals of their schools (Martinsuo, 2013). Control is the determination of intervention and the foundation for the agency theory, while institutional control is one of the essential areas of management activities (Abdillah, 2014). Both agency theory and control relates to the role of school principals in their managerial activities.

Control means that the school leaders' activities and efforts are guaranteed to be accomplished by some people and Information and Communication Technologies (ICTs) reinforce the managers' capability to control information hastily through expanses and computational procedures (Dias & Diniz, 2014). This paper evaluates how the ICT facilities, provided by the Department of Education (DoE), have helped to foster administration work in the management of secondary schools by the Senior Management Team (SMT). Furthermore, Fox (2016) established that while the introduction of networked ICTs into the administrative setting is destined to empower the employees, it also upsurges the capability of the institutions to use consolidated measures and observations. In addition, Hammond (2014) recognised that ICT deployment has had a substantial influence on the transformation occurring in societies, organisations and the economy at

large. Institutions are social entities that strive for excellence and better working conditions to yield results (Nilsen, 2015). How then may ICT be used in secondary school management?

1.1 The use of ICT in the management of schools

Vandeyar (2015) observed the concerns surrounding ICT in management methods that school administrators may have, including negative attitudes towards information management systems use. He argued that leaders of schools make numerous pronouncements beneath circumstances of improbability. The leaders of schools do not frequently assess the results and trends of their respective institutions (Cummings & Worley, 2014). It is therefore not surprising that ICT is still not utilised fully in secondary school management. This research thus seeks to evaluate the use of ICTs by school leaders in managerial activities. In light of this, the study identified two objectives.

1.2 Research objectives

The main aim of this study is to evaluate how ICTs have enabled school management in the secondary schools in Mashishila Circuit. The following objectives have been identified for this research:

- To investigate the use of ICTs in secondary school management.
- To determine the contribution of ICTs in improving the effectiveness of management in secondary schools.

Given the problem statement described, the researcher identified the following research questions:

- How are ICTs used by management in secondary schools?
- How have ICTs contributed to the effectiveness of secondary school management by the SMT?

In the technological, economic and social settings in which secondary schools are situated, SMTs have become answerable to governors, local authorities and parents, through policy commands and assessments (Wilkins, 2016). Whatever the ultimate consequences of the unequal

opinions communicated, schools have been given the mandate to train educators in order to improve their quality of work (Konyana & Konyana, 2013).

Mihai and Nieuwenhuis (2015) used the matrix theoretical approach to identify the challenges that the schools in Mpumalanga Province may be facing in adopting ICTs for management. They concluded that effective management in educational organisations is becoming increasingly recognised. Schools are likely to be much more effective if they are well managed (Buabeng-Andoh, 2012). They also concluded that there is a need for the school management teams to drive the implementation of ICT management in schools (Monczka, Handfield, Giunipero & Patterson, 2015). Looking at the way schools are run in South Africa, there is a need to establish a department that is accountable for the implementation of ICT management in schools (McLaren, 2015). This would assist in driving the schools' implementation of key ICT management goals. This department should be responsible for training, planning, coordinating and strategising the running of schools (Mpinganjira & Mbango, 2013). This kind of department would assist in looking at the strengths, weaknesses, opportunities and threats of the schools in terms of management. However, it remains to be seen if such a department exists in the management of secondary schools.

2. LITERATURE REVIEW

2.1 ICT for management

In learning institutions, management is a difficult procedure that needs timely and reliable data (Daniel, 2015). According to Kerubo (2016), ICT is key to the recording and analysing data on learning pointers, educational records, students' assessments, physical infrastructure and budget. The same essentials of ICT resources and provisions that have made industries more effective can be useful to the management of schools (Child, 2015). The use of ICTs could assist administrators and principals of schools to modernise processes, observe performance and increase the use of resources. The use of ICTs encourages communication among parents,

schools, businesses and central decision-makers, thus promoting responsibility and connectivity with the market place and public support (Matthews & Rix, 2013).

According to Biagi and Loi (2013), a number of factors, including administration work and teaching and learning, can be considered when an innovation has to be implemented. These factors can be positive or negative.

Some advantages and disadvantages in terms of these factors which influence ICT implementation, are listed below.

2.1.1 Advantages of ICT implementation

- Provides up-to-date information to parents
- Easy to search for records (for example, to go back a week to see if a student was in class)
- Easy to update records
- Assist in identifying truancy (for example, the system shows if a student attends period 4 but misses period 5)
- Easier for teachers to produce and print student reports
- Some systems work online, which allows parents to see progress from home

2.1.2 Disadvantages of ICT implementation

- School management systems are expensive to buy.
- Personal data, address, medical records, and so forth, must be secured, which means that security measures have to be implemented – these are expensive.
- The use of these systems is often complex, so staff would need to spend time being trained on how to use the system.

According to Biagi and Loi (2013), these factors provide an overview of the positive and negative reasons for the use of ICTs in management. It remains to be seen whether these factors actually exist in the secondary

schools in the Mashishila Circuit and whether they have been positively or negatively affected through the use of the technology.

2.2 Barriers to the adoption of ICTs in secondary schools

Schools have their own distinctive cultural settings. Denis (2014) observed that most transformations in school management are unsuccessful due to the inconsistent adoption of ICT technologies. Administrators and educators see negligible achievements through the use of ICTs and therefore only emphasise the negatives that are anticipated with its use (Ekundayo, 2013). The benefits related to enabling the revolution towards the administrator's approaches, behaviour and values become minimised and overlooked (Alenezi, 2015). Sarup (2017) suggested that change in the management of institutions means altering norms, values and opinions related to the school culture. Academics have established specific models that can assist school management (Yadav, Pandey & Rautaray, 2016). The beliefs include collegiality, introspection and a common logic of vision combined to generate values that back innovations in school management (Earley & Greany, 2017). The lack of ICT management policies in schools leads to a lack of accountabilities (Kale & Goh, 2014). Therefore, this might call for managers of the schools to be equipped with necessary training in ICT management.

2.3 Diffusion of innovation model

Accepting how technologies diffuse in societies has been considered in numerous areas. To clarify the adoption rate of an innovation, numerous theories have been suggested, such as the Technology Acceptance Model (Davis & Venkatesh, 1996) and the Lazy User Model (Tétard & Collan, 2009). The leading and most dominant model is Everett Rogers's Diffusion of Innovations (DOI) Model. The Technology Acceptance Model proposes that the approval of technology is subject to perceived ease of use, perceived usefulness and subjective norm or perceived satisfaction. Rogers (2010) proposed the DOI theory, stating that ease of use, and the five attributes (relative advantage, compatibility, complexity, trialability, and observability), as well as environmental factors, influence the individual's technology acceptance. This study used the DOI Model since the other

models include personal factors while no social factors were considered. The DOI Model includes the environmental factors that affect the adoption of a new technology. Hence, it was considered the best model for the study.

The DOI theory, also known as Innovation Diffusion Theory (IDT) developed by Rogers (2010), presents one of the oldest social science theories. The model enlightens us on both population and social systems. According to Rogers (2014: 4), “the idea of diffusion of innovations typically discusses the spread of philosophies from one civilisation to another, or from a focus or institution within a society to other parts of that society”. This study took ICT usage in secondary schools as the innovation. ICT as the innovation has to diffuse throughout the management of a secondary school. In many cases, leadership has to implement and facilitate the smooth adoption and dissemination of the innovation.

The theory comprises five attributes of innovation. Figure 1 overleaf shows the breakdown of the attributes.

Based on the literature, this research seeks an understanding of the reasons behind success or failure of ICT management in secondary schools. According to Celik and Yesilyurt (2013), attitude is a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person or situation. The study seeks to ascertain the attitudes of the leaders of schools towards the adoption of ICT for management. The environmental factors, the social factors, as well as the government policies in assisting in the adoption of the technology, are considered.

This study viewed ICT in management implementation as innovative and in using Roger’s model, which specifies that if the supposed benefit to the usage of an invention is progressive, then it implies that the chances of adoption will be positive. The model’s attributes are the features of an invention that have an effect on the possibility of acceptance (McQuail & Windahl, 2015).

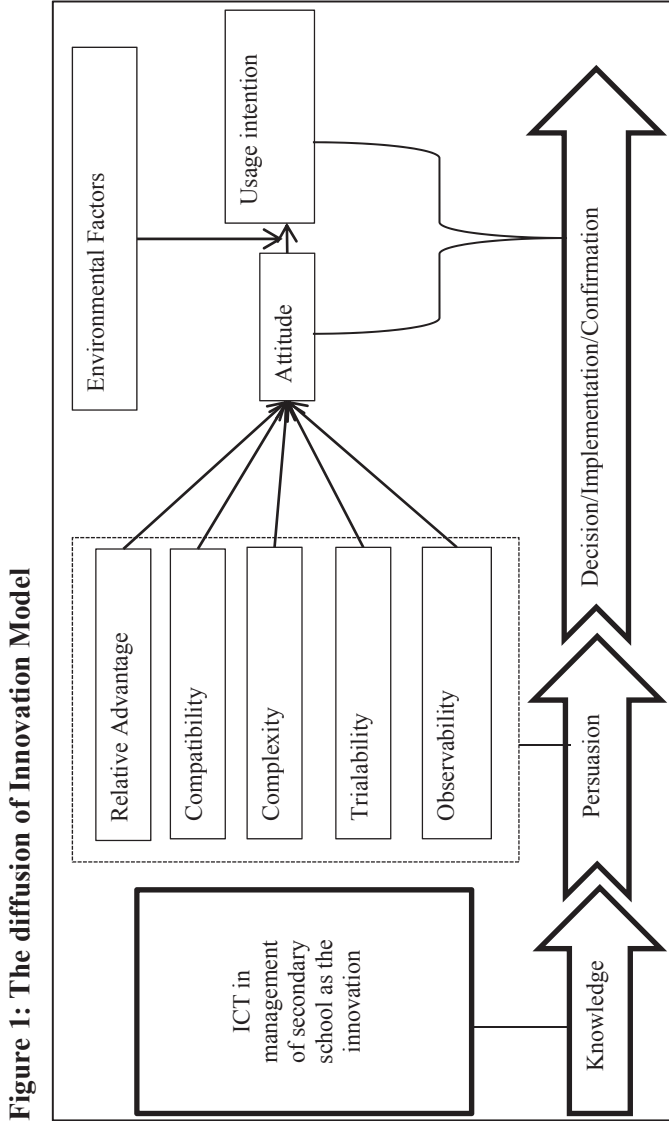


Figure 1: The diffusion of Innovation Model

Source: Adapted from Rogers (2010)

2.3.1 Relative advantage

Rogers (2010) describes relative advantage as the extent or degree to which an innovation is regarded as being better than the idea it replaces or supersedes. The social motivation status and the cost characteristics of inventions are fundamentals of relative advantage. Rogers branded inventions into two types: preventive and incremental (non-preventive) innovations. He stated that “a preventive innovation is a new idea that an individual adopts now in order to lower the probability of some unwanted event” (Rogers, 2010: 15).

The preventive innovations customarily have a sluggish degree of acceptance, so there is uncertainty on relative advantage (Driver, 2012). Incremental innovation provides valuable effects in a diminutive time. When administrators look at the new burdens on them, they may choose to implement ICT for management. If school principals see that using ICT for management adds value, then they will do so as well. To effectively incorporate ICT for management into secondary schools, school management teams should understand the necessity of providing support to staff, in using the technology (Yadav et al., 2016). To encourage the level of acceptance of the innovation and to make relative advantage more obvious in operations, indirect or direct financial reimbursement could be used as a motivation to encourage the community to accept the invention.

2.3.2 Innovation

Innovation in ICT has many attributes; five are selected for discussion below, based on experience in secondary schools.

- **Compatibility**

It is noted that “compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters” (Rogers, 2010: 17). Non-existence of compatibility in management ICT with the needs of an organisation could undesirably disturb the entity’s ICT usage. Given that an invention is compatible with the organisation’s necessities, there will be less indecision and the innovation adoption rate will increase.

- **Complexity**

Complexity is described as “the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers, 2010: 17). In contrast to the other characteristics, complexity is undesirably associated with the adoption rate. Extreme complexity of an invention is a complication in its acceptance. An invention might challenge the organisational leaders with the encounter of altering their managerial approaches to incorporate the new innovation into their order (Munyanware, 2006). This implies that if computer software and hardware are comprehensible, they might be accepted for the conveyance of successful school management.

- **Trialability**

Rogers (2010) describes trialability as “the degree to which an innovation may be experimented with on a limited basis” (Rogers, 2010, p.19). Trialability is related to the rate of adoption. The more you keep trying an invention, the quicker its acceptance rate (Adukaite, Van Zyl & Cantoni, 2016). Thus, the invention could be easily altered by adopters. Improved re-innovation could produce quicker acceptance of the technology, which could be particularly supportive for future adopters. According to Rogers, earlier adopters view trialability as more important than future adopters.

- **Observability**

Rogers (2010) describes observability as “the degree to which the results of an innovation are visible to others” (Rogers, 2010: 20). Noble observation is the significant inspirational aspect in the acceptance and dissemination of ICT in management of secondary schools (Munyanware, 2006). Parallel to knowledge, complexity, trialability, compatibility and relative advantage, observability is also strongly related to the adoption rate of an invention (Shippee, 2016). In relation to this study, it remains to be seen if the participants were being aided in adopting the innovation through observing other colleagues. However, Pandolfini (2016) argues that there is no guarantee that a user can be drawn to adopt a technology after having observed it, since some tasks are difficult to learn from observation only.

- **Environmental factors**

Hashim (2015) observed that many countries have established ICT policies. Regardless of the disposal of such policies, other countries have tried to devise and attain the policy objectives. The drawbacks in the South African ICT policy are mostly related to financing challenges, particularly a lack of funding (Conger, 2015). The Institute for Distance Education in South Africa (SAIDE), states that the lack of appropriate policies, vigilant preparation, infrastructure and resource ability, mean that positivity in assimilating ICT in the management of secondary schools in South Africa, will be deterred.

2.3.3 ICT policies in South Africa

A number of laws that permit and regulate the admittance of ICTs in management in South Africa have been promulgated. The South African Information Technology Industry Strategy (SAITIS) defines legislation as “a formal signal of intent on the part of government to embark on a specific course of action” (Kayisire & Wei, 2016: 631). Kayisire & Wei (2016: 633) note that legislation creates predictability and certainty, conditions that are often crucial in influencing the private sector (especially foreign investors), whether and where to invest. If appropriately framed, legislation can also enhance the transparency of government action and promotes accountability by designating responsibility and providing the instruments whereby performance may be measured.

The legislative framework on the adoption of an innovation in South Africa is based on the following:

2.3.3.1 Promotion of Access to Information Act, No. 2 of 2000 (PAIA)

PAIA seeks to:

- Provide a result to the legitimate right of admission to any information;
- Establish reasonable boundaries on the right to use data intended to protect public confidentiality, private commercial material and guaranteeing nominal, effective and upright authority;

- Stabilise the right of admittance to information with all the other civil rights in the establishment;
- Encourage an ethos of human rights and social justice;
- Create devices and measures to allow persons to attain admittance to registers as quickly, reasonably and effortlessly possible.

This Act empowers institutions to introduce an infrastructure that can be used to share information. In relation to this study, the Department of Education should design a hub or centre where resources are shared, and discussion groups established at creating a conducive environment for management of schools. Such hubs may be located at circuit level, regional level or at provincial level.

2.3.3.2 National Education Policy Act, No. 27 of 1996 (NEPA), as amended

NEPA provides the basic framework for the National Minister, amongst others, to determine national educational policies for the planning, provision, financing, staffing, co-ordination, management, governance, programmes, monitoring of the implementation of policies and evaluation of the general well-being of the educational system [Section 4, (1) to (3)]. It is therefore the responsibility of the Department of Education to plan and implement the necessary human and financial resources for the implementation of ICT in management of schools. In this regard, different training programmes in relation to the use of ICT for management should be made available by the Department of Basic Education. The Department should be seen as the driving force with regard to the adoption and implementation of ICT for management in secondary schools. It remains to be seen if such programmes do exist in Mashishila Circuit.

2.3.3.3 South African Schools Act, No. 84 of 1996 (SASA), as amended

SASA promotes access, quality and democratic governance in the schooling system. SASA broadly encompasses the development of an organisational funding and governance framework for all schools in South Africa. It ensures that all learners (irrespective of colour, gender and areas

of abode in South Africa) have the right of access to quality education without discrimination (Moabelo & Uwizeyimana, 2013), and makes schooling compulsory for children aged 7 to 14. It provides for, among other things, the school funding norms, prioritises redress and targets poverty with regard to the allocation of funds for the public school system (Department of Education, 2006: 4). In terms of SASA funding norms, learners from poor backgrounds who attend schools that are located in high poverty areas (mostly in rural and urban slums), are allocated more funds than those in schools in affluent areas (mostly urban areas). In order to protect the constitutional rights of the children, most of the schools located in high poverty areas, where parents and guardians are not able to afford school fees, are now progressively becoming no-fee paying schools (Mathevula & Uwizeyimana, 2014). Since Mashishila Circuit schools are located in a remote area, this gives the Department of Education the authority to fund these schools in terms of resources. Such resources could include the use of ICT in secondary school management.

2.3.3.4 Telecommunications Act, No. 103 of 1996

This Act provides for the regulation of telecommunication activities other than broadcasting, and for the control of the radio frequency spectrum and for that purpose, to establish an independent South African telecommunications Regulatory Authority and a Universal Service Agency; to repeal the Radio Act, 1952, the Radio Amendment Acts of 1957, 1962, 1963, 1969 and 1974; to amend the General Law Amendments Acts of 1957 and 1975, the Post Office Service Act, 1974, the Broadcasting Act, 1976, the Legal Succession to the South African Transport Services Act, 1989, and the Independent Broadcasting Authority Act, 1993. This last Act also provides for 50% discount to all public schools as defined in the South African Schools Act, 1996 (No. 84 of 1996) and all public further education and training institutions as defined in the Further Education and Training Act (No. 98 of 1998), on all telecommunication calls to an internet service provider, and any connection as discussed in the previous sections. Such discounts could also assist secondary schools by using the internet more frequently. Communication within the circuit, region and province could be aided by the use of the internet. As previously discussed, use of

technology in many rural schools has been hindered because of ICT infrastructure costs.

2.3.3.5 Skills Development Amendment Act, No 31 of 2003

The Act seeks to develop the skills of the South African workforce; to increase the levels of investment in education and training in the labour market; to improve the return of that investment, and to encourage employers to:

- Use the workplace as an active learning environment;
- Provide employees with the opportunities to acquire new skills;
- Provide opportunities for new entrants to the labour market to gain experience, and
- Employ persons who find it difficult to get employed.

The Act further seeks to encourage workers to participate in learnerships and other training opportunities; to ensure the quality of education and training in and for the workplace; to improve the employment prospects of persons previously disadvantaged by unfair discrimination, and to redress those disadvantaged through training and education. As discussed, the problem is that the skills levies in terms of this Act are administered by the Department of Labour, while the Department of Education is responsible for providing training to the educators. This also equips the Department of Education with the necessary ICT management skills programmes to foster the use of ICT in the management of secondary schools. These programmes might include professional ICT studies which the department funds in order to improve the ICT skills of educators. The Department of Education can also establish formal and informal training programmes pertaining to the use of ICT in the management of secondary schools.

2.3.3.6 Electronic Communications Act, No. 36 of 2005

This Act aims to promote convergence in the broadcasting signal distribution and telecommunications sectors and to provide the legal framework for convergence of these sectors; to make new provision for the regulation of electronic communications services, electronic

communications network services and broadcasting services; to provide for the granting of new licences and new social obligations, and to provide for the continued existence of the Universal Agency and the Universal Service Fund (RSA, 2005). It facilitates the communication in and from schools via the internet. It further calls for the establishment of hubs to enable communication. This could facilitate the quick conveyance of messages to relevant offices from schools in the Department of Education.

2.3.3.7 State Information Technology Agency Act, No. 88 of 1998

This Act provides for the establishment of a company that will provide information technology, information systems and related services to, or on behalf of, participating departments. Since Mashishila Circuit is in a remote setup, this Act can make it possible for the schools to have strong communication infrastructures that do not impede communication through the use of ICT in management.

The determination of such laws is to permit South Africans to use ICTs to advance the superiority of lives and the South African economy in general. The researchers welcome these laws which have significance to ICTs in the management of secondary schools in this study. ICT legislation holds substantial influence towards allowing the anticipated effects of policies, such as the South African Education Policy (Roldán-Álvarez, Martín, García-Herranz & Haya, 2016). For example, as an establishment, the DoE is responsible for delivering the essential set-up and teaching of school leaders in the use of ICT in the management of secondary school (Mojapelo, 2014).

2.3.4 Adoption

To summarise the attributes, Rogers (2010) contends that inventions contributing more knowledge, relative advantage, trialability, observability and compatibility will be accepted more quickly than other innovations. Rogers cautions that “getting a new idea adopted, even when it has obvious advantages, is difficult” (Rogers, 2010: 38). Therefore, the existence of these attributes of inventions quickens the acceptance development. People are likely to have larger threat propensities, and the higher the risk, the less

the degree of acceptance of the technology. Using the DOI theory, Matveev (2002) discovered that where there is an improbability, misperception and sustenance difficulty, an invention generates discord and appears to be daunting. It remains to be seen how the adoption of the innovation in these secondary schools facilitates sustainable management.

2.3.5 Weaknesses of the diffusion of the innovation model

One of the weaknesses of the diffusion of the innovation model is that it is linear and cause-subjugated. This is because it perceives communication development beginning with fact of opinion of a selected few who have made a decision to diffuse the technology. In that view, it under-estimates the influence of media (Richardson, 2011). It only creates awareness of a new innovation. According to Hansen (2011), Rogers' model consigns an essential part to diverse individuals acute to the development of the diffusion. Rogers' model merely indicates that media encourages the first people to accept the invention; they encourage the leaders who then encourage everyone else. He did not realise that the media could encourage group discussions that could be led by agents of change. Another setback of this model is that it motivates acceptance by individuals who may not want the technology (Anderson & Shattuck, 2012). Rogers did not comprehend that some individuals might not be the innovator types nor early adopter types, but are not necessarily quick to accept the technology either.

3. RESEARCH METHODOLOGY

3.1 Research design

“A research design is a step-by-step plan that guides data collection and analysis” (Goodwin & Goodwin, 2016:15). The quantitative approach was used in this research and refers to “explaining phenomena by collecting numerical data that are analysed using mathematically based methods (in particular, statistics)”, according to Cresswell (2013:42). The case study approach was used to gather information related to the circuit under consideration. The reason behind the selection of the case study approach was that it allows an in-depth study and produces concrete validation about

what the study proposes to investigate. The case study research design was used to determine the investigation into the principals' perceptions towards ICT use in the management of the Mashishila Circuit secondary schools. According to Yin (2013:74), a case study is "an inquiry that uses multiple sources of evidence. It investigates a contemporary phenomenon within its real life context".

3.2 Data extraction and analysis

Data analysis is a process by which knowledge is acquired from the gathered data and involves examining the raw data with the objective of drawing conclusions from the gathered data (Ghauri & Grønhaug, 2005). Data analysis was built on the nature of the data gathered. The data gathered from the questionnaires were converted into an Excel spreadsheet to enable easy capturing. After capturing the data, the response template was sent to a statistician for analysis using the Statistical Package for the Social Sciences (SPSS). The researcher used numerous techniques, namely graphs and tables, to present the findings of the primary data gathered. Lastly, secondary data were analysed through comprehensive critical assessment of the existing literature on ICT use in management. This research analysis was based on statistical tests using SPSS.

4. FINDINGS AND DISCUSSION

The questionnaire was aimed in part at validating how ICT for management was being used in secondary schools within the Mashishila Circuit. It was sub-divided into sections of usage aided by the Diffusion of Innovation Model. These sub-sections were:

- Relative Advantage
- Compatibility
- Complexity
- Trialability
- Observability
- Attitude

- User intention
- Environmental Factors

Out of these eight attributes that determine the usage of ICT in management, there were two attributes that had ‘strongly agree’ as a response option, making it impossible for analysis. The attributes are compatibility and complexity. Thus, these two attributes are not dealt with in this research paper. The following section reports on the analysis of the use of ICT in management.

4.1 Relative advantage

This section discusses the statements that have positive leverage in ICT usage. The statements included:

- ICT for management increases my competence as a leader.
- Using ICT for management improves the presentation of my work.
- Using ICT for management decreases operational costs.
- By using ICT for management, I have gained competency in my daily activities.
- Using ICT for management has made me more effective in carrying out my daily duties.
- Using ICT for management improves the quality of my work in general.

In this sub-section, the first question was on the use of ICT in increasing competence as a leader in the selected schools. Collected work showed that using ICT for management increases competence as a leader. The researcher wanted to determine if the leaders of the participating secondary schools also believed that using ICT for management increases their competence as leaders of these schools. The results showed that 98.7% of the participants agreed or strongly agreed that using ICT for management increased their competence in management. Only 1.3% of the participants were not sure of the statement, indicating that they believed that using ICT for management had neither increased nor decreased their competence in the management of secondary schools. These findings, nevertheless,

showed a significant level of satisfaction on the part of the use of ICT in management as having increased the competence of these leaders of schools.

4.1.1 Using ICT for management improves presentation

The researcher wanted to find out how managerial duties were being improved by the use of ICT for management. The findings from the survey showed that all of the participants used the ICT resources in presenting their work. This is a positive finding because at least the management is able to use ICT to do managerial activities. School record keeping is about information collection, storage, retrieval, use, transmission, manipulation and dissemination, for the purpose of enriching communication, decision-making and problem-solving in the school system. It is therefore necessary that this process be as accurate and accessible as possible. Using ICT in keeping school records would help to facilitate and enhance the administration of the school towards achieving the goals of secondary education.

4.1.2 Using ICT for management decreases operational costs

Findings on this question indicated that all of the participants agreed that using ICT for management decreases operational costs. Although all of them agreed, this could be because they based their opinions on the ease that computers provide when doing work. Even though advancing the use of ICT can be cost-effective, together with the constant decrease in ICT expenses, the total cost of owning ICT infrastructure comprising hardware, software, maintenance, development and upgrading, remains high (Mshanga, 2014). Ebere (2016) contends that expenditure for the procurement and repairs of ICT infrastructure are a great task that has an unrelenting impact on the implementation and adoption of ICT in the management of secondary schools. In the long run, it is a matter of whether the cost added by executing ICT balances the total amount, comparative to the cost of substitutes. As such, participants who responded positively might not have compared the cost of buying and maintaining the infrastructure as opposed to the ease of work it produces.

4.1.3 Using ICT for management improves competency in daily activities

The fourth question was meant to assess whether the use of ICT for management had an impact on their competency in their daily activities. Again, the findings indicated that all of the participants agreed that by using technology for management, the leaders of the schools are gaining competency in their daily activities. This could be due to the efficient manner in which computers process information, making it ready for use. This is supported by Yadav et al. (2016), who argue that top leaders comprehend the supremacy of ICT tools for the attainment of managerial targets and objectives. The use of ICT in management not only fulfils distinct institutional goals, but also augments working processes.

4.1.4 Using ICT for management assists in daily duties

The fifth question in this sub-section pertained to how the use of ICT has had an impact on the effectiveness of carrying out daily duties by the SMT members. The results indicate that all of the SMT members interviewed agreed that the use of ICT made them effective in carrying out their day-to-day duties. Participants were benefitting from using ICT for management and administration, mostly because documents can be re-organised, modified and shared more easily. To support these findings, Mokgadi (2015) argues that the use of ICT made employees more efficient and effective in data handling, retrieving, reduction of workload and improving the presentation and quality of their work.

4.1.5 Using ICT for management improves the quality of work in general

The last question in this category related to the improvement of the quality of work in general through the use of ICT for management. The findings indicate that all of the participants agreed that using technology does improve the quality of their work. To summarise the relative advantage towards the usability of the innovation, tests based on the mean as the measure of central tendency and the t-test were conducted. Since the mean score of all the questions is above 3, there is significant evidence that the use of ICT in the management of secondary schools has a positive effect on

the quality of work it produces. To support this, the results of a one sample t-test are also presented. Since the $t(76) = 67.888$, $p < .0005$ in all the questions, there is significant evidence that the use of ICT for management has a relative advantage in the management of schools.

4.2 Trialability

This sub-section examined whether the Department of Education gave the schools a trial period to test the use of ICT for management. The responses to all the questions indicate means that are above 3. This indicates that there is significant evidence that most of the members saw how important the use of ICT for management was. The researcher wanted to ascertain whether the SMT members had tried using ICT for management and had seen how important it is in decision-making. The results indicated that most of the respondents who had tried using ICT for management had seen how important it is in decision-making. However, participants who stated that they did not have a trial period for the use of the technology might have had varied reasons for this. It is probable that even those SMT members who did not have a trial period had no ICT equipment at their schools or were not encouraged to use it by the department. Lastly, negative responses pertaining to trialability of the innovation could have been due to the lack of training programmes for the use of ICT in management. According to Adukaite et al. (2016), leaders of organisations need to train their employees in the use of the innovation in order for them to appreciate its value. At present, there is no specific systematic research on the training of school managers in the use of ICT for the management of secondary schools in South Africa.

4.3 Observability

In this sub-section, the SMT members were questioned with regard to how they had observed the use of ICT in management. This included the following statements:

- Staff who use ICT work more efficiently.
- Staff who use ICT produce well-presented work.
- Staff who use ICT show enthusiasm regarding their work.

- Staff members using ICT for management enjoy using it.
- Staff members seem interested in using ICT for management when they see others using it.

A test of the means was conducted on the responses to the above statements in order to check deviations from the means. This was done through the central tendency measure, as well as the t-test.

The author sought to determine the level of encouragement of the use of ICT for management by observing, through communication, demonstration or describing an ICT adoption by other leaders from other schools as having a positive impact on the respondents' work. The findings showed a positive relationship between observing ICT use and practising it in the management of schools. These findings are consistent with the theory which describes observability as the degree to which the effects of an invention are noticeable, as witnessed by fellows of a collective structure, and is certainly correlated to the adoption rate (Shippee, 2016).

However, for respondents who gave negative responses, one probable reason for the finding could be the lack of conceptualisation, since some inventions are challenging to observe (Pandolfini, 2016). In the Mashishila context, the leaders of schools should not have to first see "miracles" achieved by the use of ICT in management in other places in order to adopt it. The leaders of the selected schools should not dwell on the past, which is filled with failures in ICT. Nevertheless, these schools should have visions for ICT for management, since failures in previous ICT endeavours are not a hindrance in this knowledge era.

4.4 Attitude

This sub-section dealt with the statements regarding the attitude of the SMT members in adopting the innovation. The statements in the section included:

- I feel comfortable with the idea of the computer as a tool in management and learning.

- The use of the computer as a learning tool excites me.
- Using ICT for management is a desirable way of running the school.
- ICT for management gives me confidence in doing my work.

The model of this research work was intended to provide clarification on negative or positive attitudes concerning the use of ICT in the management of secondary schools. Participants were thus provided with five options as to why school management teams might have negative and positive attitudes concerning the use of ICT for management.

According to Albugarni and Ahmed (2015), attitudes of leaders of schools regarding the use of ICT in management create one of the main reasons in its positive incorporation into an institution's processes. In examining the attitudes of the school managers, it is imperative to note that this has a strong effect on the use of ICT for management. Looking at the relative advantage responses, for example, how these leaders answered the questions on how they had seen technology as an aid to their day to day activities, the attitude of these leaders could have been influenced by the school principals in making use of the technology.

Literature suggests that strong affirmative attitudes towards change are likely to be dependent on the benefits that come with it (Buabeng-Andoh, 2012). The findings support this notion, as evidenced by the number of respondents who agreed that they had seen the benefits of using the technology. However, literature also asserts that while positive attitudes could be regarded as a precondition in taking an edge, it could also be regarded as an obstructing factor if there are negative attitudes (Kale & Goh, 2014). In relation to the findings, contrary to affirmative and assertive attitudes, some school leaders may have had tentative and permissive attitudes about using ICT for management. This could have been due to the inadequate skills or knowledge about the use of ICT for management. Since the Department of Education provides informal ICT training, this could have had a negative impact on the attitude of the educators. Some educators may feel relaxed with regard to the use of the innovation. Such attitudes

could be avoided by introducing professional ICT qualifications in the secondary schools.

Based on these findings, it can be concluded that school leaders in Mashishila Circuit with affirmative, assertive and obligatory attitudes towards ICT for management practice in schools are likely to display high levels of competence in the use of computers. In contrast, a lack of these attitudes towards change is likely to elicit behaviours such as non-compliance, resistance, reluctance or in extreme cases, incapacity. Attitude is therefore imperative for the successful implementation and adoption of ICT for management in schools.

4.5 Usage intentions

Participants were required to specify the means in which ICT for management were important in their corresponding institutions. The lists of managerial intentions as discussed, are listed below:

- Student records
- Financial records
- Communication with the education offices
- Staff personal information records

The results indicate that ICT for management is generally used for staff personal information records, keeping student records, communication with the Department of Education and keeping financial records.

Student records may comprise records of learner progress, behaviour, as well as attendance. Record keeping helps schools keep track of the changes in their activities in the past and present. They also provide the basis for determining what should be done in the future. This is worth it, as it permits stress-free access to information and safety.

The findings of this research are in agreement with the view of Entwistle and Ramsden (2015), who indicated that keeping records on students' academic performance is vital for educational resolutions. This is also in agreement with the opinion of Burden (2016), who suggested that for effective school management, there should be academic record keeping.

Burden (2016) indicated that school records assist in determining the financial position of a school. The school expenditure is usually entered into a proper ledger and in suitable book-keeping records. Findings of this work also concur with Konyana and Konyana's (2013) opinion that data gathered from school records on learners' admission and school amenities can be used for planning resolutions. In contrast to the positive finding explained above, for the usage intentions, the negative responses could be due to the fact that some of the leaders of schools are not willing to learn how to use ICT in management. According to McDonagh and McGarr (2015), they describe these leaders as "conservatism" leaders. These are the kind of leaders who feel that change and the use of ICT in the management of secondary schools are not essential and thus, they choose traditional ways of doing things.

4.6 Environmental factors

In order to assess whether there were environmental factors aiding in the use of ICT for management, a number of questions were asked. The list of statements which were posed to the participants are presented below.

- The Department of Education has provided training on implementing ICT management.
- The Department of Education has provided the essential set-up to implement ICT for management.
- The school has internet.
- The internet connection at the school is reliable.
- The Department of Education actively encourages the use of ICT.
- There are appropriate policies in place regarding the use of ICT for management.
- The school has the necessary ICT infrastructure.
- Maintenance on computers is done regularly, or as needed.
- Other school principals encourage me to integrate computers into management.

- There are other schools in the circuit which are using ICT for management.
- I often exchange ideas about technology integration with other school principals.

In response to these statements, a test of means using the central tendency measure was used.

Looking at the measure of central tendency (the mean), there is significant evidence that all the environmental factors were positively contributing to ICT use in secondary school management in the circuit. The findings from this section agrees with that of Buabeng-Andoh (2012) who found that while the schools in the Mashishila Circuit had ICT policy papers, there is a significant difference between this and operational incorporation in progressing secondary school management. This could be as a result of the absence of clarity on the integration of ICT strategies in a well-designed incorporation plan.

Another reason that could hinder the maintenance of the computers, on the part of the leaders of the schools, is the lack of a proper budget pertaining to upgrades of ICT equipment and know-how on when upgrades should be done. A small number of leaders indicated that their internet connections were not reliable. This could be due to a lack of clarity on how upgrades should be made, as well as who to contact when the schools experience failures in connectivity. A further reason could be the situation of these schools, as they are situated in rural areas, and telephone lines sometimes experience difficulties in connection, making it difficult to connect to the internet. In addition, some schools are upgrading their own infrastructure, apart from the upgrades coming from the Department of Education itself. These conditions poser challenges in progressing ICT initiatives for the management of secondary schools in the Mashishila Circuit.

Educators' professional development is a vital aspect to effective incorporation of ICT for management in secondary schools. The literature reveals that regardless of whether one is a novice or a proficient user, training in ICT-related programmes increases educators' proficiency in the use of computers (Roldán-Álvarez et al., 2016). In the current findings,

there is enough evidence to suggest that most leaders of the school had received ICT training from the Department of Education, given the mean score which is more than four. This is a positive response, since regardless of whether one is a novice or a proficient user of computers, the technology keeps changing. Hence there is a need to update knowledge in this knowledge area.

As discussed, in order to get clarity on the use of ICT in the secondary schools in the Mashishila Circuit, the DOI model's attributes of relative advantage, observability, trialability, compatibility, complexity, attitude, user intentions and environmental factors aided in establishing perceptions; however, of these attributes, compatibility and complexity received strongly agree responses from all the participants, making it difficult for analysis. This objective sought to investigate ICT use in the management of secondary schools.

Regarding the findings on the relative advantage of the use of ICT in terms of reducing the cost, most of the participants agreed that there was relative advantage towards decrease in costs, due to the use of the technology.

Findings on user intention are in agreement with the view by Entwistle and Ramsden (2015), who specified that keeping student records is vital for the determination of educational need. This is also in keeping with the view of Burden (2016) who advocated that for operative school management, there should be record-keeping in learning institutions. Results indicated that more than half of the participants used ICTs in the management of secondary schools. However, participants also had mixed views over the trialability of ICT usage, since the Department of Education did not give them a trial period for using ICT for management. This could have resulted in a negative attitude towards the adoption of the innovation.

5. CONCLUSIONS AND RECOMMENDATIONS

According to Rogers (2010), an innovation has to be tested and its benefits noticed in order for it to increase the chances of it being easily adopted. Most schools also indicated that they had policy documents; however, it remains unclear whether the use of ICT for management is clearly

articulated in the policy documents. It is also encouraging to note that a considerable number of participants had positive attitudes towards the use of ICT in management. However, there are those participants who had negative attitudes towards the use of the technology. Such participants may be regarded as the “conservatism” group who need intervention strategies to assist them to change their attitudes. With regard to environmental factors, although most of the leaders of the schools gave positive responses, reliability of internet connections was a concern among some schools. This could be because of the geographic location of the Mashishila Circuit. Since it is in a rural set-up, connectivity is sometimes a problem due to telephone line disconnections.

5.1 Recommendations

In order for ICTs to yield benefits in secondary school management, this study recommends approaches that could be made to progress ICT use in secondary school management. As indicated in the literature review, facilitating the purchase of ICT infrastructure for secondary schools in South Africa is hindered by a lack of funds. This work was inspired by the researcher’s reflection on many SMTs in secondary schools. They are provided with modern ICT equipment, with the intention of refining their performance in management, yet they often fail to effectively make use of these ICT resources.

The researcher therefore recommends the following, in an effort to upsurge the usage of ICT in the management of secondary schools in South Africa:

- The leaders of schools need to improve their ICT skills in order to be effective in their new managerial roles as innovation users.
- The department needs to foster the schools’ use of ICT, through highlighting the different laws that have been passed in relation to the adoption of the technology. Such laws include the Skills Development Amendment Act, No. 31 of 2003.
- The Department of Education should also conduct ICT training sessions and workshops, and develop several media platforms concentrating on specialised advancement of leaders of schools.

- In addition, this study suggests that administrators require a comparative understanding of ICT integration and be willing to use the knowledge and resources to promote technology in their management tasks.
- Findings indicate that schools have policy documents, thus, COBIT and ITIL software could be introduced in schools. This would aid in monitoring the goals and objectives of the institution, if they are being met and the individuals concerned be rewarded accordingly.
- Having discovered that there may be “conservatism leaders”, balance score cards should also be introduced in schools, in order to assess if the institutions’ goals and objectives are being successfully met.

In order to achieve these recommendations, schools are advised to develop strategies to yield the benefits of adopting the technology. The researcher discovered that the lack of fruitful results in using the technology may be due to the lack of proper guidelines in the adoption process.

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