

**Measuring the effectiveness of Management
Information Systems used for decision making in
Mpumalanga TVET Colleges**

Vongani Sharon Mboweni



Orcid.org 0000-0002-2441-4860

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Study leader: Mr P Du Plessis

Student number: 28253132

ABSTRACT

Small and large businesses are found to be using information systems to manage their businesses and information. The Technical and Vocational Education and Training Colleges are no exception. For that reason, information is becoming more and more expensive, and businesses are willing to pay high prices to access information since it is important for decision making and competitive intelligence. Vital information must meet certain requirements, such as reliability, accessibility, relevance and recent -for it to be usable.

The study aims to investigate the effectiveness of information systems in the Technical and Vocational Education and Training Colleges in the Mpumalanga Province. The research will provide the background of the Technical and Vocational Education and Training Colleges, the different types of Management Information Systems, the influence of the relevant legislation, the benefits of using the system and the influence of technology and innovation in the decision-making process.

The TAM Model was used to explain how people accept technology, and from the study conducted it was revealed that in the Technical and Vocational Education and Training Colleges people see technology as a sure way to profitability. It was also evident that Management Information Systems are important tools that play an important role in collecting, analysing and providing information to different departments internally, different stakeholders both internally and externally, and managers to be assigned for different purposes, such as report writing and forecasting.

The findings further revealed that there is a shortage of skills and resources that hinder the effectiveness of the system. As businesses are choosing the information system suitable for their use, they need to ensure that the correct choice is made. It must be provided by a reliable service provider who will be willing to assist whenever they experience problems and have technical problems. Secondly, it should be able to provide what the organisation needs, regarding the format of the information, availability of information whenever needed, and to the level of the users regarding technicality. If not, it will be of no use, and it will not achieve the objectives of a Management Information System in the organisation.

As mandated by the legislation, the Technical and Vocational Education and Training Colleges are required to use management information systems, having multiplicities to choose from. They range from College Technical System (COLTECH), Integrated Tertiary System (ITS), Technical and Vocational Education and Training (TVETMIS) and many others. They will ensure that services are improved, clients' needs can be met and satisfied fully; information will be submitted to the department in time, is more accurate than before and presented in the format they expect it to be.

The recommendations of the study will be available to the Technical and Vocational Education and Training Colleges and the department. It was recommended that for future research, a study could be done to investigate the level of skills in the Technical and Vocational Education and Training College's employees and its use. The influence of Information Communication Technology (ICT) in the Technical and Vocational Education and Training Colleges are emphasised.

Keywords: TVET Colleges, Information system, MISs, DHET, Education

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I dedicate my research to Wisani Mahlathi... this is for you...

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TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
LIST OF ABBREVIATIONS	ix
LIST OF FIGURES	x
LIST OF TABLES	x
CHAPTER 1: NATURE AND SCOPE OF THE STUDY	1
1.1 INTRODUCTION	1
1.2 CONTEXT	2
1.3 CAUSAL FACTORS	3
1.4 IMPORTANCE AND BENEFITS OF THE PROPOSED STUDY	4
1.5 PROBLEM STATEMENT	6
1.6 OBJECTIVES OF THE STUDY	9
1.6.1 Primary objective	9
1.6.2 Secondary objectives	9
1.7 RESEARCH METHODOLOGY	9
1.7.1 Literature/theoretical study	9
1.7.2 Empirical research	10
1.7.3 Limitations	11
1.7.3.1 Sources	11
1.7.3.2 Research	11
1.8 LAYOUT OF THE STUDY	12
1.9 CONCLUSION	12
1.10 CHAPTER SUMMARY	12
CHAPTER TWO: LITERATURE REVIEW	14
2.1 INTRODUCTION	14
2.2. KEY CONCEPT DEFINITIONS	14
2.3 MANAGEMENT INFORMATION SYSTEM (MIS)	15
2.3.1 Background of MISs	16
2.3.2 The need for MISs	17

2.3.3	An MIS provides the following advantages	18
2.3.4	MIS Model	19
2.4	MIS AND THE DECISION-MAKING PROCESS	20
2.5	ROLE OF MIS IN DECISION MAKING	21
2.6	CHALLENGES WITH THE USE OF THE MIS	22
2.7	THE DECISION SUPPORT SYSTEM (DSS)	22
2.7.1	The characteristics and capabilities of DSS	23
2.7.2	Benefits of the DSS	23
2.8	TRANSACTION PROCESSING SYSTEM (TPS)	24
2.8.1	Components of TPS	24
2.8.2	Methods of processing transactions	25
2.9	BUSINESS INFORMATION SYSTEM (BIS)	25
2.10	EXECUTIVE INFORMATION SYSTEM (EIS)	26
2.10.1	The use of EIS	27
2.11	THE TECHNOLOGY ACCEPTANCE MODEL (TAM)	29
2.12	INTERNATIONAL PROTOCOLS AND CONVENTIONS GUIDING TVET	31
2.13	AN OVERVIEW OF INFORMATION SYSTEM IN TVET COLLEGES	32
2.13.1	Role of TVET in Developing Human Capital in South Africa	32
2.13.2	The Role of the DHET in TVET Development	33
2.13.3	MIS challenges experienced by TVET colleges in South Africa	34
2.13.4	Foresight in an organisation	36
2.14	INFORMATION SYSTEMS AND TVET: SOUTH AFRICAN CONTEXT	37
2.14.1	Review of information systems for TVET	37
2.14.2	Benefits of Management Information System in the TVET colleges	40
2.14.3	Current approaches of Information Systems for TVET	42
2.14.4	Management Information Systems for TVET: Enablers or Impediments?	43
2.14.5	Challenges and Opportunities of Managing Information Systems in TVET	46
2.15	LEGAL FRAMEWORK FOR POST-SECONDARY SCHOOLING IN SOUTH AFRICA	47
2.15.1	White Paper on Post-Education Schooling	47
2.15.2	The Impact of Changes in Legislation for TVET Institutions	48

2.15.3	The Role of the State in Enabling TVET Success in South Africa	49
2.16	CONCLUSION	50

CHAPTER 3: RESEARCH METHODOLOGY AND FINDINGS 51

3.1	INTRODUCTION	51
3.2	RESEARCH DESIGN AND METHODS	51
3.3	PROCEDURE AND SCOPE OF THE QUALITATIVE RESEARCH	52
3.4	PROCEDURE AND SCOPE OF THE QUANTITATIVE RESEARCH METHOD	53
3.5	SAMPLE GROUP AND SIZE	56
3.5.1	Sampling for quantitative data	56
3.5.2	Sampling for qualitative data	56
3.6	URVEY INSTRUMENT	58
3.7	DEMOGRAPHICAL PROFILE OF RESPONDENTS	59
3.8	EMPIRICAL STUDY: RESULTS	63
3.8.1	Frequency analysis and descriptive statistics	63
3.8.1.1	Assessment of questionnaire results Section B	63
3.8.1.2	Assessment of questionnaire results Section C	66
3.8.1.3	Assessment of questionnaire results for Section D	69
3.8.1.4	Assessment of questionnaire results Section E	72
3.8.1.5	The results with the lowest mean	72
3.9	CORRELATIONS AND RELATIONSHIPS	74
3.9.1	Correlations and relationships of Section B	74
3.9.2	Correlations and relationships of Section C	74
3.9.3	Correlations and relationships of Section D	75
3.9.4	Correlations and relationships of Section E	75
3.10	QUALITATIVE ANALYSIS	76
3.11	CONCLUSION	78
3.12	CHAPTER SUMMARY	79

CHAPTER 4: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS 80

4.1	INTRODUCTION	80
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4.2	CORRELATION BETWEEN THE LITERATURE REVIEW AND RESEARCH RESULTS	80
4.2.1	Conclusion on MIS and the decision-making process in TVET Colleges	81
4.2.2	Conclusion on MIS and difference in software	82
4.2.3	Conclusion on Foresight	82
4.2.4	Conclusion on TAM	83
4.3	CONCLUSION ON SECONDARY RESEARCH OBJECTIVES	83
4.3.1	Research objective 1	83
4.3.2	Research objective 2	84
4.3.3	Research objective 3	84
4.3.4	Research objective 4	85
4.4	CONCLUSION ON THE PRIMARY OBJECTIVE	85
4.5	LIMITATIONS	86
4.5.1	Limitations of the literature review	86
4.5.2	Limitations of the empirical research	86
4.6	RECOMMENDATIONS	87
4.7	FUTURE RESEARCH	87
4.8	CHAPTER SUMMARY	88
	REFERENCE LIST	90
	APPENDIX A: Informed consent form	97
	APPENDIX B: Questionnaire	99
	APPENDIX C: Letter from language editor	97

ABBREVIATIONS

Abbreviation	Meaning
COLTECH	College Technical System
DHET	Department of Higher Education and Training
DOE	Department of Education
DSS	Decision Support System
EIS	Executive Information System
ESS	Executive Support System
FET	Further Education and Training
FETMIS	Further Education and Training Management Information System
HEMIS	Higher Education Management Information System
ICT	Information Communication Technology
IS	Information System
ISMS	Information Security Management System
IT	Information Technology
ITS	Integrated Tertiary System
MIS	Management Information System
NATED	National Accredited Technical Education Diploma
NCV	National Certificate Vocational
NQF	National Qualification Framework
PERSAL	Personnel and Salary System
SAQA	South African Qualification Authority
TAM	Technology Acceptance Model
TPS	Transaction Processing System
TVET	Technical and Vocational Education and Training
UMALUSI	Council for Quality Assurance in General and Further Education and Training

(i)

LIST OF FIGURES

Figure 2.1: - MIS Model	20
Figure 2.2: MIS and decision-making process	21
Figure 2.3: Components of a BIS	26
Figure 2.4: EIS System	28
Figure 2.5: Technological Acceptance Model (TAM)	29
Figure 2.6: COLTECH System	39
Figure 2.7: Four-level pyramid model	41
Figure 3.1: Research map giving an overview of the study	51
Figure 3.2: Population Age	59
Figure 3.3: The qualifications	60
Figure 3.4: The Positions	61
Figure 3.5: Experience (Years)	62
Figure 3.6: The TVET College	62

LIST OF TABLES

Table 3.1: Management Information system (MIS) and decision-making	65
Table 3.2: The use of different software's in managing information and decision-making	68
Table 3.3: Strategic management and Foresight	71
Table 3.4: The Acceptance Model (TAM) and the MIS usage	73

CHAPTER 1: NATURE AND SCOPE OF THE STUDY

1.1 INTRODUCTION

Valuable information is expensive; companies spend a great deal of money to collect information since it is considered to be the building block to success. Organisations at times will pay a very high price to access information. Nevertheless, it is worthless if this information is not in a correct format (Botha, 2011: 1). If you have the right information, it is as good as having a pot of gold.

There is a continuous shift of the strategies used in the Technical and Vocational Education and Training (TVET) colleges in South Africa. These changes, require TVET colleges to adapt their business strategies and that requires enormous amounts of money and time. Amongst others aspects, this change requires the adaptation of the Management Information System (MIS), since this is considered important in running corporates in the 21st century (Irani and Love, 2008 and Visser 2011: 5).

Originally, there were 152 Technical colleges in South Africa in the FET Sector, as it was called before the merger with other educational institutions in 1995. It was after the merger that the colleges were scaled down to 50 multi-campus and they also received a name change to further education and training (FET) colleges. Democracy brought about many changes, including the introduction of the National Qualifications Framework (NQF) with the aim of endorsing the integration of the Education and Training Sector under the South African Qualifications Authority (SAQA) (Department of Education, 2008a). The process was also aimed at skilling the South African youth with scarce skills to empower them for further study and/or employment and economic growth (Visser, 2011: 5).

The introduction of the FET Colleges Act 16 (2006), outlined areas that needed much attention in the TVET colleges. The quality assurance system had to be prioritised by colleges, and the MISs' performance evaluation tool was introduced to gauge their performance. The TVET colleges were to evaluate their system and report on its performance as a form of monitoring by the Department (Department of Education, 2008a, Department of Education, 2008b, Republic of South Africa, 2006 and Lund, 2010).

According to Kumar (2006), to define MIS, the facets of the MIS system should be well understood; firstly, which are management, information, and systems. He further indicates that management can only exist when there are subjects (employees) to be managed. Al-Zhrani (2010:1248-1252), indicates that data has to be interpreted and analysed to have information in the organisation. Different systems are employed by different organisations, depending on what they can afford, the size of the organisation, and their needs and performance, among other reasons.

Generally, these systems consist of smaller systems known as subsystems, which are all tasked with ensuring the efficacy of the large systems. Based on the preceding definitions, MIS refers to a system that uses information to ensure appropriate management of businesses (Kumar, 2006). Fundamentally, the facets should run parallel to ensure the effectiveness of the system.

In summary, to achieve the recommendations made during the merger by the Department of Education, aimed at successfully managing information by the TVET colleges, a proper database tool is needed. Such a tool will ensure that the colleges are running smoothly with all the relevant information being available and will assist in providing information for decision making. The MIS should be able to deliver as expected and provide information swiftly when needed (Rhodes, 2010). This process includes communicating with other decision support systems (DSS), giving practical suggestions and 'what if...' scenarios so that it makes sense to managers for decision-making. Rhodes (2010) believes that organisations with an MIS stand a better chance of succeeding since the system produces important information for the company.

1.2 CONTEXT

As technology advances, so do the needs of organisations and business operations. TVET colleges have to adopt their MISs to manage information more formally. Different systems are available for the TVET Sector, ranging from Coltech, ITS and many others. There is frustration for the IT Managers since they cannot view the fact-based views of the information technology activities, there is a demand for organisations to take advantage of new IT initiatives. Together with the aligned resources (Lee and Lehto, 2013:193).

However, most organisations cannot afford the high cost of installing the new technology, as well as the costs of the new skills needed for implementing this technology. The costs include the maintenance of both the new and existing technology, plus the applications and infrastructure (Visitation, 2003).

TVET colleges are required to use the new IT systems; this is a statutory requirement. Although Colleges are required to use the IT systems, it is still a challenge due to factors such as low skill levels at Colleges and the huge need for funding for the training of all those directly involved in their use (Visser, 2011: 8).

The following aspects must be considered:

- Identifying people within the organisation who can use the IT system, and those who can be capacitated to assist them for the benefit of the organisation.
- Identifying any challenges within the organisation regarding their IT system, the nature of these challenges and the barriers that the organisation overcame.
- Identifying any specific strategies that were used to integrate the IT system with organisational activities successfully.

Although there are challenges such as capacitating IT information system users and the costs of the system, as cited by Visser (2011:8), the DoE still expects TVET colleges to implement these systems. There are no specifications as to which IT system should be used. For that reason, different TVET colleges use different IT information systems for various reasons. This study is intended to investigate the various IT MISs that are used in the Mpumalanga TVET Sector, together with their differences and effectiveness.

1.3 CAUSAL FACTORS

The TVET colleges have been experiencing changes in their governance, management and administration. These changes include the shift from manual information systems to computerised information systems. Institutions are now relying on modern ways for managing and administering their information (Visser 2011: 8) The current changes in information technology have enabled businesses to easily administer their complex social and economic programs, something that was almost impossible manually.

The South African Government, and the DoE specifically, welcomed the introduction and use of IT Communication in TVET colleges, as a means of improving their delivery and performance. According to Farelo and Morris (2006:3), the South African Government understands the need to develop an information society and to attach the power of ICTs for the economic and social development in South Africa and its citizens and thus focuses attention on the TVET sector.

The IT MISs is intended to assist TVET colleges in capturing student information, and for generating students' academic records within the institutions. Among others, the DHET, through the MIS, dedicated the use of the IT MIS for administering the finances of the institutions, thus making it possible for them to account and report on these issues. The MIS assists in managing issues relating to human resources, academic administration and asset management. An effective IT MIS allows the decision maker (i.e. the line manager) to extend his or her subjective knowledge and understanding with computerised, objective output to produce meaningful information for decision-making (DoE, 2008a; DHET, 2012).

1.4 IMPORTANCE AND BENEFITS OF THE PROPOSED STUDY

The literature review has shown that TVET colleges have been transformed from being FET colleges to 'institutions of choice' as referred to by the former Minister of Higher Education, Dr Blade Nzimande (2016). The TVET colleges have undergone major transformations as a result of implementing the IT MIS. However, they still need to adapt to the changes this system involves, and to become more productive organisations.

The study will assess the use of the MIS and its success in assisting the organisations in managing information and decision making. MISs are important tools that business institutions value as important in running an effective and efficient businesses (Irani and Lowe, 2008).

Generally, in an organisation, an MIS is used by various people at different levels for disparate purposes. The system is designed to provide information in various formats to a wide range of people, thus enabling top management to receive information timeously on the organisation's current performance since the system is constantly

generating, analysing, sorting and disseminating information to relevant people (Euromed Marseille School of Management, 2010b).

The term MIS in this context will refer to an internal system that is used to generate information from both external and internal sources, using a transaction processing system (TPS). Once data is generated, it is summarised in different forms for different stakeholders' reports and specifications, such as graphs, tables and others. When developing and setting up the MIS, the needs of the users need to be considered (Stair, Reynolds and Chesney, 2008:276). Secondly, the type of official who will use the MIS, whether an administrator who will use it to capture data, or managers who will use it for forecasting and decision making, needs to be taken into account. Lastly, the skills level of the users must be considered.

The main emphasis about the implementation of an MIS is on technology and, in particular, on how ICT and IT function, and how these are managed by the organisations. When managed well, ICT can increase an organisation's performance and give it a competitive edge. ICT can provide considerable benefits and value proposition to clients. The different components of ICT work corporately to guarantee the collected data is transformed into usable and readable information for its users (Kekana, 2011:13). Through ICT, communication becomes possible, and then the effective flow of information between different levels of management and the internal and external stakeholders becomes a reality. Operations can be planned for and monitored easily by the relevant people to ensure that the relevant information is readily available for decision making.

According to Botha (2011: 11), management information becomes active when are daily in operation, as well as significant and more vital long-term strategic decisions, have to be made. This study will serve the following purposes:

- Act as an 'eye-opener' to the staff members in TVET colleges, the MIS service providers and the DHET.
- Benefit the TVET colleges and DHET by informing them of other uses of the system.

- Identify problems previously unknown to these organisations, and provide obtainable solutions to these, as well as providing solutions to earlier problems they were unable to resolve appropriately.
- Produce knowledge that is applicable outside of this research setting with implications that will go beyond the group that has participated in the research, such as the DHET.
- Produce results that might have implications for policy implementation. Recommendations will be made from the findings that will be available to all those who are interested and affected by the area of study, especially the DHET.

To conclude, much has been undertaken already to improve the state of TVET colleges regarding innovation and technology, including improving service delivery through relevant ICTs. However, there are still challenges that are experienced by TVET colleges, such as shortages in skilled staff who can use and interpret the data generated by the IT MIS. The state of the ICT environment will be investigated, and recommendations made as to what still needs to be instigated to improve the current state (Kekana, 2011:5).

1.5 PROBLEM STATEMENT

The public services, like most other organisations, are looking for ways in which to easily manage information within their business, in such a manner that it is readily available when needed, in a correct format and accessible for the appropriate decisions to be taken. The information must be better managed to be able to do this. TVET colleges are using various IT MISs to assist them in managing information, such as the COLTECH system, ITS, PERSAL and SAGE.

The management of information in the TVET Sector has been a challenge for some time and can be traced back some years to when student information, such as academic records, could only be filed physically. Such records could be damaged during renovations, moving between offices, or as a result of changes in the administrative system and/or employees when different measures and legislation had been put in place to deal with the information related problems. (Green Paper for Post School for Education and training: April 2012)

Some challenges were identified, as experienced by the DHET in respect of TVET colleges; first, the inaccuracy of the data provided by the colleges regarding students' submissions and performance reports (DHET, 2012).

Data management systems should be implemented in all colleges, universities, Adult Basic Education and Training (ABET) facilities, the South African Council of Authority (SAQA) and the National Student Financial Aid Scheme (NFSAS). The system should be designed to interpret and analyse the collected data according to the needs of the educational institution, the DHET and SAQA to ensure a high standard of reporting.

In the first Annual Report (1998-1999), concerns were raised about lack of details available when reports had to be submitted (DHET, 1999). TVET colleges cannot present a detailed report with updated statistics in a uniform manner. Different colleges present their data in different ways, which often do not conform to the standard culture of educational institutions. The reports were inadequate and unreliable in areas such as the number of enrolled students at the college, or the number of lecturers currently working at the college. The capabilities of Higher Education Management Systems (HEMIS) managing the information in the TVET colleges are still to be evaluated as to whether it can provide valid and accurate information for reporting purposes as currently required by the DHET.

Thirdly, the MISs that have been used in some TVET colleges provided large amounts of data in an unusable format. Such systems were not only a waste of money and time, but wrong decisions were taken because the information could not be interpreted correctly. An effective MIS should be able to do what it is expected to do timeously for the right people.

Fourthly, the skills and abilities of the MIS users of the system and the information that they produce determines the usefulness of the MIS. He further indicates that the ability to manage and understand the information generated by MISs remains an important issue. Most of the administrative personnel in TVET colleges could not use the MIS. The challenge of capacitating these employees was another issue, particularly because it required a budget to access and finance the service providers and the relevant resources to implement the MIS according to the DHET's requirements.

The problem is that the managers of administrative departments are unaware of their lack of knowledge of MIS. This study seeks to discover the role of MIS in the decision-making processes of TVET colleges.

The next challenge facing the DHET concerns quality assurance in TVET colleges. The FET Colleges Act 16 (2006) also focuses on quality assurance systems. It involves the evaluation of the MIS of the colleges as a key performance indicator of organisational success. Since the majority of the TVET colleges did not have an MIS system in place, the colleges were not performing as expected. The above Act allowed the DHET to look at the inadequacies of the MISs, monitor activities and evaluate institutions (DoE, 2008a, DoE, 2008b, Republic of South Africa, 2006, Lund, 2010).

The DHET has recommended that all TVET colleges use an MIS, whereby different colleges had a choice of choosing the system that best suits their needs, since a variety of MISs is available to choose from, ranging from the COLTECH System to the ITS system and others. The question remains, how effective are the various methods, can the TVET colleges rely on them, are they operating in the way the users are expecting them to operate, and do they produce the results the DHET expects from them.

To conclude this section, government institutions have always had a lack of up-to-date MISs and lagged behind private business institutions and were left behind when it comes to Information and Communication Technology (ICT) that led to poor service delivery (Themistocleous and Sarikas, 2005:508). ICT can offer so many benefits to organisations as indicated by Kamal (2006:193) such as preparing effective service delivery that will lead to time and money saving approaches thus saving costs for the organisation by efficiency. Government institutions are always seen as being reactive rather than proactive, which is a major concern explored in this study.

It was found that there are major challenges in the use of MISs in public institutions that are affecting their performance, such as the instability of functional areas, due to the lack of sufficient information for appropriate decision making and/or outdated information being used for decision making. The training of the MIS users and the

updating of the system are among the challenges facing public institutions (Kamal, 2006:193).

1.6 OBJECTIVES OF THE STUDY

1.6.1 Primary objective

According to the Business Dictionary (2011), decision making is a thought process of selecting a logical choice from the available options. The main aim of this study is to investigate the effectiveness of the MISs in managing information and decision making and to establish whether they are reliable and can be trusted by the users.

1.6.2 Secondary objectives

- To determine the problems associated with the MIS.
- To determine how MISs influence the management decisions in the TVET Sector.
- To investigate the uses and benefits of the MISs in the TVET Sector.
- To investigate the accessibility and availability of information when needed by the users and the application of the Technology Acceptance Model in TVET colleges.

1.7 RESEARCH METHODOLOGY

1.7.1 Literature/theoretical study

The study will explore relevant studies on MISs applicable in TVET colleges. The intention is to unpack the history, the development, the types or forms, the use and the relevance of the MIS.

The study intends to learn more about the success of MISs, and their influence in decision-making and the benefits the TVET colleges derive from using the MIS. The influence of the DHET in the implementation and use of the MISs in the TVET colleges will also be studied. Furthermore, the type of MIS used and how effective it has been will be investigated to contextualise the key objective of this research project, namely to investigate the effectiveness of MISs in TVET colleges.

1.7.2 Empirical research

A mixed method of research was applied because there was a need to obtain a fuller picture of the current state of the use of MISs and what support is required for their users to advance to a higher grade of data collection and decision making. According

to Johnson and Christensen (2008), the strength of both qualitative and quantitative research approaches can be achieved in a single research study. Secondly, this dual approach produces an increased understanding of the phenomenon because, as Creswell (2009) stresses, the combination of the qualitative and quantitative research methodology, offers a guideline on data collection and its analyses.

The quantitative approach will be used in this study. This approach is based on what is called a 'logical positivist' philosophy, which embraces the scientific method of inquiry, a method which is embodied in the problem-solving processes (Welman et al., 2010:6). A semi-structured interview will be used for questioning and probe, to give respondents the opportunity to react to questions in their own words, through the use of questionnaires

Documents were used as secondary data since they can offer background information about the study (McMillan and Schumacher, 2001:42). Sources such as Journals and Dissertations, White Papers on Education and Government Gazettes, and the TVET Policies and relevant textbooks will be used to provide data from previous research. The facts in the documents, from the DoE and local TVET colleges, will be analysed, and the findings will be used to provide clarifications of past scenarios. These facts will also further explain the present practices and any other issues that are experienced currently in TVET colleges (McMillan and Schumacher, 2001:4).

1.7.3 Limitations

1.7.3.1 Sources

The study will concentrate only on the TVET colleges, not all Higher Education institutions. It was decided to limit this study to the three Mpumalanga TVET colleges thus decreasing the generalisability of the findings, which means that the study will not be generalizable to all TVET colleges in South Africa.

The study will confine itself in interviewing only current TVET College employees who currently use the MIS while performing their duties, which include Managers, Supervisors (Educational Specialists), Departmental Heads, Examination Officers and Campus Managers. All other staff members are excluded from the study.

1.7.3.2 Research

A mixed sampling procedure will be used for different sets of data sources. The quantitative approach will take the form of a questionnaire that will consist of questions to be answered using a Likert Scale. Following the recommendations of Creswell (2009:4) instruments that statistically use numbered data will be employed to assist the researcher in measuring the different variables. A probability systematic random sampling will be employed to measure quantitative data, while a non-probability sampling procedure will be employed to obtain qualitative data for which respondents will be systematically sampled. Unfortunately, some staff members who wished to participate in the research were not included.

As mentioned already, this study will use questionnaires to collect data to avoid delimitation of respondent thus the term 'he/she' is not used in the questionnaires. According to Bryman et al. (2016), to avoid bias and the experimental effects that can be experienced in qualitative research, the researcher should avoid direct involvement with respondents as much as possible and thus will not be able to influence or be influenced by, the study's occurrences. Mixed method will be administered through the open ended questions in the questionnaires. The experimental design was employed in this research project to decrease both the level of biases and the effect of extraneous variables (White, 2005:83).

1.8 LAYOUT OF THE STUDY

The study has four chapters. They are:

Chapter 1: Orientation and problem statement

The research will be introduced, with the presentation of the research problem and its research questions. A synopsis of the research design forms part of this chapter.

Chapter 2: Literature review

An in-depth account of the literature review will be presented in this chapter.

Chapter 3: Research Methodology and Design

The research design, population size, sampling methods, data collection methods and data analysis will be described in this chapter.

Chapter 4: Results and Conclusions

The findings of the study, together with the conclusions and recommendations will be presented.

1.9 CONCLUSION

There is no doubt that there is a need for implementation and effective use of MISs in TVET colleges. This study indicates that, like any other technology, MISs are expensive, but their presence in an organisation is both indispensable and cost-effective, not only to the organisation but to the competition and the industry as a whole. MISs are IT systems that provide the necessary support to enable companies and their departments to be competitive, set and achieve goals, reduce costs and improve their organisational processing competencies. MISs will be described and discussed more fully in Chapter 2.

1.10 CHAPTER SUMMARY

This research project intends to determine the effectiveness of the use of MISs in the TVET sector and to develop a successful evaluation tool. A study survey will be developed, using the outcomes of the literature review, to assist in the evaluation of the MISs. This study will assist in measuring how effectively the MIS enables decision making. The requirements of the TVET Sector guidelines, the South African DoE's policies for the functioning and administration and of public TVET colleges, together with other relevant guidelines governing South African TVET colleges will be considered. The data obtained from the three chosen Mpumalanga TVET colleges will assist the researcher to apply and test the applicability of the guidelines above.

This study provided a deeper understanding of TVET colleges' implementation and use of MISs applicable to the TVET Sector, which will be unpacked in detail in the following chapter. Issues discussed will include information on what the MISs are used for, who uses the MISs and what is their relevance in TVET colleges, how successful the system has been to TVET colleges in which they have been implemented and the challenges surrounding the use of MISs. The success factors related to accessing the MISs and their use will be presented in Chapter 2.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter is premised on the notion that to understand the implementation and use and effectiveness of MISs in managing information at TVET colleges, it is important to provide a brief historical overview of the economic strategies, policies and legislative frameworks that orchestrated, and are still shaping the TVET college context in which the MISs are used.

The use of computerised operational systems is very common these days, and in the companies in which MISs are used, captured data is the standard input, which remains an important component within the MIS. According to Botha (2011:11), the MISs are responsible for much of the decision accountability through default settings. However, decision accountability remains the responsibility of the decision function in the default setting, and this setting needs to be updated manually, in conjunction with interpretations achieved by the use of other systems available to the organisation. The purpose of this chapter is to explore relevant literature relating to the MISs in TVET colleges. This chapter will explore the historical background of this phenomenon and contextualise the review regarding the modern use of information systems in enabling education management in TVET colleges. The relevant legal framework applicable to TVET colleges will be discussed together with its influence in the administration of these colleges.

The study will also determine the use of MISs in the broader sense by the TVET Sector and, therefore, the literature study on MISs, as well as on other decision-making systems, will be conducted to evaluate their effectiveness. The relevant concepts associated with information systems will be described and explained.

2.2. KEY CONCEPT DEFINITIONS

In this section, the key concepts in the study field of Information Systems applicable to this study are given to assist in the understanding the discussions below.

Buthelezi (2016:13) indicated that there is unanimous agreement that the phrase 'technical vocational education and training' be adopted to describe the combined process of education and training that recognises the common objective of

employment as their immediate goals. In South Africa, this term was not adopted initially.

- **FET**

The technical colleges were called FET colleges and were only renamed in 2015 as TVET colleges.

- **VET**

The Vocational Education and Training sub-sector has been variedly described over time. Different concepts are used in different countries to describe the various activities and foci, for example, 'skills development and training for the world of work', implying that this is training in preparation of the job market. In this study, the concept of FET/TVET colleges will be unpacked about the nature of these colleges, what they offer to students, such as a combination of formal and informal programmes in both TVET and VET, as portrayed in the descriptions above (Buthelezi, 2016:13).

- **Types of information systems**

Different organisations choose different information systems that suit their needs regarding cost and the type of information they require to access from the system. There is a variety of information systems available for TVET organisations to choose from, and these are discussed below.

2.3 MANAGEMENT INFORMATION SYSTEM (MIS)

An MIS may be defined as a system that is well integrated and planned to collect relevant data, processing and converting it into information, and sending it to the decision makers for decision making. Mishra et al. (2015:2) define the MIS as "a machine that can be used by organisations to provide information for the different functions that take place in different departments and performed by different people, such as supporting operational functions, managing information and decision-making".

To perform as expected, the MIS utilises different processes such as programmed computers, manual procedures, analytical models, the organisation's planning processes, control systems and decision-making processes (Mishra et al., 2015:2).

2.3.1 Background of MISs

The MIS was created during the early 1960s, and it became very popular as a tool for relating computer technology and IT systems to the processing of organisational data. The computer then became an important tool in situations where it was functional in finding solutions to problems within the organisation. The computer focused on the computerised clerical record-keeping tasks. The concept of MIS was developed to respond to the inefficient increase in, and the ineffective usage of, the computer, (Mishra et al., 2015:1).

It was found that, before the computer became popular, the majority of the organisations struggled to manage information a whole. The study acknowledges the importance of information in the organisation. Mishra et al. (2015:1) assert that the information needs to be current, accurate, concise, timeously accessed, complete, well presented and storable. It was the developments in computer technology that enabled the collection, integration, storing and managing of information according to the specifications of the information's users. Principally, the information should be accessed timeously, sent to all relevant employees and other stakeholders, storable, complete and well-presented if it is to be useful to the users.

There are two main reasons why the MIS concepts are valued as important, effective and efficient computer use by organisations. Firstly, because the MISs are integrated computer-based information systems that are regarded as a framework for managing the organisations' computer applications. Secondly, due to its main objective which was to process data collected by other organisational systems, its focus is the management of all the available MISs within (Kumar, 2015).

The TVET colleges, like any other organisation, are required to use an MIS. The MIS is used to capture their data, to receive data from the DHET such as students' results, and to analyse and disseminate the resultant data to relevant stakeholders such as the DoE, in the format the stakeholders require the data and processed information to be presented.

2.3.2 The need for MISs

All organisations are in need of an effective MIS that will enable them to be effective as an organisation because of the increased complexity of decision-making and the

extent of change in the business environment. There are so many changes in technology and innovation that educational organisations need to implement and manage. For example, the curriculum manager needs information about students' performance to obtain a clear picture of the TVET College's performance in the academic year, as well as any trends in that performance (Botha, 2011:18).

The financial manager needs information on the campus's income and expenditure to prepare a financial report. The personnel manager needs information about staff salaries and the payroll system that provides this information in the requisite format. Information about capacitating staff members according to their job specifications will be provided from a well-designed MIS that will automatically update the data as the employees' status changes and submit this information to the Home Affairs Department or DHET (Botha, 2011:20).

The MIS must be able to provide updated information about the latest cost-effective marketing strategies applicable to educational organisations. The processed information gained from the MIS is used to make comparisons between various situations and to reduce uncertainties. The use of the MIS as a decision-making support system serves a very useful and important function in TVET colleges for the following reasons: computations become faster and proper storage is ensured, productivity increases and the quality of service can be guaranteed, all of which provides a competitive advantage (Botha, 2011:20).

According to Mihir (2013: 2) the MIS has the following distinguishable characteristics:

- Customised reports can be generated, either as an electronic version or hard copy, depending on the specifications provided to the system.
- Data can be stored in different formats and in different places within the system to ensure safety and easy access by users. For example, data can be stored in the network, in standard network encryption, and on some form of portable IT device.

The MIS collects data from various sources, including external sources such as DHET, and analyses the data before transmitting it to different stakeholders for decision-making.

The DSS is also as important as the MIS for the administration of TVET colleges and provides the stakeholders involved in decision-making with the 'what if 'scenarios needed for making informed and relevant decisions.

2.3.3 An MIS provides the following advantages

Although the MIS is an expensive tool, it has the following benefits for organisations and the staff who use it.

- Planning becomes possible and a 'doable' task. Managers can formulate high-quality plans which will lead to informed decision-making.
- The use of the MIS prevents an overload of meaningless data. It ensures that information can be sorted and the only relevant information is used for decision-making.
- Top management can easily delegate decision-making responsibilities to the lower levels of the management team since they can be trusted to make decisions based on the correct information available.
- Activities can be easily coordinated between the different departments of the organisation. All sections of the organisation become aware of each other's function, and, can contribute information easily, thus making collective decision-making possible.
- The MIS controls who have access to what information and when, thus, the flow and the use of information can be easily controlled (Ranisavljević et al., 2012: 187)

The use of an MIS brings further advantages for the TVET colleges: Reports on the colleges' performance are easily made, staff and students' information and academic records can be managed and stored safely. It is easy to forecast and plan for the following year.

Lauderdale (2017) further indicated that MIS allows managers to send and receive information about the company's daily activities. MIS allows the company to receive internal and external information. It uses a two-system approach in which electronic ISs are used to create management reports. The MIS assists management in

analysing and writing the reports on decision-making. Planning becomes possible and easily managed from the 'what if ...' scenarios that the MIS produces.

2.3.4 MIS Model

The MIS model manages data from both internal and external sources according to the company's requirements. The accounting system is designed to continually provide information which is stored in the company's database and later sent to the report writing software responsible for timeously generating special reports as and when instructed. This software also produces information in a mathematical model for simulation of different aspects of the organisations' operations (Mishra et al., 2015:2).

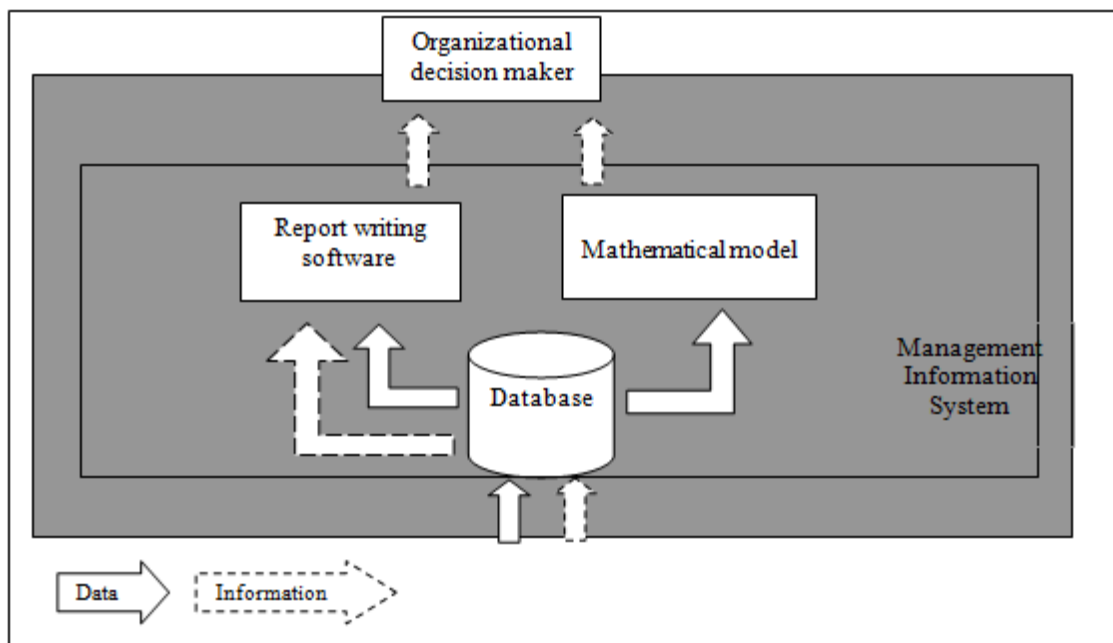


Figure 2.1: MIS Model (Mishra et al., 2015:2)

Once the data has been analysed and is ready for use (output), it is then sent to the people responsible for using the information to make decisions and solve problems. The information is sent to internal and external stakeholders, such as customers, suppliers and investors (Mishra *et al.*, 2015:2).

2.4 MIS AND THE DECISION-MAKING PROCESS

MIS is a system that provides management with accurate and timely information. Reliable, current information is necessary to simplify the decision-making process that will enable the organisation's planning, control and operational functions to be carried

out effectively (Ranisavljević et al., 2012:187). The MIS is useful to the organisation because:

- It provides a competitive advantage to the organisation while saving the company unnecessary costs
- Operational decisions are made much faster which enable the organisation to identify opportunities to increase sales
- The MIS serves as a foundation for the DSS and makes effective decision-making possible
- It ensures self-monitoring and makes recommendations for improvement when necessary

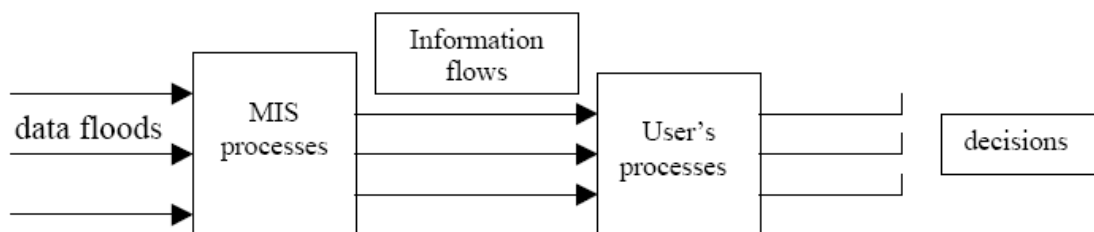


Figure 2.2: MIS and the decision-making process (Ranisavljević et al., 2012:187)

In summary, an MIS is 'an integrated man', a machine system that provides information to support the planning and control function of managers in an organisation. The MIS assures the provision of tasks such as, the useful managerial function, the collection of stores, the systematic and routine evaluation of information, the supporting of the planning and controlling decisions that include files, hardware, software and operation research models.

2.5 ROLE OF MIS IN DECISION MAKING

According to Mishra et al. (2015:3), decision making is the process by which organisational members choose a specific course of action out of several alternatives, in response to opportunities and threats. It is believed that every organisation grows, flourishes or is unsuccessful as a result of decisions made by management. The

availability of information in the organisation will determine the type of decision to be made and its success or failure.

The existing functions need information to make departmental decisions that influence the whole organisation. The organisation's MIS is continually flooded with data, which is later processed within the system and becomes usable information for the decision makers. The data is processed into information for a specific purpose, and it provides 'what if ...' scenarios, on decision-making, enabling managers to see the available options and their consequences before making a decision (Mishra *et al.*, 2015:3).

For example, to identify the TVET campus with the highest academic performance, statistical data must be generated through the MIS (COLTECH) and presented to the curriculum manager. If a TVET College wants to change its under-performing programmes, the MIS can provide statistics from another campus to assist in decision-making.

2.6 CHALLENGES WITH THE USE OF THE MIS

The MIS has some challenges in the decision-making process that need to be controlled. The MIS is a vibrant tool and, thus, some organisations find it hard to deal with its diversity and complexity and to keep up with the changes resulting from its development and updates. An MIS has non-adaptable software, and thus it is recommended that staff members are appropriately trained to use it effectively. Although an expensive process it is essential for the organisation to regularly update the MIS and train the users on these updates (Mishra *et al.*, 2015:4).

To overcome the identified challenges with the MIS system, a well-defined decision-making system is needed within the organisation. It is evident that the implementation and regular updating of an MIS is expensive so, strategies to manage the system and decrease the costs involved are needed, such as identifying an experienced decision maker from operations manager who can handle diverse decisions and think inversely and rationally (Mishra *et al.*, 2015:4).

Secondly, top management can identify less experienced managers and train them to assist with less challenging decisions. Training sessions can be organised as a strategic decision and part of the corporate culture to inform less experienced

managers about the diverse and dynamic nature of MIS, thereby helping them to assist their staff in improving their performance (Mishra et al., 2015:4)

2.7 THE DECISION SUPPORT SYSTEM (DSS)

Hussein (2016:19) states there are two benefits that ICT have for organisations. The first one is that it enables organisations and managers to attain data that will further support the decision-making process easily. Secondly, the use of ICT qualifies organisations to make effective decisions that enable them to perform better within a globally competitive environment. The use of ICT improves the quality of decision-making and is an important factor that needs to be acknowledged by organisations (Hussein, 2016:19).

Decision-making is an essential component of organisational life. Once the MIS receives data, it is processed and sent to the DSS that later transmits data to the decision makers. These decision makers can analyse the received information using different media such as traditional print, group and interpersonal information exchanges and computer-based tools (Hussein, 2016:19).

2.7.1 The characteristics and capabilities of DSS

The following list explains what the DSS can offer the organisation.

- Both top and senior management decisions are supported, being neither interdependent nor sequential decisions, regardless of the stage or style of the decision-making process
- It is adaptable to the changes occurring in the environment and industry
- It can perform sensitively (Nijaz, 2015: 14)

2.7.2 Benefits of the DSS

Although the DSS provides information for better decision-making, there are also other benefits for its users, some of which are immediate while others are long term. Both help the organisation to perform better and become more competitive.

The DSS also improves the user's competence. Organisational problems can be identified quickly and dealt with before they escalate. Communication between

different functions of the organisation becomes possible, where exploration of the various related phenomena is encouraged. The DSS makes it possible for the organisation to identify new ways of thinking about and handling different topics because it generates ideas for decision-making while motivating learning and development amongst the users (Nijaz, 2015: 15).

Different companies use data that is generated from different internal and external sources, to form their data warehouse for decision making. Nachar (2016) describes the DSS as a system that provides information to the decision makers in different formats as part of the analytical modelling. This information assists managers to make formal and semi-formal decisions. The DSS plays an important role in the organisation's decision-making process and is responsible for identifying any 'red flags' and making recommendations immediately. It also assists in tracking the performance of staff members and setting targets and analysing results (Nachar, 2016).

The TVET colleges also benefit from the use of the DSS. Strategic decisions can be made easily, data can be traced and performance analysed and compared regarding different semesters, trimesters and years so decisions can be made that will avoid a crisis or solve a problem.

2.8 TRANSACTION PROCESSING SYSTEM (TPS)

TPS are computerised systems that execute and record the daily routine transactions necessary for conducting business (Ghaebi, 2015: 2).

2.8.1 Components of TPS

- Input
- Processing
- Storage
- Output

The TPS plays an important role in problem-solving. It produces some standard reports, for example, budget reports and balance sheets. It also provides a rich

database that can be used in problem-solving and is the foundation upon which other problem-solving systems can be built.

2.8.2 Methods of processing transactions

- On-line entry for immediate processing, when received or captured data is immediately processed
- On-line entry with subsequent processing, when received or captured data is not processed immediately but is processed at a later stage
- Batch processing when data is processed in batches (Pilbeam et al, 2008: 128)

TPSs are information systems that process data resulting from the occurrence of business transactions, for example, the payroll system and production instructions. The finance department in the TVET sector usually manages the payroll system, using a different system from the one used to capture student information. Through the TVET College's MIS, data will be extracted and summarised from the TPS, which enables users to monitor, direct and prepare reports using information generated from the system. Top managers will use the TPS generated data to make strategic decisions, middle managers will use it to make tactical decisions, and line managers use it to make operations decisions (Ghaebi, 2015: 2).

2.9 BUSINESS INFORMATION SYSTEM (BIS)

A BIS includes all types of information systems, computers and computer technology and application software in a business environment.

Data from different departments and systems are integrated by the system, which later sends the generated data to management as and when required (Visser, 2011: 22). The BIS represents a system of controls and processes (including accounting systems) which organisations use to analyse information needed to run and manage their organisations effectively.

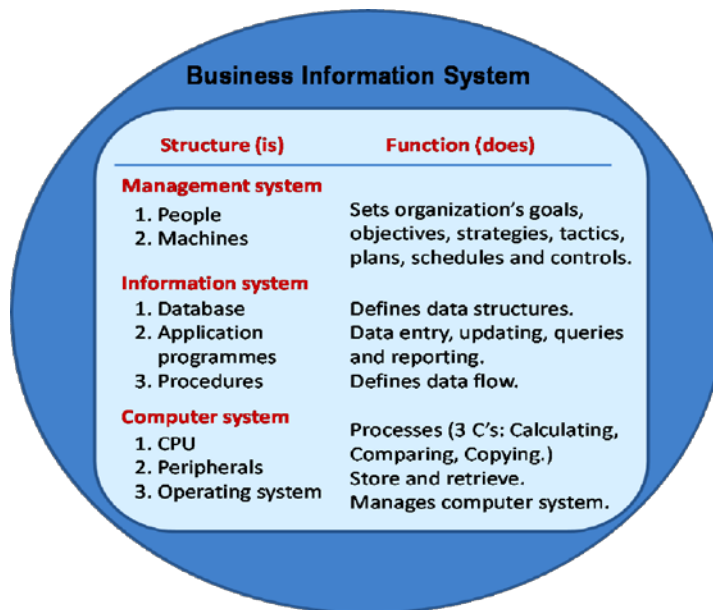


Figure 2.3: Components of a BIS (Visser, 2011)

The study focuses on one component of a BIS in the context of an educational environment, namely the MIS as it is used to manage information in TVET colleges who use different MISs for different reasons.

2.10 EXECUTIVE INFORMATION SYSTEM (EIS)

Another form of an information system is the EIS (also known as the Executive Support System (Martinez, 2013). Senior management utilises the EIS as an information dashboard to proactively monitor the organisation's performance and business trends for decision-making purposes. The EIS dashboard presents information in graphical format, with a drill-down facility if needed.

The EIS is capable of predicting sales and assists in reviewing the organisational strategies. The EIS is useful to senior managers since it provides them with strategic information in various categories for decision-making (Josphatw, 2015). These categories are designed to fit the decision maker's profile regarding his/her level in the company. This process ensures that only relevant and correct information will be sent to the person who needs it. The main emphasis is on providing appropriate data in different formats to enable the managers to produce reports. The data comprises graphics and integrated text to meet the various needs of differently skilled people (including computer skills) (Botha, 2011: 22).

The characteristics of a good EIS includes the provision of information, such as graphs and tables that is adapted to the users' individual needs and preferences. If there are any deviations from the norm, the system automatically alerts the users. The EIS also provides information for tracking performance. Since the EIS is linked to the external database, it can receive data and send it from both internal and external sources (Botha, 2011:22).

In the small business environment, such as private TVET colleges, the EIS will probably be combined into one information system with a supporting database because the organisation might not have sufficient resources to purchase or the capacity to operate more than one information system. Similarly, this is one of the reasons why most private TVET colleges prefer to have one system that provides the basic and most important data needed.

Martinez (2013) identified the following advantages of EIS: it increases the individual competence within the organisation, and management can have direct control over all organisational processes thus providing a sense of control over organisational activities that will lead to a competitive edge. A good EIS within an organisation guarantees the smooth running of operational activities through effective decision making.

2.10.1 The use of EIS

Contemporary EIS programs can collect, analyse, sort and disseminate data to relevant people inside and outside the organisation. The easy-to-use desktop analytical tools and online data displays can be used to ensure that the instructions and specifications given are achieved. EIS timeously provides managers with relevant external information, such as economic information, current news on financial markets and more. The EIS can analyse data in-depth and make it more understandable to the user. It also provides companies with detailed environmental scanning, where possible threats can be detected and opportunities identified, which are key issues for management's strategic planning. Comparisons, analyses and trends are provided for decision making (Martinez, 2013).

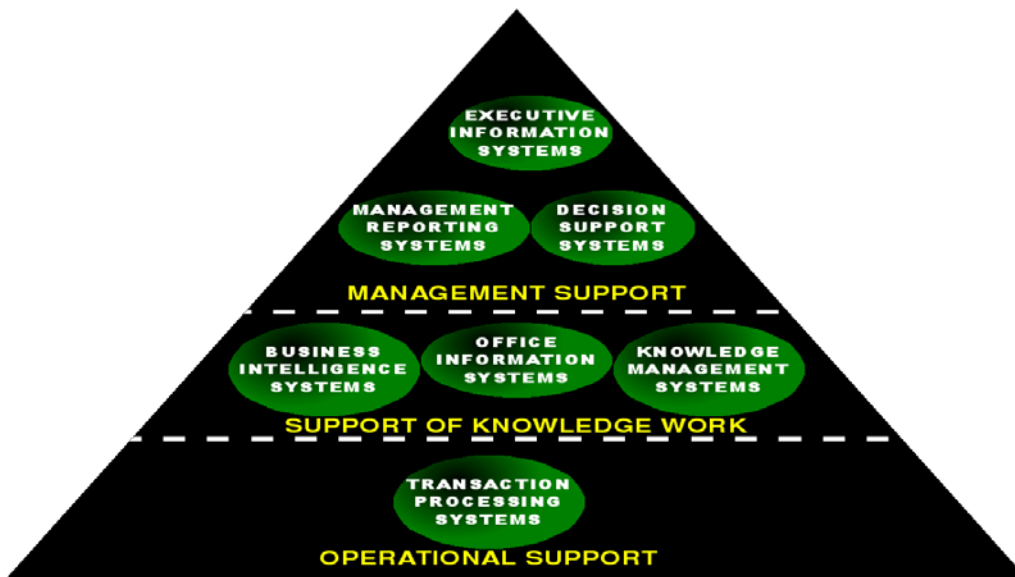


Figure 2.4 EIS Source: Octium (2011)

An effective information system ensures integration of different operations within an organisation. In large organisations with different departments, integrated information from all departments must be collected and analysed for decision making (Halal, 2000:137).

For the smooth running of activities in an organisation, all systems must be in place, and there must be good coordination between the different systems. The MIS usually receive, summarise and use data received from the TPS. The ESS is the main recipient of data from lower-level systems which is mainly used in unstructured decision making (Josphatw, 2015). TVET colleges also need data for informed decision making, and so an understanding of the different uses, functions and benefits of various computerised information management systems remains important.

To conclude this discussion, it is evident that the TPS plays a major role as the main source of data for other systems within the organisation. The TPS records daily routine transactions and assists management in monitoring the status of the operations, which later lead to structured decision making by managers.

2.11 THE TECHNOLOGY ACCEPTANCE MODEL (TAM)

As technology advances so does the use of IT in TVET colleges. The availability of options for managing information and technological innovation has increased the efficiency of managing data in organisations. MIS now appears to be a promising management system in TVET colleges for managing information and decision-making. The TAM is the most widely recognised model for addressing why users accept or reject technology. This model will be used to assist in this research study to explain the reasons why it is difficult to effectively use an MIS at TVET colleges (Lee and Lehto, 2013:193).

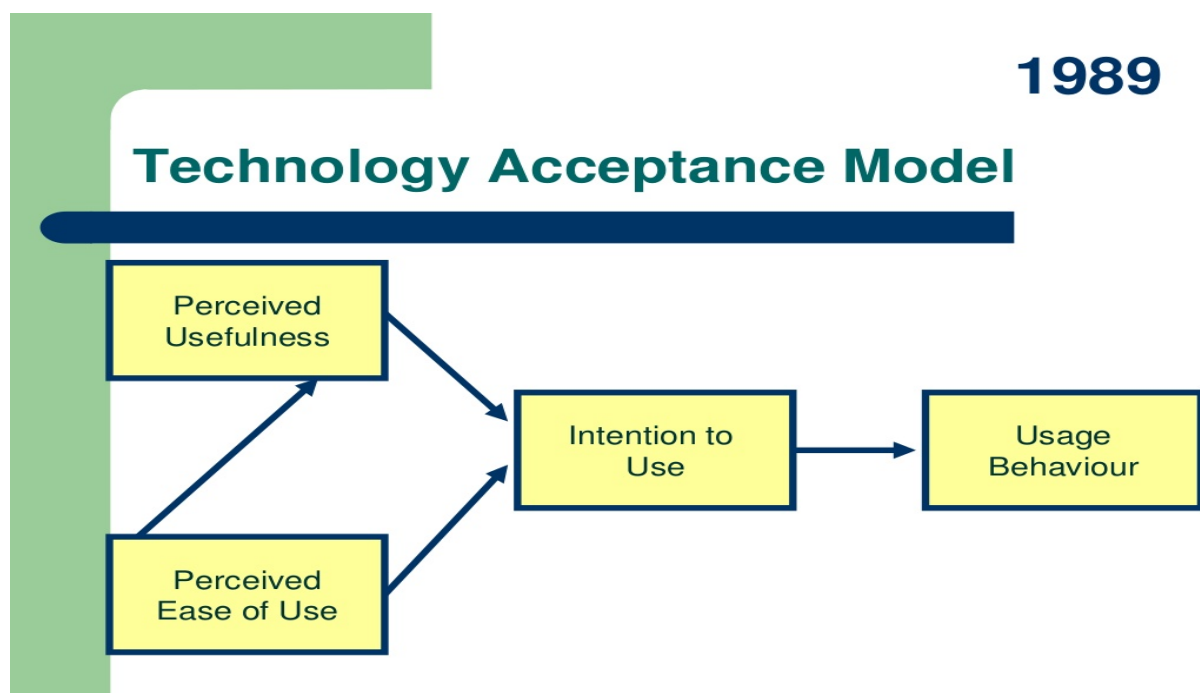


Figure: 2.5 Technology Acceptance Model (TAM) (Gordon, 2013).

According to Lee and Lehto (2013:193), the TAM is a significant socio-technical model that explains how individuals accept the technological and innovative ISs that are used in different organisations. According to TAM, users can accept or reject the technology, but this decision will be influenced by both their own and the organisation's intentions for using the IS. The user needs to feel that there is a need for the IS and must have a positive attitude toward ISs for him/her to accept it.

Lee and Lehto (2013:193) define attitude as an assessment that different individuals make, over the utilisation of a system available for use within the organisation. The

assessment will be based on the usefulness and benefits achieved, although it is usually influenced by the individual's belief in the system's performance and effectiveness. In the TAM, perceived ease of use is assumed to indirectly affect the user's behavioural intention by impacting its perceived usefulness (Niederhauser and Perkmen, 2010).

From the discussion above, there are two key aspects that have been identified as important for the acceptance of the IS; these are 'how easy it is to use new technology' and 'the perceived usefulness of the IS'.

Lee and Lehto (2013:197), identified three conventional relationships of the TAM, which are 'apparent usefulness', 'apparent ease in using the system' and 'apparent ease regarding usefulness affecting the behaviour intended'. Three variables have been identified which will influence the trust and belief in the system; these are the user's 'belief', 'intention' and 'attitude'.

According to the TAM, the above psychological factors will determine whether the user will accept or reject the technology. Some of the relevant questions that will influence the decision to accept the technology are: How easy it is to use the skills? Is it worth it? Does it make a difference in the users' decision making? Does it improve performance? The TAM proposes that external factors affect intention, as well as actual use through mediated effects on perceived usefulness and perceived ease of use (Lee and Lehto, 2013:198).

In general, there are four categories of variables related to the use of IT by organisations, namely: individual context, system context, social context, and organisational context. Social context describes the social influences relating to an individual's personal acceptance of IT use, and organisational context relates to the organisation's influence or support for the individual's IT use, such as providing a digital library (Gordon, 2013).

TAM is an IS model that shows how users accept and use a new form of IT (Gordon, 2013). In this study, MIS accessibility refers to the degree of ease with which an employee of a TVET College can access and use a TVET College MIS, be it COLTECH, Sage, ITS or any other MIS used by the College system as an organisational factor. According to Erasmus et al. (2015), viewed from the South

African context, TAM suggests that the MIS should be one that will build confidence in the user by ensuring that it is easy to use. It is important for management to consider the usefulness of the system from the users' perspective and how it will benefit them in the future regarding the return on the users' investment in time and effort.

Thirdly, proper training must be provided, and users motivate users to become as skilled as possible to achieve the full benefit of the MIS. Management should design and implement incentives or rewards programmes that will encourage employees to become fully trained in the use of the MIS system to ensure better results and satisfaction with the product. Lastly, it is necessary to ensure the implementation of follow-up practices, after sales service and evaluation of continued support.

To conclude, two factors were identified from the TAM, firstly, how skilled and comfortable the users felt with their computer use and the main reason for using the IS. Secondly, the social influences that are associated with the use of IT, such as threats on the existing technologies for communication, stress associated with fear of the unknown and change and users' commitment in learning and accepting ICT. This research will attempt to understand the use of IT and MIS and the users' behaviour around these systems.

2.12 INTERNATIONAL PROTOCOLS AND CONVENTIONS GUIDING TVET

The TVET colleges were first introduced in South Africa in 2012 as part of the DHET system. The former FET colleges underwent a name change to TVET colleges that brought the South African educational system in line with the International TVET trends. The TVET colleges are viewed as a central component of National Skills Development Strategy of the DHET.

Furthermore, TVET colleges are seen as a primary route out of poverty for economically disadvantaged individuals and as a way of promoting equal opportunities as mandated by the White Paper on post-school Education and Training (DHET, 2013). This mandate responds to the needs of the South African population, regarding training young people for post-school qualifications and pre-employment of youth. It was deployed to assist in the provision of training in both knowledge and skills for employed and unemployed South African citizens.

Several countries still believe that TVET colleges play a crucial role in improving the national economy (Rauner and Maclean, 2008). It is for this reason why the TVET colleges were created, namely to assist in addressing problems associated with poverty and unemployment amongst the youth globally. As a result, educational policy reforms have been undertaken globally. (Human Resource Development Council for South Africa : 13) further indicates that the FET College sector now the TVET sector is a pivotal and diverse segment of the overall education system in South Africa and perhaps the most complex.

The TVET College is seen as a bridge between school and university while forming a link between education and possible work opportunities. For its success, global consensus among different stakeholders involved in TVET colleges is necessary for the objectives to be achieved. It was further indicated that it is important for these objectives to be aligned with the world of work and the curriculum to be designed in such a way that it is weighted towards the needs of the employers and the training of employable skills (UNESCO, 2014).

According to UNESCO (2015), successful TVET systems from other countries do not necessarily translate linearly into Africa, where socio-economic and cultural contexts determine what is possible to implement or adapt. African countries should not import programmes that cannot be fully supported and implemented (Euler, 2013). Nevertheless, Dr Blade Nzimande (2016) confirmed that unemployment continues to be of concern when he stated that “to have three million out of seven million 18–24-year-olds sitting at home doing nothing is a ticking time bomb”.

2.13 AN OVERVIEW OF INFORMATION SYSTEM IN TVET COLLEGES

2.13.1 Role of TVET in Developing Human Capital in South Africa

The change from FET to TVET colleges has been an international process over the past few years as stated by Buthelezi (2016:4). The revolution brought advantages such as the education and training of uneducated young people, and the various development strategies which are seen as the building blocks of economic growth. As a result, in many countries, the TVET colleges are seen to be the best solution to the problems identified above and are a means of being reactive to the economic needs and the developments of the uneducated youth. There was an obligation to use TVET

colleges to be the main role-players in changing the economic statuses of different countries, and to date, the following changes have been attested:

- Management of all TVET colleges, together with that of universities, has now been put under the newly formed DHET.
- The Minister of Education has established the new Higher Education Qualifications Framework (HEQF).
- The SETAs, which had previously fallen under the Department of Labour, has now been brought under the auspices of the Minister of Higher Education and Training.
- TVET colleges have been encouraged to prioritise post-school youth and to present flexible versions of the new curriculum; the NCV is being explored to meet this proposed shift in focus.
- The Ministry of Higher Education and Training has made moves towards reinstating the NATED courses and apprenticeships (Buthelezi, 2016: 65).

2.13.2 The Role of the DHET in TVET Development

As a result of the transformation of FET colleges, the establishment of the TVET sector required funding as a starting point. The processes necessary for this upgrade included the review of policies, transforming the sector and, most importantly, the diversification of the academic programmes to ensure equal opportunity of access to a dynamic and vibrant vocational education and training sector (Mestry and Bosch, 2013:145).

Part of this transformation was the process of implementing various types of IT-based BMS. The FET colleges had been seen as “college administrative systems” placing focus on day-to-day college administration. With the new changes, they had to be equipped to handle additional administrative processes and be able to keep up with technological innovations such as the MIS (Buthelezi, 2011: 52).

A system that will be able to respond to the requirements of modern college business management and the best practice of management and governance reporting had to be implemented to meet the needs of the transformed TVET colleges. A contemporary

system will ensure timeous and effective reporting to both internal college executives and line managers, as well as externally to the parents, employers and other stakeholders, including the DHET (TVET College Conference, 2014).

When TVET colleges select a Business Management System, it is important that minimum standards for required reporting, including dashboards that are complementary to the functional requirements that are linked to college administration are defined. The objectives for Business Management System/MIS must be specified to permit the Executive Management team, Campus Managers and Departmental Heads deeper distinguishability into the performance of the TVET College (TVET College Conference, 2014).

Dashboards are tools used to monitor progress on KPIs in for example the student academic history, his/her applications, enrolment, attendance, and work-based learning, provided by the college and an identified employer, for acquiring skills while still learning. Also, the dashboards can provide enhanced reporting on the TVET College's financial position, specifically relating to income, expenditure, cash flow, arrears and suppliers which the procurement department and the financial department of the TVET are responsible for (TVET College Conference, 2014).

2.13.3 MIS challenges experienced by TVET colleges in South Africa

When the TVET colleges were first introduced, they were meant for learners who could not complete their secondary education. It was meant to be an alternative route that the learners could take. In the delivering of the set objectives to be achieved by the TVET colleges, the following challenges were faced:

- Inaccurate/unreliable or inconsistent data
- Huge variations on weekly enrolment data and annual survey data
- Altered DHET templates
- Delays experienced by the DHET in receiving data from TVET colleges
- Some TVET colleges reported having lost data (TVET Colleges Strategic Planning, 2015).

The challenges identified, revealed that in South Africa the TVET colleges still need to work harder to achieve the objectives set for 'institutions of choice and economic development' in South Africa (Mestry and Bosch, 2013).

Hussein (2016) stated that it is evident that school MISs have transformed school management in some ways that include leadership, decision-making, workload, human resource management, communication, responsibility and planning. There have been changes in the way schools are governed, although there are still challenges with the use of the MIS which include the following:

- **Personnel shortage:** Most of the people who use the MIS are not trained, or fully trained. There is a lack of resources and skills to provide both centralised and decentralised training.
- **The need for continuous training:** Technology is always changing, and that means the users of the MIS constantly need to update their skills to keep up with the demands and changes. Decision makers often overlook these needs.
- **Budget allotment:** Decision makers are reluctant to set aside a budget for the capacitation of the MIS users, who are expected to be innovative and to learn on the job. No budget is allocated for regularly upgrading the MIS to the latest version (Hussein, 2016).

Within an organisation, for the MIS to be introduced, there are various aspects that need to be considered. Firstly, everyone must accept that the MIS is a social-technical entity, meaning that it does not work on its own, but some staff members will be involved in the technological change, which will require a change in skills as well. Secondly, for the MIS to work, both the technical and the social elements need to be addressed from the management level down and will require the restructuring of the organisation as a whole, regarding its management and decision-making systems (Dhungana, 2016).

Both the designers of the MIS system and the management of the organisation (such as the TVET colleges) should be ready to accept and understand the changes that are being made. They should also understand how the changes will affect the organisation and decision-making process and prepare the users of the MIS for the changes that

will be implemented. Decision makers must also consider how the nature of the work groups will change with the new system (Dhungana, 2016).

There is a need for them to be vigilant to avoid organisational failure because of the possibility of failures occurring in the social and political processes employed in the building of the MIS if these were not well planned and the faults anticipated. It is always advisable that the MIS users be involved in the designing process and are allowed to influence the system's definitive shape, to ensure that the system is both linked to, and supports, the organisation's business plan (Dhungana, 2016).

2.13.4 Foresight in an organisation

Magruk (2011:701) defines foresight "as a process that is more concerned about the future of an organisation; it attempts to plan into the long-term of science, technology, economy and society".

It is aimed at finding and categorising different ranges for strategic research relating to new technological tendencies that will bring about benefits to the company as cost-effectively as possible'.

The findings of research undertaken by Du Plessis (2014:80) showed that staff members did not feel that there was a great need for the organisation to change, even when new technologies were implemented. These findings indicate that there is still some resistance to change in TVET colleges although some groups indicated that there is a slow adaptation to the new technologies within the company.

From the findings, conclusions can be made that there is a need for innovative approaches when introducing new technology, although fear of change will always exist in an organisation. Du Plessis (2014:83) further mentions that there is a need for innovative ways in strategic planning because it has become an activity in which almost all levels of employees from all the departments contribute in different ways.

It is possible that the new technology is needed to direct and advise management in decision-making to ensure wise and strategically planned short-term and long-term goals. Research findings by Du Plessis (2014:89) further indicated that innovation drives the internal change that gives an organisation a competitive advantage over the competition. To be competitive, organisations need the right technical knowledge and

an understanding of the needs of the people they serve. To keep up with the current business trends, it is important for management and staff to acknowledge the value of new technology as a source of knowledge and to use it to their advantage to improve innovation and performance within the organisation.

To conclude, there is a need for improvement in how managers understand the environment they operate. The application of entrepreneurial activities, such as evaluating alternative futures, roadmaps, scenarios and real options, will assist in the creation of an environment that is and ready for innovation. The acceptance of foresight as a formal part of innovation will assist the organisation to allocate the relevant resources needed to support the strategy to be implemented and to prepare for it (Du Plessis, 2014:84).

TVET colleges as organisations operate within three environments - micro, macro and the market environment. Understanding and watching the changes in all these environments is crucial and then identifying the changes as they occur and adapting to these changes. As innovation and technology evolve, the TVET sector should not be left behind but should align their business strategies to the changes to remain competitive and offer better services to their clients.

2.14 INFORMATION SYSTEMS AND TVET: SOUTH AFRICAN CONTEXT

2.14.1 Review of information systems for TVET

The findings of the audit done at the FET colleges revealed that there are different computer software programs that are used. They range from SAGE, COLTECH, ITS, FETMIS, VIP payroll, COLTSMS to name a few. But the most popular is COLTECH (Cosser et al, 2011 and Visser 2011: 76). Most of the colleges are using a combination of these products to facilitate different functions based on their needs and preferences. For example, a College might be using SAGE for assets, COLTECH for finance and student registration, and a different system for human resources management such as TVETMIS (Cosser et al, 2011 and Visser 2011: 76). But there are colleges that are only using one system to date.

According to Cosser et al (2011) in Visser (2011:76), two-thirds of the TVET colleges are using COLTECH as their MIS. For that reason, COLTECH will be unpacked a bit more. This is a system that is meant for running on either a LAN or a WAN.

The system can hold the versatility of multi-campus colleges since the TVET colleges are characterised by four to six Campuses respectively.

The following important points were used to comply with the development of the COLTECH MIS:

- The system is designed to be able to handle a large number of information needs according to the campus
- The WAN is designed to operate centralised with the ability to share information with its different campuses
- There is a campus code, which enables campuses to differentiate between their students
- Campus codes are also used to store students' information within the system and financial information of different campuses
- Year courses, semester and trimester courses can be captured accordingly with their time period
- SAQA courses with Unit Standards and lecturer assessments, to meet the requirements and expectations in accordance with the need.

The usage of the different systems in the TVET colleges in South Africa indicates that COLTECH: 27 TVET colleges, ITS: 21 TVET colleges and others 2, TVET colleges Strategic plans (2015).



COLTECH
COMPUTER TRAINING

... an
Innovative Approach to
Student Management Needs ...

Figure 2.6: COLTECH

Figure 2.6 is an image of the COLTECH updated Website (<http://www.coltech.co.za/>). From the website, the following products are listed: COLTECH Student System; COLTECH Photo System; COLTECH Personnel System; COLTECH Library System; COLTECH Financial System; and COLTECH Staff and Management.

The literature review furthermore exposed that various types of information systems exist: ESS, MIS, DSS, and TPS. These Information Systems are linked with different groups of people within an organisation (Euromed Marseille School of Management, 2010a). The management information system is a system that has been operating for decades now. It has been described in many ways as Hussein (2016:19) indicated. It is also known as an information system, and information and decision system by others or computer-based information system. It doesn't matter much what it is called, but it remains to be an important tool that organisation need for managing their information and assisting them in making strategic decisions and planning for the future too.

Hussein (2016:20) further states that "MIS is a system, which provides information support for decision making in the organisation and an integrated system of man and machine for providing the information to support the operations, the management and the decision-making function in the organisation".

2.14.2 Benefits of Management Information System in the TVET colleges

There are benefits that are provided by information and communication technology in an organisation that the TVET colleges are benefiting as well. Firstly, it makes it possible for an organisation to acquire data needed for the functioning of the organisation and decision-making. Secondly, it makes it possible for organisations to compete globally, and to make strategic decisions. These systems improve the quality of decisions that are taken by management; it influences the designing of strategies, the type of leadership that is displayed by managers since they are well informed on the factors that influence the organisation being it inside or outside the organisation (Feizi and Moghadassi, 2012:155).

Informed and efficient decisions are possible to organisations when the correct, accurate and recent information is available. Managers are faced with important

decision-making daily; they are faced with challenging situations that require them to be strategic and thinking ahead for the benefit of the organisation. To produce that kind of performance they require information and assistance, advice and support in taking the final decision (Hussein, 2016:20) which the decision support system will provide with the possible solutions that can be taken for the manager to decide on the best intervention for the situation.

The information system in school management plays an important function in supporting the management of educational activities of the school by processing information according to the specifications given. Moreover, to ensure that information is analysed for managers and to develop student performance evaluators such as progress reports in the TVET colleges, and to identify changes in performance are most helpful to staff.

The realisation of innovation and technology by managers will be achieved by continuous use of information systems, and as a result, they will be able to identify required information through the system.

They will further be able to access the system on their own with much ease, interpret the data correctly and use the data. The data can be used in evaluating and developing efficient use of the system to the benefit of the organisation in a cost-effective way (Hussein, 2016:20).

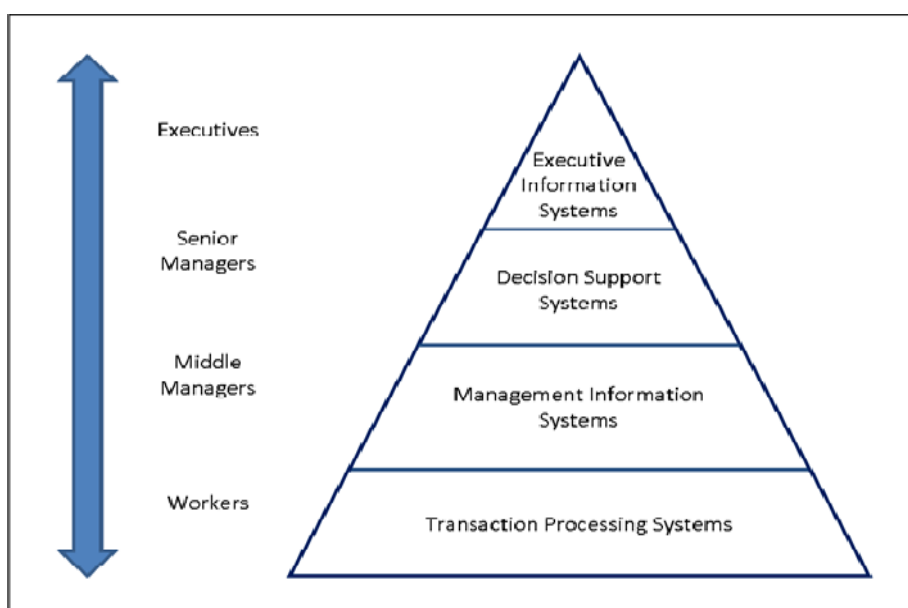


Figure 2.7: A four-level pyramid model

A four-level pyramid model of the different types of information systems with staff levels applicable in an organisation (Euromed Marseille School of Management, 2010a).

Figure 2.7 indicated that MISs are management-level systems, they are meant to be used in the organisation by different people at a different level, including middle managers and supported by other employees in ensuring the smooth running of the organisation's activities. Within the TVET colleges, it is applicable in short to medium term. One benefit of the system is that it provides highly structured information needed by managers since it makes an evaluation of performance possible and efficient. Comparisons of current and previous outputs can be achieved, and the plan against actuals become possible (Euromed Marseille School of Management, 2010b).

Initially, the Information systems were presented to industries as a means of improving operational efficiency. Back then the system was used as a tool for performing operations. It was only later when the perception changed; it is now however seen as a vital component of an organisation with so much value (Visser, 2011:20).

The information system is so important within the organisation that the organisation cannot function effectively without its applications. Most of the company's operations run efficiently because of the presence of the system, for example, the flow of information, the payment of staff members on time, and the capturing and recording of student data in the TVET colleges.

Among its many benefits, the information system has ensured management's dependency on the system that, once there is a short interruption or failure on the system can lead to a business coming to a halt (Visser, 2011:19). The emergence of e-business accelerated this trend.

2.14.3 Current approaches of Information Systems for TVET

The different government departments within the country would request statistics from the 'Technical colleges' as they were called prior to 1994, but it was not an easy task to do since the colleges did not have a formal system of administering their activities. It was a challenge to track back students' academic history since they had paper files,

which would get lost during renovations and moves. The colleges didn't have specific software that was prescribed to them to manage their information. Different computer systems were employed in different colleges, with different programmes. It led to a lot of confusion within the users, and the department (Visser, 2011:76).

After challenges had been highlighted to the department concerning the TVET colleges, the South African Department of Education took the responsibility of developing a standard system that will ensure uniformity in the administering of the TVET colleges. The system will administer students' information, finances, human resources and the management of assets (Department of Education 2008; Department of Higher Education and Training, 2011).

According to Vayghan et al. (2007:671), there is a need to incorporate data into the organisation from different departments using different systems. Welman et al. (2010:66) argued that the incorporation of data from different departments and company segments will enable breaking data silos and aggregation of data from different sources be it external or internal sources. Information and communication technology (ICT) has become central in enabling this integration and coordination. Optimal use of ICT makes it possible to analyse large volumes of data.

There is a global challenge concerning the need to reform the administration and to governing entities (Kekana, 2011:7). The use of ICT in the public services is seen as the major transformation needed. Organisations and departments are frequently modifying their business operations to keep up with the trends and new technology, Knuppe (2011:11). It is for that reason why the TVET colleges had to adapt to the changes in technology to enjoy the benefits like other existing organisations. Benefits such as quicker communication channels, changes in the way in which responsibilities are carried such as reporting, the storing and disseminating of data, easy and accessible teaching and learning material through the use of e-learning systems such as 'Khuphula', Knuppe (2011:11) and Gert Sibande (TVET College Website).

2.14.4 Management Information Systems for TVET: Enablers or Impediments?

The MIS remains to be essential to the organisation because of its ability to measure performance, availability of information in various formats for different people inside and outside the organisation (Görgens and Kusek, 2009:325). Da Cunha (2013:725)

maintains that information systems are a sovereign check on managers' contributions to their organisation. The managers' performance can also be evaluated through the reports that are generated through the system on what they have done during a specific period.

There are factors that managers need to be aware of when using the system, since it influences the value of the output, such when the output is not good, so are the decisions to be made. It is essential to ensure that the system is monitored to ensure desired performance. Ineffective decisions will cost the company a lot of money, and wrong decisions will be made (Da Cunha, 2013:725).

- **Relevance of data**

Data to be used must apply to the organisation. Data can be from the internal and external source; external data should be from identifiable and known sources to the organisation (Botha, 2011:25). The same applies to the internal data: it must be current and make sense to the users. It must have sorted and filtered data from other departments.

- **Timeliness**

Data is the raw facts that have not been processed or refined to be user-friendly to the users. For it to be of use to the users, it must present recent and up-to-date, if not it is not usable. For that reason, the information system must be working timelessly generating information. The reports must be readily available, if not they might contain information that can be outdated (Blackwell et al., 2006:3550). System integration helps to merge information generated in several different sources. Blackwell et al. (2006:3550) information need to be complete; if not it will not be useful, and information systems of the organisation must all be integrated to provide useful information so that the information can be supplied timeously.

- **Quality**

Management has a responsibility to ensure that integrity and control over the information within the organisation since it is easily possible for information to be incomplete, incorrect and unusable. Bentley (1998:133) in Botha (2011:24) state that the format and specification of data must be controlled as information enters the information system.

The format in which information is needed must be clear to the system. Data management programmes are needed, set up accordingly to manage the database that has to store the information as it comes in, to ensure that data is accessible and available whenever it is needed for use. Quality means the correct format, information that can be trusted from reliable source, validity of information and applicability (Botha 2011:24)

- **System security**

For the organisation to run effectively, it needs information. For that reason, information remains to be an important asset to the organisation. Without information the organisation will fail, wrong decisions will be taken.

For data/information to be readily available, a good system is needed, that will be secured and maintained to allow a good flow of information from different sources to different users (Botha, 2011:24).

Ensure control access, to avoid unauthorised access, and unauthorised people are accessing the information they are not entitled to. Another aspect that is to be highly considered since it can threaten the existence of the organisation is hacking that can either be from competitors or unknown sources. Organisations such as TVET colleges have to restrict access to different sites within the systems since they are being used by different people, such as lecturers, data capturers, examination officers and others. An effective security system (ISMS) should do the same (Analytix, 2011:02).

- **Management involvement**

Management's involvement in the design of the system does not only benefit the designer but the organisation as well. Inputs on what the system should be able to do can be given; specifications can be highlighted as well. Challenges with the system can be minimised by discussing the validity of the system and test it to ensure consistency and effectiveness (Botha, 2011:24).

Various measures were identified, to ensure effective implementation of ICT in the TVET colleges To Eesure that the infrastructure and resources needed are in place. Capacitating the users at the college level, the encouragement and motivation to be ICT minded and mostly the introduction of the e-learning unit.

The system is meant to improve the management of data and information within the organisation. A system that will be able to provide what is expected of it, from collecting, analysing, sorting and disseminating to relevant stakeholders. Connectivity has been identified to be the most common problem, especially in the rural areas. Not to forget the competency level of the personnel, which hampers success and effectiveness of the system and decision making (Knuppe, 2011:36).

The need for having the correct skills to assist the College whenever there is problem situation had to be planned for to ensure that the project is a success. That meant the employment of IT interns. The interns assist the school by ensuring that there is connectivity at all times, and access to the system is possible (Knuppe, 2011:35).

2.14.5 Challenges and Opportunities of Managing Information Systems in TVET colleges

A briefing was held, where issues concerning the revamping, upgrading and improving of the systems and the TVET College, in general, were discussed.

Among others it was feedback given on the work that has been done already, such as installing proper local area network systems (LAN) and the wide area network (WAN) briefing of the Portfolio Committee on FET colleges at the Department of Education (2009) (Visser 2011:69). Furthermore, the challenge on the absence of an effective management information system to assist management in decision-making was raised in the TVET colleges.

During the introduction and implementation process of management information systems in the TVET colleges, it was found that different colleges have choices on which system to use. That led to a situation where there is no uniformity in the systems used (Visser, 2011:9). The study is now intended to evaluate the effectiveness of these different systems.

The MIS on its own is so vibrant to the extent that some TVET colleges cannot keep up with its different principles, the ideas it brings out and its strategies. It is for that reason why it is crucial that the users of the MIS be trained and understand its use to make informed decisions. Expertise is needed for one to be able to monitor the MIS, the MIS on its own is expensive to sustain (Botha 2011: 37). It becomes evident when looking at the Private TVET colleges since they cannot afford it. Moreover, to find a balance between the technology and innovation in the system and its use and pure running of business managers is another issue. Lastly, most of the TVET colleges are not improving in their decision-making and reporting system since they do not have the correct tool (MIS) to assist and give recommendations, which was identified in the literature review.

Botha (2011:37) recommended that there is a need for an organisation to monitor the MIS. He believes that proper monitoring will reduce the chances of an organisation falling victim to poor decision-making from a system that is not working effectively, meaning it is not producing what the organisation is expecting. That can be achieved by outsourcing expertise to run the system, it can also be achieved by escalating all decision-making to be centralised, training all members of staff so they can all be watchful, and be able to identify innovation opportunities as they arrive in the industry and employ a system that will specifically be able to produce the specified information in relation to decision making (Botha, 2011:37).

2.15 LEGAL FRAMEWORK FOR POST-SECONDARY SCHOOLING IN SOUTH AFRICA

2.15.1 White Paper on Post-Education Schooling

According to King III, the board should be responsible for Information Technology (IT) governance. IT is an integral part of any business and is fundamental to support, sustain and grow the business.

The King III guide stipulates the responsibility of the board regarding information and technology within the organisation. Amongst others, Its role includes ensuring that the information technology policies and the IT charter are implemented as required. It further explains that the board should align the performance and sustainability of the objectives of the organisation to the policies and the IT charter (Kings III Guide: 2017).

In the first policies formulated by the Ministry of Education, education and training were categorised into three bands which were, General Education and Training (GET), Further Education and Training (FET) and Higher Education and Training (HET). The TVET colleges for vocational education and training, which are the focus of this study, fell under the FET band which was seen to be unclear by many at the time. Since within the same band (FET) was also secondary and the high schools.

The TVET Sector has had major changes in the past years that included institutional, structural and circular changes with the view to improve the quality of the qualifications and teaching and learning. Formerly they were characterised by ethnic and racial segregation as indicated by Sayed (2003:3) and known as Technical colleges.

2.15.2 The Impact of Changes in Legislation for TVET Institutions

The announcement and the approval of the changes in the Constitution in June 2010 to transfer the functions of Adult Basic and Training Act of 2000 (No. 52 of 2000) (SA, 2000) and the Further Education and Training Act (No 16 of 2006) (SA, 2006), from provincial administration to the Minister of Higher Education and Training brought in major changes in the managing and administering of the TVET colleges.

The changes brought in benefits along, such as improved planning and increased articulation with the universities and the skills development sector. The major benefits were the fact that the Minister could give a national focus to the challenges and needs of the TVET colleges and the learners in the sector (Sabinet, 2010).

Secondly, the move from being governed by the Provincial Authorities to the college Council regarding the Further Education and Training Act No 16 of 2006 (SA, 2006) allowed TVET colleges more freedom in governing their TVET Colleges. The educational staff had to migrate as well, from the Provincial Department to the College Council.

Further changes were experienced with the announcement of The Further Education and Training colleges Amendment Act (Act No. 3 of 2012) (SA, 2012). The Act brought in changes that included among others the employment status of the TVET Colleges staff again. Through a rigorous process that lasted for about two years, staff had to migrate from the College Councils to be employed by the DHET (Department of Higher Education and Training, 2012).

The migration of staff caused tensions within the TVET Colleges staff. It was evident enough that some staff members did not want to be moved and would rather prefer to be employed by the College Council. The reasons varied from one TVET to another, but the major reason was the difference in the structuring of the activities and the offering of the institutions. The TVET College will have to fall off some of their offerings, as per indicated in the gazetted programmes, such as the staff teaching non-formal programmes and skills courses (DoE, 2012).

2.15.3 The Role of the State in Enabling TVET Success in South Africa

The Constitution of the Republic of South Africa states it clearly that everyone has the right to basic education and to further education (SA, 1996). The state took a responsibility for ensuring that every child has access to education at a reasonable payable amount, where whenever there is a need the state will assist where possible. The new education system in South Africa was based on the Constitution, be it national or at a provincial level.

The responsibility of governing the TVET colleges has been moved from the provincial department of education to the national department, where a national Ministry of Education has been appointed responsible for policy formulation. The said ministry has been tasked to ensure that the TVET colleges are well funded. Each province has been allocated a provincial director, whom they had to work with directly.

At the FET College Summit (September, 2010), the Minister of Higher Education and Training addressed issues relating to the TVET colleges, including their shift in the management system. The move from the provincial to the national government was the main issue. The key address in the TVET Conference (November, 2014), addressed key objectives in strengthening colleges to include 'improving access, throughput rates, management capacity (especially about planning, financial and

human resource management), student support services and student accommodation, as well as developing management information systems.

Strengthening governance, building partnerships with employers and other stakeholders, increasing the responsiveness of colleges to local labour markets, improving placement of college graduates in jobs, and creating a programme and qualification mix to meet the varied needs of students were among of the main issues to deliberate on. Although the governance of the TVET is in the national government, the DHET still relies on the provincial department in some of the day-to-day management and monitoring of the TVET colleges. For example, provincial structures are still active in the collaboration between national and provincial governments, as well as providing support to the TVET since they are closer as easily accessible. (TVET Conference, November 2014).

2.16 CONCLUSION

This chapter reviewed the literature on the use and effectiveness of MISs in the TVET colleges. The different MIS available and its use were discussed about the TVET colleges, how they influence decision making and performance.

In the modern business environment, it is important to notice how this specifically has an impact on the strategic management, innovation management and technology management.

The literature review also exposed that, apart from the many challenges facing TVET colleges and the users, there are positive experiences from which the users or the TVET colleges can take advantage of and strive for survival in the industry. These positive experiences include the instructions on the White Paper and the transformative government policies which emphasise the use of MIS in all TVET colleges, to develop and empower the users with the latest skills in technology to be able to use the system effectively and efficiently and support them.

The next chapter will present the research methodology, and the instrument used to measure the factors that play an important role in the use of MIS.

CHAPTER 3: RESEARCH METHODOLOGY AND FINDINGS

3.1 INTRODUCTION

The chapter will serve as a guide to how the study will be conducted and will explore the data sampling and data collection processes. It will also present the correlations and relationships that exist between different phenomena, as well as draw conclusions from the information gathered. The results of the data analysis conducted by the Statistical Consultation Services for the North-West University, Potchefstroom Campus, will be presented.

3.2 RESEARCH DESIGN AND METHODS

A mixed method was used because there was a need to obtain a fuller picture of the current state of MIS usage at TVET colleges and its effectiveness in the TVET Sector. An attempt was made to find answers to the following questions:

- Why do TVET colleges use an MIS?
- Why do TVET colleges not use an MIS?
- What type of MIS was chosen and why was it chosen?
- What is the MIS used for?
- Who uses the MIS?
- If an MIS is not used, what processes do TVET colleges use to manage information?
- Is support needed to advance the use of the MIS?
- How can this support be accessed and by whom? (Bryman et al., 2016:62).

This research project will attempt to discover the advantages of the various MISs chosen by TVET colleges to achieve the necessary data coverage and to acquire a deeper understanding of the benefits of using these MISs (Bryman et al., 2016:62).

The mixed-method research approach was chosen for the following reasons:

- Its use eliminates bias in the study because the research cannot be easily influenced by the researcher's personal experiences

- The methods used will overcome the boundaries usually caused by the use of a one-method research approach (Bryman et al., 2016:62)

3.3 PROCEDURE AND SCOPE OF THE QUALITATIVE RESEARCH

Only a few questions are asked in this study, based on the qualitative method. Qualitative research was also chosen in this study as it allowed the researcher to collect and interpret information established from responses to the questionnaires.

Questionnaires will be completed by participants to find out what the real situation is in TVET colleges about the use of MISs (Anyan, 2013:1). There was a need to ask qualitative questions to collect data based on the respondent's opinions regarding the use of the MIS. Qualitative research looks at "discovering and understanding the meaning of the targeted population in a study" (Creswell, 2009:4). The objective of such research is to advance the understanding of the phenomenon. Creswell further describes qualitative research as a form of "interpretative inquiry" in which the researcher interprets what is seen and heard according to his/her understanding, unlike quantitative research in which the main focus is the collection of data through surveys. Bryman et al. (2016:31) indicate that the qualitative research approach is more about verbal expressions and not the collection and presentation of statistics common to the quantitative approach.

When using the qualitative method, the measurements, volume and intensity of the situation are not thoroughly analysed because they are not the main focus of the study, but the participants' interpretation of the procedures and practices are observed in detail. The main aim of the research is to explain the causes of the phenomenon being studied, together with the relationships that exist between the study and the respondents. The qualitative method relies on the collected data that expresses the respondents' opinions, feelings and personal judgements instead of quantifiable data (Bryman et al., 2016:31).

Bryman et al. (2016:31) further indicate that qualitative research views social reality as both constantly shifting and emergent, as interpreted by individuals. In this approach, the behaviour and attitudes of the respondents will be investigated by an experienced researcher to interpret meanings and make sense out of these as a way of collecting data.

In this study, the respondents will be asked to complete a questionnaire, in which there will be some qualitative questions, to assist the researcher to collect as much data as possible about the feelings, opinions and attitudes of the target population regarding the use of MISs in TVET colleges situated in Mpumalanga specifically.

3.4 PROCEDURE AND SCOPE OF THE QUANTITATIVE RESEARCH METHOD

In a quantitative approach, the main objective is to interpret the data collected in the form of numbers or statistics (Welman et al., 2010:8).

The data analysis in this study will be conducted by the Statistical Consultation Services at the North West University, Potchefstroom Campus. Different variables are measured and analysed, and the causal relationships between the variables will be determined to conclude confirming or negating the hypothesis.

There is limited flexibility in the quantitative research method. The level of bias is also reduced in the presentation of findings. Direct life experiences are not observed and presented through the quantitative method, and the researcher is restricted from reality and presenting an outsider perspective. The researcher is not directly attached to the research (Welman et al., 2010:8).

There are positivist approaches and anti-positivist approaches in research studies. The positivist approach occurs in quantifiable research in which the research methods are natural-scientific, whereas the anti-positivist approach occurs in qualitative research which concentrates on human behaviours, such as feelings and experiences. The positivist approach neglects experiences and feelings, for that reason, researchers do not become attached to human behaviour directly during the study (Welman et al., 2010:6).

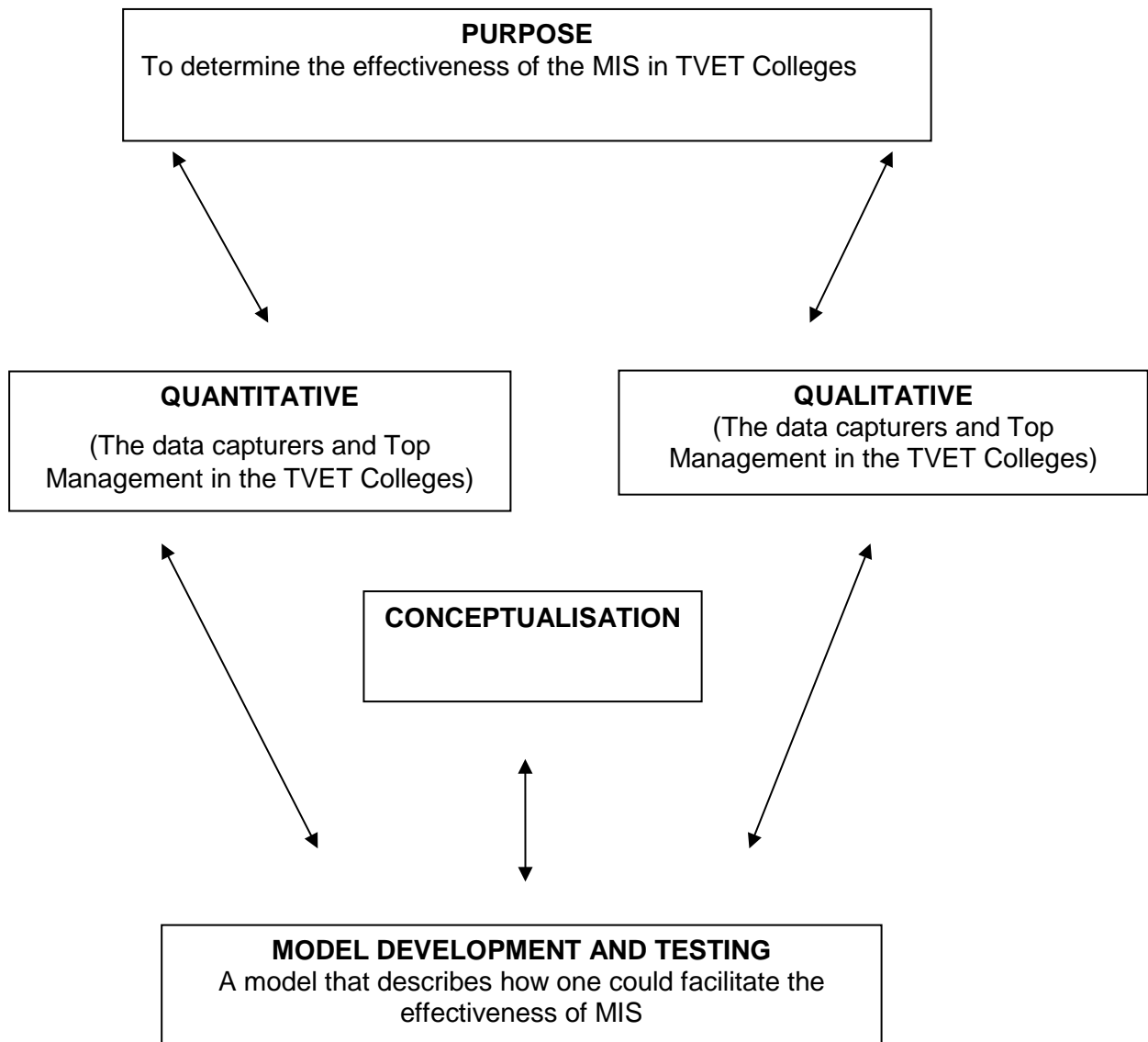
The study is aimed at involving as many employees as possible from the DHET in TVET colleges in Mpumalanga, who are using the MIS when performing their duties and/or making decisions.

Finally, the study will attempt to assess the effectiveness of the MIS in TVET colleges, and the TAM model's relevance and application. The manner in which IT is accepted and influences decision-making will be explored.

Conclusions will be made on the effectiveness of the use of MISs, to assist the researcher in determining how dynamic the staff of TVET colleges are in their use of IT systems. The use of a mixed method research approach provides an opportunity for triangulation, where a multiple of methods are used concurrently in one study (Bogdan & Biklen, 2006:3533).

Bryman et al. (2016:62) further define triangulation as occurring when the two approaches are used together, with the intention of supporting the findings of each other during a research investigation. Triangulation of data thus enables cross-referencing of data and allows the researcher to give a broader presentation of the study that would not have been possible using only one method. In this study, both qualitative and quantitative findings will be analysed.

Figure 3.1: Research map giving an overview of the study



3.5 SAMPLE GROUP AND SIZE

The sample will be drawn from the following South African TVET colleges, in the Mpumalanga Province, South Africa. The respondents will be drawn from the three TVET colleges since they possess similar characteristics such as working in similar institutions and environments (Whitley and Mary, 2013). A mixed sampling procedure was employed for different sets of data sources. A probability systematic random sampling method was used for quantitative data to give every staff member using the MIS to perform their duties, an equal chance of being part of the study.

The following categories of employees were included in the sample:

- Employees who are permanent at the College (Sample of 60).
- Employees who are using the MIS to perform their duties at the College (Sample of 60).
- Employees who are in a management position (Sample based on availability).
- Employees who are capturers of data and decision makers (Sample based on availability).

3.5.1 Sampling for quantitative data

The principle of sampling is based on the understanding that the researcher will not be able to include all potential participants in the study because of the limited size and time, and would rather work with a representative sample. In this research study, the size of the sample is relatively small because participants needed to have expertise in performing MIS related duties at work. Therefore only 60 full-time employees of the TVET colleges were considered suitable participants for this research study.

3.5.2 Sampling for qualitative data

Firstly, this research study is aimed at a few respondents because the units of the study, an intention of increasing variety by including almost all management levels from the TVET colleges was made. Four experts in the educational sector, namely the Curriculum Managers, the MIS data capturers, the Deputy CEO of Academics as well as the COLTECH/ITs clerks, were sampled to conduct the study. These people were deliberately chosen, based on the notion that they have relevant experience and were likely to possess useful and rich information for the study.

The sample size was carefully determined by the researcher to guarantee that it is as representative as possible by the requirements of the quantitative research approach. The size represents more than a number of respondents in the research, such as the validity of the research and the conclusions drawn after that. In this study, it would not be possible to involve all the TVET colleges' staff members since many of them do not use the MIS in performing their duties and, thus, are not skilled in its operation. Nevertheless, using all TVET employees could be used as a recommendation for future research.

The formula for calculating sample size:

$$n = \frac{Z^2 \pi (1 - \pi)}{e^2}$$

Where:

n = It is the required sample needed

Z= It is the (S) standard deviation for accuracy

π = the proportion of sample of interest

e= is the acceptable error, i.e. 10% (Levine *et al.*, 2011:312)

The qualitative research design that the researcher followed was an Appreciative Inquiry study which seeks to understand experiences from the participants' point of view. In its broadest focus, Appreciative Inquiry involves the art and practice of asking questions that strengthen the system's capacity to apprehend, anticipate, and heighten positive potential.

3.6 SURVEY INSTRUMENT

The researcher followed two approaches in designing the survey instrument: the qualitative approach – only a few questions took this form in the survey while the majority was based on the quantitative approach.

A four-point scale survey questionnaire was used to collect data in a quantitative approach format, with a few qualitative approach questions, with the aim of reducing

any uncertainties in the research. This approach was chosen to assist the researcher in meeting set objectives listed in Chapter 1. The few open-ended questions will be analysed separately, using the qualitative data analysis method.

Survey research is the best method available for this research study because:

- The population from which original data must be collected is too geographically dispersed to make direct observation possible since they are employed in three different TVET colleges in Mpumalanga.
- The standardised questionnaire offers the possibility of making refined descriptive assertions about expatriates' job attitudes.
- A constructed standardised questionnaire provides data in the same form for all respondents, making comparisons possible. Surveys are feasible.
- There is a possibility of anonymity and privacy which will increase responses on sensitive issues.
- Many questions can be asked on a set topic, giving the researcher considerable flexibility in the analysis (Bryman et al., 2016:192).

The decision to use a questionnaire was because of its perceived advantages, respondents can answer at their convenience, it is relatively cheap to use, and a great deal of data can be collected within a short space of time. The researcher had to get Ethical Clearance from the North West University Research Support Office before the research could take place (Bryman et al., 2016:192).

Plans were made with the different TVET colleges, to mail the survey questionnaires to the respondents electronically. The covering letter, detailing the reason for the study and voluntary participation, was attached to the questionnaire. An allowance of 10 days was given to the respondents to complete the approximate 5-minute questionnaire. Telephonic interviews were used in very few cases to increase the response rate.

3.7 DEMOGRAPHICAL PROFILE OF RESPONDENTS

The population of the study consisted of 51 respondents (27 Males and 25 Females) from the three targeted TVET colleges. Who answered the questionnaires? These figures represent 52.9% male and 47.1% female respondents.

Figure 3.2 depicts the age differences, the majority of the respondents are between the ages of 26 – 30 years (27%), between 30 – 35 years (12%), between 35 – 40. (17%) and between 46 – 50 years (10%). The lowest age group is between 51 – 55 (2%).

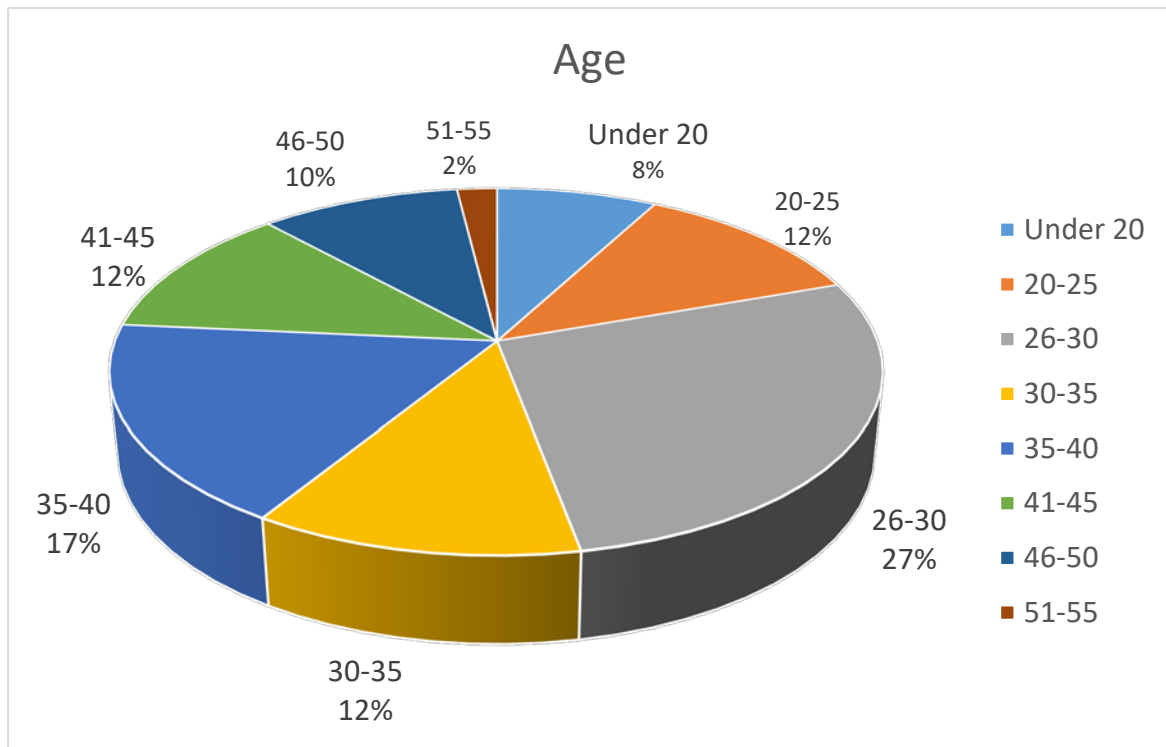


Figure 3.2: Population Age

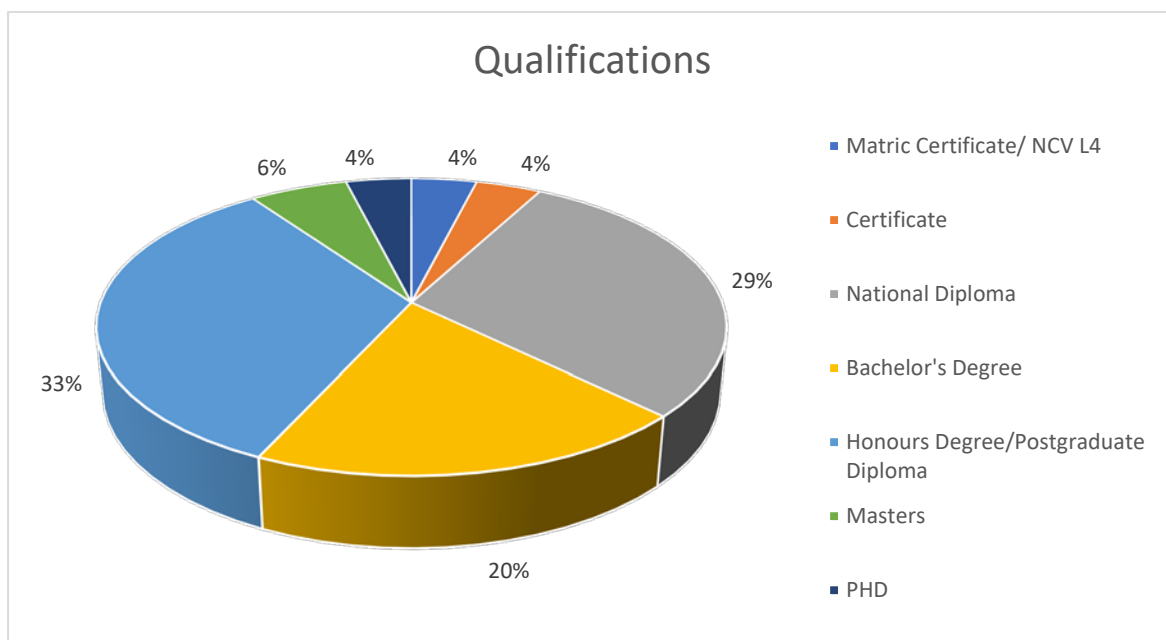


Figure 3.3: The qualifications

Figure 3.3 above, represents the qualifications of the participating employers from the three TVET colleges where data was collected. It shows that the majority of the users of the MIS have an academic qualification. 33% have an Honours Degree/ Postgraduate Diploma, 29% have a National Diploma, and 20% have Bachelor Degrees. At the lowest level, 4% have a PhD qualification, 4% a Certificate and 4% a Matric/NCV L4 certificate.

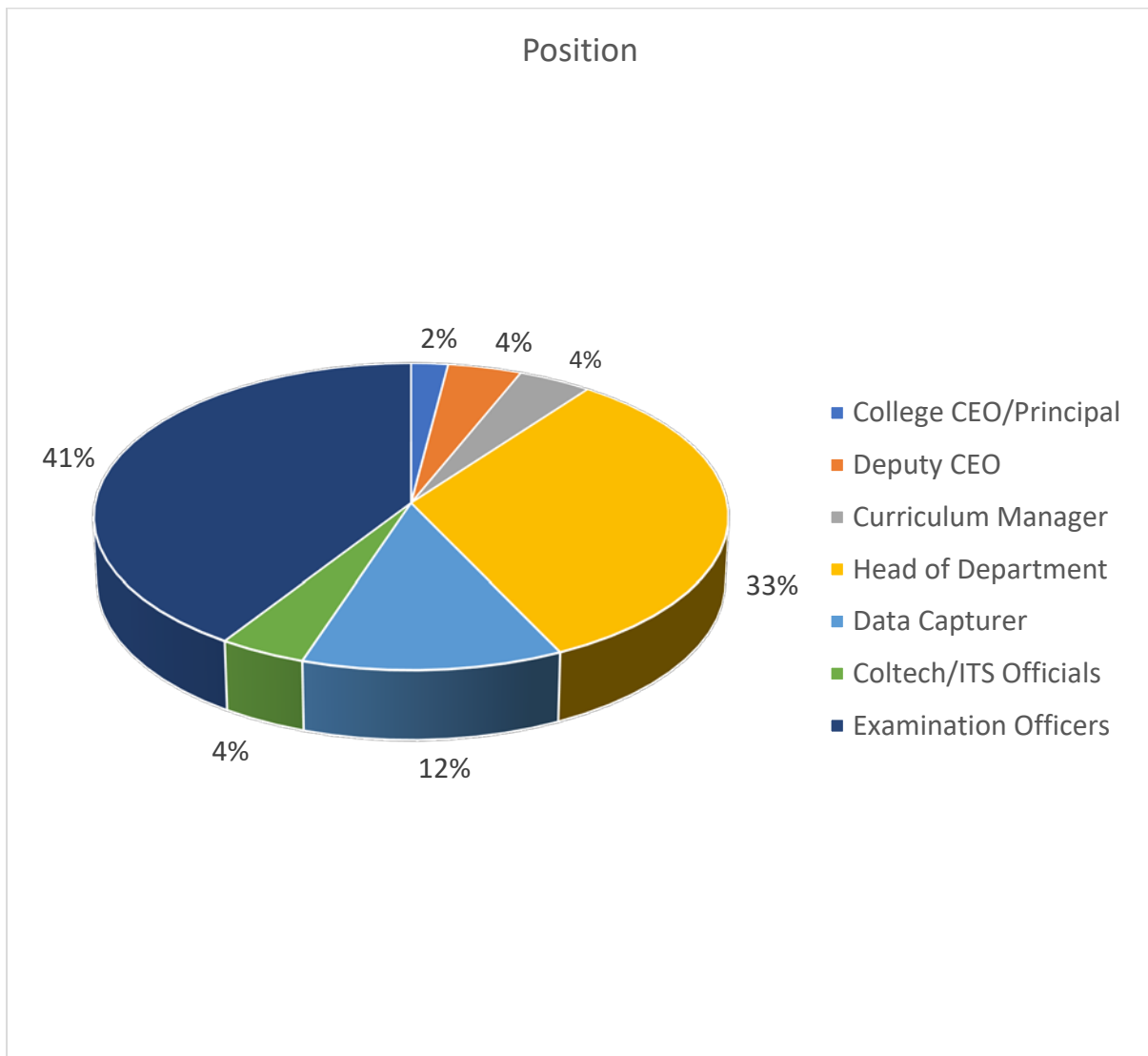


Figure 3.4 The Positions

Figure 3.4 above shows the different positions held by the participating employees that are working directly with the MIS system at the TVET colleges. 41% of these are data capturers, 33% are Heads of Department. The smallest categories were College Principal at 2%, Deputy CEO at 4% and Curriculum Manager with 4%.

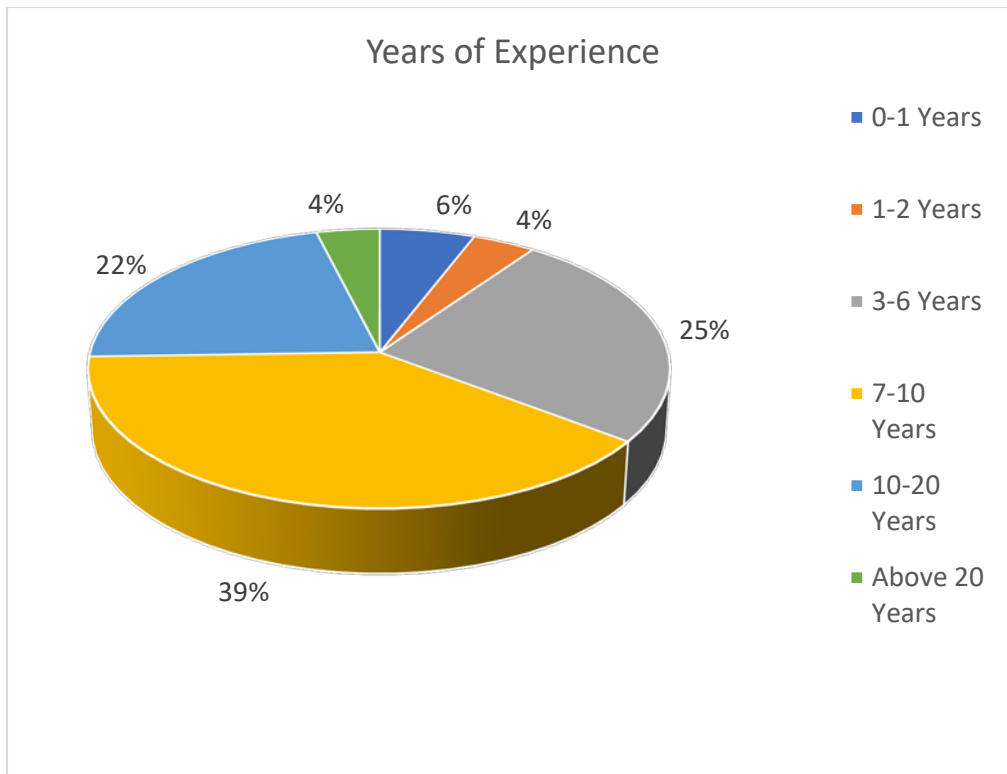


Figure 3.5 Experience (Years)

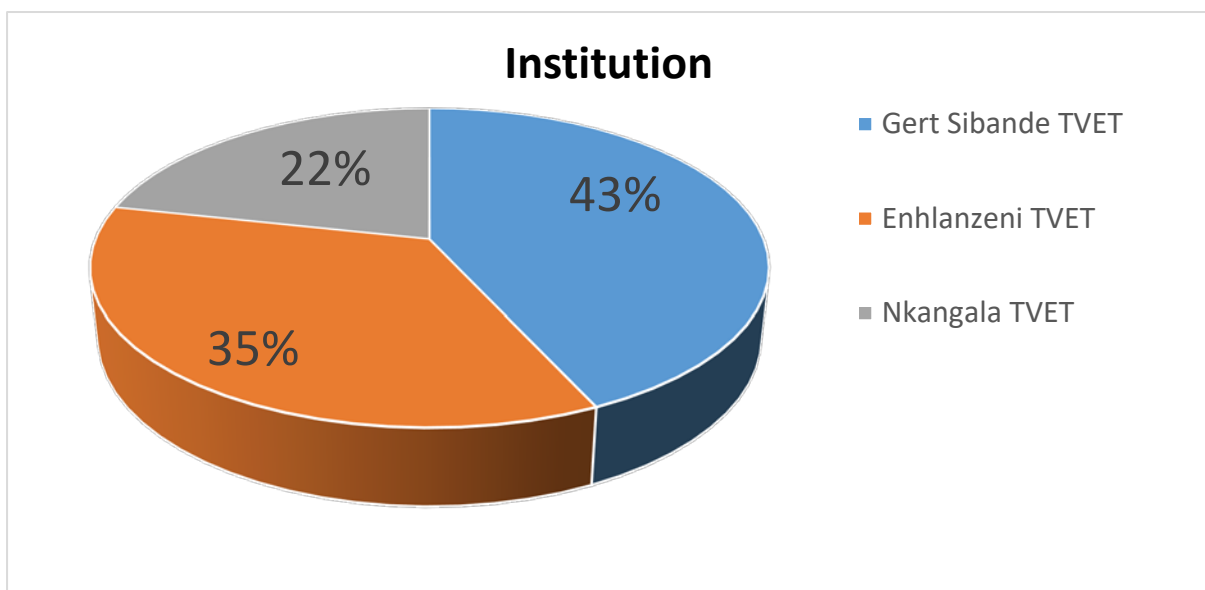


Figure 3.6: The TVET College

Figure 3.6 represents the three TVET colleges regarding the number of employees participating in the study. Gert Sibande TVET College had the most survey participants with 43%, Enhlanzeni TVET College has 35% participants, and Nkangala TVET College had 22% participants.

3.8 EMPIRICAL STUDY: RESULTS

The data analysis presented in this study was analysed by the North-West University Statistical Services, through the use of the SPSS software package. The following reports were generated: presentation of descriptive statistics and frequency analysis. The results listed below will be discussed regarding the answers provided by the participants in the study that was conducted at the three TVET colleges situated in the Mpumalanga Province.

3.8.1 Frequency analysis and descriptive statistics

The descriptive analysis and the frequency analyses are discussed below, based on the data collected from the questionnaires completed by the respondents. These discussions will include presentations of the highest mean variables, and the lowest mean (X) with its standard deviation (S). It will also include the correlations and relationships between variables.

3.8.1.1 Assessment of questionnaire results Section B

In the Table below, the results of data collected in Section B will be discussed. The discussions will start with questions displaying the highest mean values as respondents indicated how much they agree with the statements concerning the use of the MIS.

Questions with the highest mean:

Question 16: There are advantages in implementing a formal MIS. $X = 3.52$ and $S = 0.580$

Question 12: The MIS can be trusted to generate information that is useful for decision-making. $X = 3.44$ and $S = 0.644$

Question 13: The information provided by the MIS improves the performance of the organisation. $X = 3.36$ and $S = 0.663$

Question 15: There is a positive relationship between the use of MIS and the performance of business. $X = 3.36$ and $S = 0.663$

Question 19: You apply the recommendations given by the MIS. $X = 3.31$ and $S = 0.657$

Question B9: Decision makers within the organisation rely on the MIS to make informed decisions. $X = 3.26$ and $S = 0.642$

Question 20: There are challenges with the system (MIS) at times. $X = 3.18$ and $S = 0.800$

Question 17: The data can be imported from external sources into your MIS. $X = 3.10$ and $S = 0.789$

From the analysis, the results will focus only on the influence of the MIS on decision-making in the organisation. The results indicate that there are employees within the organisation who value the MIS and the information provided by it. The data provided seems to be useful to them, since they can export it from the MIS system and use it for decision-making purposes.

It is evident that information provided by the MIS is important for decision-making. Even though most of the respondents believe that there are challenges with the use of the MIS, they do rely on the system for recommendations because it can provide them with 'what if scenarios.'

Table 3.1: Management Information system (MIS) and decision making

Please read the following statements and indicate whether you Strongly Disagree, Disagree, Agree or Strongly Agree.

Statement	No of Participants	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard deviation
9.Decision makers within the organisation rely on the MIS to make informed decisions	51	0	5	25	17	3.26	0.642
10.The decision makers within the organisation are skilled enough to use them and interpret information provided by the system	51	0	7	27	15	3.16	0.657
11.The MIS can generate information in a format required by all the decision makers	51	1	4	32	12	3.12	0.634
12.The MIS can be trusted to generate information that is useful for decision-making	51	1	1	23	25	3.44	0.644
13.The information provided by the MIS improves performance of the organisation	51	0	5	22	23	3.36	0.663
14.When the system is down, there are alternative ways set up for decision-making	51	5	16	12	17	2.82	1.024
15.There is a positive relationship between the use of MIS and the performance of a business	51	0	5	22	23	3.36	0.663
16.There are advantages in implementing a formal MIS	51	0	2	20	28	3.52	0.580
17.The data can be imported from external sources into your MIS	51	2	7	25	16	3.10	0.789
18.Users are aware of where external data comes from	51	2	12	21	14	2.96	0.841
19.You apply the recommendations given by the MIS	51	0	5	23	20	3.31	0.657
20.There are challenges with the system (MIS) at times	51	1	9	20	20	3.18	0.800

The questions below represent the lowest mean from the respondents' answers. They indicate the degree to which the respondents agree with the questions:

Question 14: When the system is down, there are alternative ways to set up for decision making. $X = 2.82$ and $S = 1.024$

Question 18: Users are aware of where external data comes from. $X = 2.96$ and $S = 0.841$

From the findings above, it can be concluded that the organisation is not fully functional without the use of the MIS. It is believed that in most cases in the TVET colleges, there are not enough resources for decisions to be made without the MIS, be it HR or financial resources that can assist in getting the information from another source or through other available means.

It is indicated that some of the users are not aware of the course of the data they use; nevertheless, they have sufficient trust in the data to use it. That is an indication that data is considered an important resource in the organisation.

3.8.1.2 Assessment of questionnaire results Section C

The results below are the interpretation of the respondents' responses concerning the use of different software for managing information in the TVET colleges. The questions with the highest mean are discussed.

Question 25: Expertise is needed within the organisation, to manage the different software/MIS effectively for success. $X = 3.36$ and $S = 0.525$

Question 24: The decision of using more than one software/MIS has been driven by technological knowledge and change. $X = 3.27$ and $S = 0.569$

Question 23: Using more than one software/MIS within the organisation has continually led to improved customer services. $X = 3.22$ and $S = 0.764$

Question 30: The internal cultural environment in the organisation supports the use of the systems in managing information. $X = 3.16$ and $S = 0.650$

Question 22: There is a need for using more than one software/MIS in the TVET colleges: $X = 3.10$ and $S = 0.928$

From the results above, it is evident that users believe that for the MIS to be effective in providing reliable information the users need to be skilled to a certain degree. They believe that the use of the MIS increases efficiency and improves customer service. The Mean of 3.27, indicates that there is more than one IS software program used by the TVET colleges and that despite the current culture of the TVET Sector to support the use of the technology, there are still employees who are not trained in using the MIS as is indicated by the 3.36 Mean.

It is surprising that there are still staff members in the three participating TVET colleges who do not believe that there is a need to use more than one software program in organisations that promote technology, as indicated by the 3.10 Mean, especially in institutions that provide technical and vocational training where IT skills are a major emphases.

The results below indicate the responses with the lowest mean:

Question 29: The organisation has sufficient resources supporting the systems. $X = 2.96$ and $S = 0.894$

Question 27: There are feedback systems between new technologies and the new market need. $X = 3.04$ and $S = 0.815$

The majority of the respondents believe that there is a lack of resources to support the use of software programs in TVET colleges. The mean of 2.96 shows that 23.5% of users are dissatisfied with the state of the resources in the TVET colleges that are meant to support the implementation and use of the relevant IS technologies. The results further indicate that the feedback systems in place within the institution is not aligned with what the both the DHET and the market is expecting. The organisation does not keep up to date with the changes in the market environment.

Table 3.2: The use of different software programs in managing information and decision making

Please read the following statements and indicate whether you Strongly Disagree, Disagree, Agree or Strongly Agree.

Statement	No of Respondents	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard deviation
22. There is a need for using more than one software/MIS in the TVET colleges	51	5	3	22	18	3.10	0.928
23. Using more than one software/MIS within the organisation has continually led to improved customer services	51	2	4	25	19	3.22	0.764
24. The decision of using more than one software/MIS has been driven by technological knowledge and change	51	0	3	30	16	3.27	0.569
25. Expertise is needed within the organisation, to manage the different software/MIS effectively for success	51	0	1	30	19	3.36	0.525
26. It is expensive to manage these systems as an organisation	51	2	12	16	21	3.10	0.900
27. There are feedback systems between new technologies and the new market need.	51	1	12	20	16	3.04	0.815
28. Different departments within the organisation use different systems	51	4	7	22	18	3.06	0.904
29. The organisation has sufficient resources supporting the systems.	51	3	12	20	16	2.96	0.894
30. The internal cultural environment in the organisation supports the use of the systems in managing information.	51	0	7	28	15	3.16	0.650

3.8.1.3 Assessment of questionnaire results for Section D

The results below indicate the respondents' response to the questions concerning strategic management and foresight. The questions with the highest mean are discussed below:

Question 36: Foresight is a non-formal part of strategic planning. $X = 3.10$ and $S = 0.805$

Question 37: Foresight is used to determine future strategies. $X = 3.17$ and $S = 0.694$

The results have indicated that foresight exists in the TVET colleges. It is used to determine future strategies and strategic planning. Although it is part of informal strategic planning, only top management is responsible for strategic planning and the lower management is not part of this process. Although the majority of respondents (78.5%) agree that foresight is important within the organisation, around 22% of them believe that foresight is not part of strategic planning, and 15.7% that foresight can be used to determine future strategies.

Questions with the lowest mean are discussed below:

Question 38: Strategic planning is participatory with lower levels. $X = 2.84$ and $S = 0.800$

Question 34: Managers can adapt to changes in technology and innovation. $X = 2.80$

Question 33: Managers understand the changes in the industry. $X = 2.81$ and $S = 0.741$

Question 35: The innovation system of our organisation is quick at identifying, and fast-tracking innovations systems. $X = 2.81$ and $S = 0.915$

The above results indicate that the lower levels of management are not necessarily part of the strategic planning process in most of the TVET colleges. Some respondents feel that their contributions toward innovation and technology are not valued. Hence the organisations have to strive to be innovative to be competitive. Although TVET colleges are using the MIS as required by the DHET, they are not prepared or ready to explore what more can be done through these systems.

The findings of the survey further revealed that managers cannot adapt easily to innovation. There is still training that they need to undergo to understand the latest technological innovations that are occurring in the ever-changing external market environment. The organisation's systems are not as innovative as they are supposed to be. The TVET colleges are not aligned and ready to compete with the business world because many of the managers are unaware of the latest IT trends, and their organisations are not ready regarding knowledge and resources to achieve what other organisations have about innovation and technology.

Table 3.3: Strategic Management and Foresight

Please read the following statements and indicate whether you Strongly Disagree, Disagree, Agree or Strongly Agree.

Statement	No of Participants	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard deviation
33. Managers understand the changes in the industry.	51	1	15	23	8	2.81	0.741
34. Managers can adapt to changes in technology and innovation	51	2	16	21	10	2.80	0.816
35. The innovation system of our organisation is quick at identifying, and fast-tracking innovations systems	51	3	16	16	13	2.81	0.915
36. Foresight is a non-formal part of strategic planning.	51	1	10	20	17	3.10	0.805
37. Foresight is used to determine future strategies.	51	0	8	24	16	3.17	0.694
38. Strategic planning is participatory with lower levels.	51	2	14	23	10	2.84	0.800

3.8.1.4 Assessment of questionnaire results Section E

The findings presented below are the respondents' responses to the questions relating to the TAM Model. They provide insight into how the TVET College employees are accepting technology and innovation in their work environment and their decision-making processes. The results with the highest mean are discussed:

Question 44: The MIS makes it easier to make conclusions and write reports. $X = 3.26$ and $S = 0.600$

Question 42: The information produced is of good quality and accurate. $X = 3.34$ and $S = 0.688$

Question 41: The features of the MIS suits the needs of the organisation. $X = 3.34$ and $S = 0.625$

From the analyses of the results, the following facts were concluded: 56.9% of the respondents agree that the MISs that are used are assisting in decision-making. Decision and reports can be made from the high-quality information they produce which can be trusted by the users. Some 88.2% of the users feel that the features of the MIS do meet the needs of the organisation. However, the results show that is still a small number of employees who feel that the features of the MIS can be upgraded to cater for more options.

3.8.1.5 The results with the lowest mean

Question 43: The use of the MIS does not have much influence on users' abilities and job effectiveness. $X = 2.82$ and Question 40: It is easy to access the MIS within the organisation for use. $X = 3.18$ and $S = 0.691$

From the results above, it can be seen that some users feel that it is not always easy to access the MIS. This problem is due to some factors as indicated in the qualitative data, such as when the electricity supply power is switched off, and the lack of a stable internet facility, especially in the rural areas of Mpumalanga.

Section E: The Acceptance Model (TAM) and the MIS usage

Please read the following statements and indicate whether you Strongly Disagree, Disagree, Agree or Strongly Agree.

Statement	No of Participants	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard deviation
39. Technology is seen as a way to go within the organisation	51	0	3	23	20	3.37	0.610
40. It is easy to access the MIS within the organisation for use	51	0	8	25	17	3.18	0.691
41. The information produced is of good quality and accurate	51	0	4	25	20	3.33	0.625
42. The features of the MIS suits the needs of the organisation	51	0	6	21	23	3.34	0.688
43. The use of the MIS does not have much influence on users' abilities and job effectiveness.	51	2	17	19	12	2.82	0.850
44. The MIS makes it easier to make conclusions and write reports	51	0	4	29	17	3.26	0.600

3.9 CORRELATIONS AND RELATIONSHIPS

3.9.1 Correlations and relationships of Section B

There is a good relationship between the variables. Looking at the highest and the lowest variables the average is 3.22.

Question 9: Decision makers within the organisation rely on the MIS to make informed decisions with the mean of 3.26, and

Question 10: The decision makers within the organisation are skilled enough to use the system and interpret information provided by the system with the mean of 3.16.

These are the two questions in which the mean is close to the average mean. There is a slight gap between the two averages, but when compared to the rest of the questions with the highest mean of 3.52 and the lowest mean of 2.82, which are about being able to make decisions when the MIS system is not operating, and the highest mean in relation to the advantages of using the MIS. Conclusions can be made that the MIS users know the importance of the system, and without the MIS decisions cannot be made easily. Informed decisions need relevant information which can only be produced by the MIS. This means there is a relationship between the informed decisions taken in the TVET colleges and the use of MIS.

3.9.2 Correlations and relationships of Section C

There is a correlation between the variables.

Question 29: The organisation has sufficient resources supporting the systems, with the lowest mean of 2.96

Question 25: Expertise is needed within the organisation, to manage the different software/MIS effectively for success, with the highest mean of 3.36

When looking at the questions, it is evident that 92% of the respondents believe that there is a need to be trained to become an expert in the use of MIS, which is a challenge since resources are limited. Lack of resources negatively affects the performance and effectiveness of the MIS. The relevance of the TAM Model is applicable.

Question 26 with a mean of 3.10 and Question 30 with a mean of 3.16 with the average mean of 3.14. When analysing the correlation between the average mean and the mean of the two questions, a conclusion can be made that they positively correlate regarding the gap between the lowest and the highest mean. It is acceptable to believe that while the MIS is well received and accepted by the culture of the organisation, it is expensive to implement and maintain.

3.9.3 Correlations and relationships of Section D

There is a correlation between the variables and the average mean of 2.92. The responses to the questions below are the closest to the average mean.

Question 36: Foresight is a non-formal part of strategic planning with a mean of 3.10.

Question 38. Strategic planning is participatory with lower levels 2.84.

Although, Question 35 represents the low mean, with 56.9% respondents who believe that innovation does occur and that the organisation is quick to adapt to the changes in the market and Question 37 represent the highest mean, with 78.5% respondents who believe that foresight is used to determine future strategies. Although respondents believe that the organisation does not adapt to innovation easily, they still believe that foresight is part of strategic planning.

There is a relationship that exists between the two questions with the highest and a low mean occurring in these two questions. The level of response is 71.5%.

3.9.4 Correlations and relationships of Section E

There is a close relationship between the responses to the questions in this section when looking at the two questions that are closest to the average mean:

Question 40: It is easy to access the MIS within the organisation for use, with the mean of 3.18 and

Question 44: The MIS makes it easier to make conclusions and write reports with the mean of 3.26.

There is a relationship with the rest of the questions. The average of 3.22 provides a basis to conclude there is a correlation between the variables. There is a relationship

between the use of technology and TAM, and even though it is not easy to access the MIS, as indicated but the findings of 15.7%, respondents still feel that technology is important and its use should be endorsed by both management and staff.

Question 42: The features of the MIS suits the needs of the organisation, recording the highest mean together with Question 43: The use of the MIS does not have much influence on users' abilities and job effectiveness records the lowest mean. 86.3% of the respondents agree that the features of the MIS suit the needs of the organisation, and contributes to the effectiveness of the TVET College. 60.5% believe that the use of MIS does not influence a person's abilities and job effectiveness, which shows that there is still a lack of understanding on the benefits and use of the MIS.

3.10 QUALITATIVE ANALYSIS

Open-ended questions were asked. The following questions represent the qualitative approach in this research.

Question: What challenges do you experience with the system in decision-making?

When asked about the challenges that the respondents are experiencing with the system the following answers were given:

- Power failure
- Lack of expertise
- System is down most of the time during busy times
- System is too slow, due to either infrastructure or network
- System not generating information in a format they require

Question: List the different computer software/MIS that are used at your TVET College:

When asked about the different software used, the following answers were given:

- COLTECH,
- SAGE,
- ITS,
- TVETMIS

Question: Are there specific reasons for using them?

- SAGE is used for paying employees
- COLTECH is used for capturing students' data and academic records
- SAGE is also used for assets
- ITS is used for capturing data and generating academic records of students
- TVETMIS is used as a database, records and stores data

Question: Did you receive formal training before using the system?

- Majority of the people did not receive formal training, only informal training from their supervisors and colleagues.
- Few received formal training
- Others were not trained at all, but they are using the system

From the three TVET colleges, the following facts were highlighted in the completed questionnaires:

Different TVET colleges are using different MIS and a combination of the different software programs available. Gert Sibande TVET College, is using COLTECH to capture student information. Enhlanzeni TVET College is using ITS for the same purpose, while Nkangala is using ITS as well. The Three TVET colleges are using the rest of the MISs combined for the other purposes.

Different reasons were given for using the different systems, as indicated above already; different departments are using different systems. The systems are designed to serve specific needs as required by the organisation.

From the questionnaires completed, it resulted that the 43.1% believe that there is a need to use more than one system within the organisation, which is supporting the qualitative data collected.

It was further indicated that 49.0% of the respondents of the questionnaires indicated that more than one system is used in the organisation. From the findings it is evident there is a need of using more than one system, and to increase the level of

communication and training for all the personnel to know about the different systems applicable and their use, never mind whether you are directly using the system to perform your duties or not.

From the responses given above, it is evident that more than one system is used and for different reasons. Different people are using different systems, for example finance department used Sage to pay employees, and the Examination Officers and data capturers are using COLTECH to capture student data. The Asset Officer and asset clerks are using Sage to control assets and to keep records.

3.11 CONCLUSION

This study has revealed interesting findings. The TVET colleges are known to be Technical and Vocational Education institutions in which the teaching of skills is the main priority. Looking at the findings that were presented by the study, the people who present these skills are a little reluctant to take advantage of the benefits of the current technological era and make use of IT and the various ISs available. Although they are gradually coming to accept the benefits of IT, they are currently less competitive compared than other Higher Education and Training Institutions.

According to the TAM Model, people accept technology because they see a need for it, and often their acceptance is based on their perception of how easy the technology is to use. This study revealed that technology has many advantages, such as quick decision making, that the TVET colleges are currently benefitting from. This conclusion also applies to the concept 'Foresight' that is enabling the TVET colleges to plan and make forecasts based on the relevant information they are accessing through the MIS.

About the effectiveness of the MIS, the responses to the questionnaires indicate that it is effective regarding gathering the information needed to manage the TVET colleges. The DHET can now rely on the data provided by these colleges since it was indicated in Section B and Section C of the questionnaire that most of the MIS users trust the information generated and presented by the system. This data is also used by the management of TVET colleges for decision-making.

Unfortunately, there are still MIS users who are not well trained which negatively affects the proper use of the system. Some functions cannot be used as intended, such as receiving feedback from the system. The MIS has certain features that are

more advanced than the other features, and these require more expertise than some of the MIS users possess. The DHET has a role to play in ensuring that the challenge of under-trained users is addressed to ensure the optimum effectiveness of the MIS.

Since data were collected from three different TVET colleges, it was a challenging task to ensure that the identified participants received the questionnaires and responded to them within the set time frame. The majority of the MIS users were busy entering examination marks for the semester and trimester programmes and the Academic Managers were assisting with the verification of these marks. The researcher had to travel to the TVET colleges to collect the questionnaires because problems relating to returning them via email or normal post was delaying the research process. The advantage, of collecting questionnaires personally was that the researcher could reach more respondents.

3.12 CHAPTER SUMMARY

This chapter outlined all the relevant issues concerning the research methodology used in this research project. Firstly, the study described the survey instrument (a questionnaire) and presented it, the size of the sample, and the procedure for collecting data. The qualitative and quantitative findings of the study were presented, analysed and discussed.

The demographics of the respondents were presented through pie charts, the frequency analysis and descriptive statistics were also discussed with the correlations and relationships that existed in the research findings.

Lastly, the qualitative findings and analysis were presented together with the quantitative analysis based on the qualitative responses of the respondents. Conclusions were then drawn from the two approaches.

CHAPTER 4: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS.

4.1 INTRODUCTION

Chapter 4 concludes the research undertaken to investigate the effectiveness of the MISs used in three TVET colleges in the Mpumalanga Province. The limitations identified regarding the MISs, together with applicable recommendations will be highlighted.

The conclusions will be drawn from the information provided in the literature review presented in Chapter 2 in correlation with the findings of the research study described in Chapter 3. The use and management of the various MISs, together with their influence on management's decision-making and the TAM will also be discussed.

4.2 CORRELATION BETWEEN THE LITERATURE REVIEW AND RESEARCH RESULTS

The literature review was compiled through the use of different documents related to the TVET colleges. These included case journals, previous research findings, different policies, relevant legislation that influenced transformation in the TVET colleges, such as DoE Guidelines, White Papers and Audit Reports (FWC, 2013).

The literature review revealed that the use of an MIS is important in TVET colleges. It provides many benefits such as gathering relevant data and generate reports which ensure that informed decisions are made. The literature review further indicated that different TVET colleges are using a variety of ISs for different reasons. The MIS is an expensive resource but is needed by all TVET colleges if they are to improve their customer services and remain competitive in the provision of vocational training.

The findings of the study, attained through the survey questionnaire distributed to the three TVET colleges, revealed that all the colleges use an MIS which, although different systems serve the same purpose, namely to store student information in a format that makes it easier to submit reports to the DHET.

According to the literature review, the DHET is concerned that TVET colleges submit statistical information in different formats, the accuracy of which cannot always be validated.

The state of the MIS and ICT installed in the three TVET colleges was also investigated, to understand how effective the MIS is currently compared to how efficient it was before the DoE made it mandatory for all TVET colleges to implement an MIS. The research study revealed that there was no standardisation in the implementation of the MIS which means that there is a variety of reporting systems being used, which utilise different reporting formats. The study revealed that despite the use of different MISs, all the systems are effectively integrated to meet the requirements and needs of TVET colleges. Also, the TVET colleges know what information the DHET expects and how it must be presented in reports.

The literature review also revealed that historically the TVET colleges were disadvantaged in many ways, there was no proper planning, and activities were not properly coordinated. To conclude, the findings of the descriptive statistics revealed that the MIS is mainly used for decision making and strategic planning in the TVET colleges.

4.2.1 Conclusion on MIS and the decision-making process in TVET colleges

The availability of information within the organisation ensures that the decisions taken will impact positively on the organisation. Correct, valid, authentic information lead to quality decision-making since managers need current and reliable data to make informed decisions. Managers of TVET colleges should inspire and encourage employees to always provide quality service with integrity to ensure that they access and generate information that can be trusted for decision-making processes.

The literature review revealed that using the MIS ensures that decisions are made faster because managers can attain helpful recommendations from the MIS. The respondents indicated that they use these recommendations for decision-making.

The literature review also indicated institutions need to acknowledge that the MIS is a technical tool that requires expertise and commitment from the users. The MIS is a dynamic tool that offers both advantages and disadvantages regarding data access

and usage. TVET colleges need to ensure the validity of the information generated, and thus must be selective when giving employee's access to the MIS.

The study indicated that some staff members are using the system without formal training or with no training at all. Such employees learn by doing, which can lead to information being incorrectly entered, leading to wrong decisions being made. This situation raises questions as to whether such employees know the importance and value of the MIS they use, or even more importantly, the implications of entering incorrect data. There is a need for professional monitoring of the MIS users' performance.

4.2.2 Conclusion on MIS and difference in software

The literature review revealed that to prevent waste of both time and money, institutions should remember that 'when deciding [on] which software to use, it is always advisable to check if the software is compatible with the current MIS (Rhodes, 2010; Jahangir, 2005). The literature review revealed that TVET colleges are using different ISs to manage their data. It further indicated that they often use more than one software program to complete different tasks. These programs include COLTECH for capturing students' information and SAGE for salaries and asset management.

4.2.3 Conclusion on Foresight

The use of foresight was investigated in the literature review, which revealed that technology and innovation are major factors in ensuring the success of 21st-century organisations, as is the case in the three Mpumalanga TVET colleges under review.

Although the study indicated that TVET colleges are not fully ready for technology and innovation, because in some instances employees they are still reluctant to rely entirely on technology, they are slowly embracing the advantages of the technological era.

It was also revealed that managers utilise foresight for planning, decision-making and forecasting the future and identifying trends.

4.2.4 Conclusion on TAM

In respect of TAM, the literature review indicated that TVET colleges, like other institutions, need to be ready for incorporating technology into their daily practices. These colleges should be ready to move from a traditional decision-making style to a more innovative approach.

The study also highlighted that the MIS should be accessible to its users at all times and be able to provide up-to-date good quality data when needed. An effective MIS consistently provides relevant information that enables managers to execute their duties.

4.3 CONCLUSION ON SECONDARY RESEARCH OBJECTIVES

4.3.1 Research objective 1

To determine the problems associated with the IS:

The research investigation revealed that TVET colleges are experiencing challenges that limit the effectiveness of the MIS. Some colleges cannot keep up with the designated DHET principles and strategies due to the vibrant nature of the MIS. In some colleges, a range of ISs is used, each of which fulfils a different task, instead of using a composite MIS.

The literature review further revealed some problems that prevent the TVET colleges from using the MIS. These problems include lack of infrastructure, a lack of budget and skilled personnel to operate the MIS, lack of trust in the MIS causing the continued use of traditional methods.

This study also noted that the MIS operates through the internet and when this system is not functioning, managers do not have other alternatives that can be used to assist in decision making. Although MIS users utilise the information generated by the MIS some employees are not aware of the source of data; at times the MIS works very slowly.

4.3.2 Research objective 2

To determine how the IS influences the decisions of management in the TVET Sector:

The literature review indicated that the MIS could gather, interpret, analyse and disseminate information to various decision makers in different departments and different stakeholders. It was highlighted that incorrect information in the MIS would result in incorrect decisions being taken, thus, ensuring the reliability of data produced by the MIS is crucial for effective decision making. Based on the information gathered from the MIS, the colleges can plan for the next terms, next semester's and next year's enrolment numbers. The colleges can also plan intervention strategies in underperforming areas based on the statistics drawn from the MIS.

The study indicated that the MIS adds to the performance of the organisation. The users of the MIS agreed that they can make decisions easily because they are skilled at accessing and interpreting information provided by the MIS and that they rely on the MIS to provide benefits such as this.

To conclude, even though most TVET colleges have the benefit of an MIS, they still lack clear decision-making strategies and are thus unable to reap the full benefit of the MIS regarding decision-making.

4.3.3 Research objective 3

To investigate the uses and benefits of the MIS in the TVET Sector.

The literature review highlighted the many advantages of the MIS in the TEVT Sector, which was later confirmed by the study. However, there are still challenges regarding the use of the MIS in TVET colleges. The study indicated that a well-designed MIS has many benefits, it accelerates decision-making by ensuring the timeous receiving and sending of information to and from different internal and external stakeholders in formats applicable to the stakeholders.

The study revealed that the MIS assists with the administration and management of the TVET colleges by enabling managers to make strategic decisions. They can easily compare different departments' performances and become more competitive in the education sector. The study further indicated that the TVET colleges now utilise technology to generate informative and reliable reports.

4.3.4 Research objective 4

To investigate the accessibility and availability of the information when needed by the users and the application of the TAM in TVET colleges:

The literature review and the findings indicated that it is not always easy to access the MIS system. Some reasons for this limited access have been identified from the study, such as the rural or semi-rural location of most of the TVET College Campuses, together with the unreliability of both the network and internet access.

The literature also indicated that it is difficult for TVET colleges to adopt and accept technology because some staff members still do not trust technological systems. However, the research findings indicated that most TVET College employers who use the MIS are happy to embrace technology while a few respondents feel that technology is taking their place regarding decision making, the majority believe that the MIS is only there to assist them and that they can still use traditional decision-making methods.

4.4 CONCLUSION ON THE PRIMARY OBJECTIVE

To investigate the effectiveness of the IS in managing information and decision-making:

Although it was found that MIS is very effective in TVET colleges, the investigation indicated that the monitoring of the system requires a great deal of expertise, the planning and institutionalisation of the system need professional people who can personalise the MIS according to the organisation's needs. It was found in both the literature review and the research study that most of the TVET colleges lack the necessary expertise since it involves high costs that the TVETs are unable to incur due to their limited financial status.

The study indicates that the MIS is effective in TVET colleges when the users are well trained and skilled personnel are responsible for administering and managing the system. When correctly implemented and managed, the MIS provides relevant quality data that is useful for decision making. Managers can timeously identify trends, forecast plan and budget appropriately. Managers can generate quality reports for different stakeholders from the easily accessed information provided by the MIS. The

literature review revealed that before the MIS, the DoE struggled to administer the TVET colleges and former FET colleges.

4.5 LIMITATIONS

Limitations that influenced this research study will be discussed as experienced in the study, both from the literature review in Chapter 2 and the empirical study in Chapter 3.

4.5.1 Limitations of the literature review

Through the literature review, the researcher found that there are few studies that have been undertaken in South Africa, specifically on the use of MISs in the TVET colleges. Data on the subject is mainly related to different business institutions, and there is not much information provided on TVET colleges.

4.5.2 Limitations of the empirical research

- The findings of the study on the effectiveness of MIS in the TVET colleges can only be generalised to the three Mpumalanga TVET colleges.
- The second limitation is that only a few qualitative questions could be asked, and this limited the recording of the respondents' views, feeling and opinions on the use of MIS.
- Thirdly, the number of participants in the research sample could have been larger, specifically from Enhlazeni TVET College and Nkangala TVET College.
- The time during which the study was conducted coincided with the busiest time in the Curriculum Department, and so respondents from this department did not have sufficient time to participate in the study in the way they would have liked to. This time limitation led to the decision of including very few qualitative questions in the questionnaire.

4.6 RECOMMENDATIONS

- Firstly, there should be measures in place to ensure the accuracy and validation of the data from the MIS since it plays an important role in decision making which helps determine the success of the TVET colleges.

- Strategic planning within the colleges should also be extended to the lower levels of management.
- The MIS should be distributed to lower levels of management so that all TVET College employees are well informed about the technical and innovative opportunities that apply to the institution.
- It is also recommended that all employees should be trained to use MISs to increase their acceptance of technology and satisfaction with the MIS, for example, lecturers should be enabled to access student information from their classrooms when necessary.
- It is also recommended that top management be part of the designing and development of the MIS so they can contribute to the features that the MIS should have, to increase the effectiveness of the MIS at College level. ICT personnel should be encouraged to become aware of the functional managerial needs of the MIS.
- The TVET colleges should be given an option to employ or outsource an ICT professional to oversee the MIS and its decision-making processes to assist those managers who do not understand the role the MIS technology plays in decision making.
- Lastly, older staff members, especially those in management, should be encouraged and assisted to become computer literate and to accept technology since it was revealed in the study that older people working in TVET colleges are hesitant to accept technology.

4.7 FUTURE RESEARCH

For future research, the researcher recommends the use of the qualitative approach only to collect data, so that the researcher will obtain deeper insight on the subject. It would also be beneficial for future researchers to expand the population and include other TVET colleges in South Africa when seeking to determine the MIS' effectiveness in decision-making.

For future research, the following topics can be further investigated:

- The effect of MIS in business practices in the TVET colleges

- An impact evaluation of the presence of the MIS, regarding the actions taken in response to output reports that monitor and evaluate TVET College success indicators
- The construction of TVET college success indicators that could be incorporated into the MIS
- The impact of training in ICT skills on the use of MIS systems in TVET colleges.
- The type of skills that need to be developed to ensure the effective use of MISs.

4.8 CHAPTER SUMMARY

Although there are many positive aspects concerning the use of MIS in TVET colleges, there are some challenges that need to be addressed by the designers of the system, the DHET and the TVET colleges. These challenges include network problems, IT skills shortages, recommending more MIS features and making them available to the TVET colleges, such as generating a wide variety of report templates so that users can access them from the system without having to produce them manually.

It is believed that the MIS is an integrated system that can provide information to assist and support managers in the operation and management of the various departments and levels of management. The MIS's main function is managing the TVET colleges' objectives.

To conclude, the findings of this research project are important in two ways:

- Firstly, to the DHET in South Africa, to the three TVET colleges that were part of the study, and the users of the MIS respectively.
- Secondly, although the questionnaire used was designed specifically for this study, it can be adapted in future studies to evaluate the effectiveness of MIS in the other TVET colleges in South Africa, to see if there had been changes or developments.

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APPENDIX A

- Informed consent form –

Letter of Introduction and Informed Consent

NWU School of Business and Governance

Title of the study

The effectiveness of information Systems used for managing information in Mpumalanga TVET Colleges.

Research conducted by:
Ms VS Mboweni,
Student NO: 28253132,
Cell NO: 081 042 3848

Date:17/ 10/2017

Dear Participant

You are invited to participate in an academic research study conducted by Vongani Sharon Mboweni, MBA student from the School/Department of Business and Governance at the North- West University- Potchefstroom.

The purpose of the study is to investigate the effectiveness and impact if information systems in managing information and decision-making in the TVET Colleges.

Please note the following:

- This is an anonymous study survey as your name will not appear on the questionnaire. The answers you give will be treated as strictly confidential as possible.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions in the attached questionnaire as completely and honestly as possible. This should not take more than 5 minutes of your time
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.
- Please contact my study leader, Mnr P Du Plessis, 018 299 4012, if you have any questions or comments regarding the study.

Please indicate that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis.

(Please tick)

Yes

Date of consent:

APPENDIX B

- Questionnaire -

Section A: Biographical Details

1. What is your gender?

1	Male	2	Female
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2. Please indicate your age group.

1	Under 20	2	20 – 25	3	26 – 30
4	30 – 35	5	35 – 40	6	41 – 45
7	46 – 50	8	51 – 55	9	55 – 60

3. Please indicate the highest level of qualification you have acquired.

1	No Matric	2	Matric Certificate/NCV L4
3	Certificate	4	National Diploma
5	Bachelor's Degree	6	Honours Degree/ Postgraduate Diploma
7	Masters	8	PHD

4. Which of the following is your field/fields of expertise?

1	Arts (Languages; Social and Government studies; Music; Communication; Philosophy)
2	Natural Sciences (Physical and chemical; Biological; Geo- and Spatial; Computer; Statistical and Mathematical; Environmental; Engineering Related)
3	Education Sciences (Human and social science; Education studies; Natural science and technology; research in education science)
4	Economic and Management Sciences (Business School; Accounting; Economics; Business Management; Human Resources)
5	Technology Management; Information, Communication and Technology.

5. Please indicate your position at your institution:

	Position	Full time	Part time
1	College CEO/Principal		
2	Deputy CEO		
3	Curriculum Manager		
4	Campus Manager		
5	Head of Department		
5	Data Capturer		
6	Coltech /ITS Officials		
7	Examination Officers		
8	Other		

6. If you have chosen other, please elaborate.

7. How many years have you been working at your organization?

1	0 – 1 Years	2	1 – 2 years
3	3 – 6 years	4	7 – 10 years
5	10 - 20 years	6	Above 20 years

8. Indicate the Higher Education Institution you are working at in the Mpumalanga Province?

1	Gert Sibande Tvet	2	Nkangala Tvet
3	Enhlanzeni Tvet		

Section B: Management Information system (MIS) and decision-making

Hussen E (2016: 20) alludes that for effective decisions to be made, managers need updated information produced by the organisations management information system. For decisions to be made, recent, reliable, relevant information must be available for the decision makers to make informed decisions. Information must be available at the right time, in the right format to the relevant stakeholder, or else the information is useless.

Please read the following statements and indicate whether you Strongly Disagree, Disagree, Agree or Strongly Agree.

Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
9. Decision makers within the organisation rely on the MIS to make informed decisions	1	2	3	4
10. The decision makers within the organisation are skilled enough to use the and interpret information provided by the system				
11. The MIS can generate information in a format required by all the decision makers				
12. The MIS can be trusted to generate information that is useful for decision-making				
13. The information provided by the MIS improves performance of the organisation				
14. When the system is down, there are alternative ways set up for decision-making				
15. There is a positive relationship between the use of MIS, and the performance of a business				
16. There are there advantages in implementing a formal MIS				
17. The data can be imported from external sources into your MIS				
18. Users are aware of where external data comes from				
19. You apply the recommendations given by the MIS				
20. There are challenges with the system (MIS) at times				

21. In Question 20, If the answer is Agree, what challenges do you experience with the system in decision-making?

Section C: The use of different software’s in managing information and decision-making

Cosser et al. (2011) stated that different Public TVET Colleges uses different computerised systems, with many different computer software products according to the TVET Audit. These systems are used by different groups of people for different purposes.

Please read the following statements and indicate whether you Strongly Disagree, Disagree, Agree or Strongly Agree.

Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
22. There is a need for using more than one software/MIS in the Tvet Colleges	1	2	3	4
23. Using more than one software/MIS within the organization has continually led to improved customer services				
24. The decision of using more than one software/MIS has been driven by technological knowledge and change				
25. Expertise is needed within the organisation, to manage effectively the different software/MIS for success				
26. It is expensive to manage these systems as an organisation				
27. There are feedback systems between new technologies and the new market need.				
28. Different departments within the organisation use different systems				
29. The organization has sufficient resources supporting the systems.				
30. The internal cultural environment in the organization supports the use of the systems in managing information.				

31. List the different computer software/ MIS that are used at your Tvet College

32. Are there specific reasons for using them?

Section D: Strategic management and Foresight

Many organisations view foresight to be crucial. Foresight is defined as a crucial function used to assist organisation in planning and organising its resources as they that is used to plan for the future. It is more than the planning, it also assist in recognising the relevant technological trends within the industry and ensure that all stakeholders are up-to-date for integrated decisions to be taken. (Könnölä et al., 2010:252).

“Strategy means making clear-cut choices about how to compete.”

Jack Welch

Please read the following statements and indicate whether you Strongly Disagree, Disagree, Agree or Strongly Agree.

Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
33. Managers understand the changes in the industry.	1	2	3	4
34. Managers are able to adapt to changes in technology and innovation				
35. The innovation system of our organisation is quick at identifying, and fast-tracking new innovations systems				
36. Foresight is a non formal part of strategic planning.				
37. Foresight is used to determine future strategies.				
38. Strategic planning is participatory with lower levels.				

Section E: The Acceptance Model (TAM) and the MIS usage

'The technology acceptance model (TAM) is the most widely recognised model addressing why users accept or reject technology', according to Lee and Lehto, 2013, the model is aimed at explaining the acceptance process of information systems and technology by users.

Please read the following statements and indicate whether you Strongly Disagree, Disagree, Agree or Strongly Agree.

Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
39. Technology is seen as a way to go within the organisation	1	2	3	4
40. It is easy to access the MIS within the organisation for use				
41. The information produced is of good quality and accurate				
42. The features of the MIS suits the needs of the organisation				
43. The use of the MIS does not have a much influence on users' personal abilities and job effectiveness.				
44. The MIS makes it easier to make conclusions and write reports				

45. Did you receive formal training before using the system?

Thank you

APPENDIX C: Letter from language editor



Dynamic Language &
Translation Specialists

Antoinette Bisschoff
71 Esselen Street, Potchefstroom
Tel: 018 293 3046
Cell: 082 878 5183
language@dits.co.za
CC No: 1995/017794/23

Sunday, 24 June 2018

To whom it may concern,

Re: Letter of confirmation of language editing

The dissertation **Measuring the effectiveness of Management Information Systems used for decision making in Mpumalanga TVET Colleges** by **Vongani Sharon Mboweni** was language edited. The referencing and sources adhere to NWU guidelines. Final corrections remain the responsibility of the author.

Antoinette Bisschoff

Officially approved language editor of the NWU (since 1998) and UKZN (2018)
Member of SA Translators Institute (no. 100181)

Precision ... to the last letter