CHALLENGES AND OPPORTUNITIES OF ADOPTING

MANAGEMENT INFORMATION SYSTEMS (MIS) FOR PASSPORT PROCESSING:

COMPARATIVE STUDY BETWEEN LESOTHO AND SOUTH AFRICA.

By

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Submitted in accordance with the requirements for the degree of

M.TECH IN BUSINESS ADMINISTRATION

at the

CENTRAL UNIVERSITY OF TECHNOLOGY

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May 2014

DECLARATION

I, Ratakane Baptista Maime, declare that this dissertation titled: “Challenges and opportunities of adopting Management Information Systems (MIS): Comparative study between Lesotho and South Africa” is my independent and original work. All the sources that I have consulted or quoted have been indicated and acknowledged by means of complete references. To my knowledge, this dissertation has never been submitted at any other University or Faculty for degree purposes.

ACKNOWLEDGEMENTS

It is not just a formality for me to thank God my father for every finished business. In fact time will fail me if I were to express my gratitude to him – who provided me with all the necessary strength, resources and people who guided me on this long journey. People like my supervisor and co-supervisor under whose oversight I felt like a son being sharpened from uncooked to something of significance – so, thank you Prof Naong and Mr Muriithi. I dedicate this work to my wife and my mother. For me to start and complete this work, the sacrifices that my wife took cannot cease to touch my heart. Whenever possible, my mother has always denied herself any pleasure for my sake. For financial support, my sincere appreciation goes to the CUT Research Office and National Research Foundation (NRF). For the wonderful statistical work and guidance, I also acknowledge Dr Sjolader of the University of the Free State (UFS). For the brilliant language editing work, I sincerely thank Dr David Barraclough. Mr Mlambo of Bloemfontein Home Affairs and Mrs Mamookho Phiri of the Lesotho passport office are also acknowledged for making it possible for me, not only to conduct my study, but also for supplying me with all the necessary information.

ABSTRACT

Fast and secure public service delivery is not only a necessity, but a compulsory endeavour. However, it is close to impossible to achieve such objectives without the use of Information Technology (IT). It is correspondingly important to find proper sustainability frameworks of technology. Organisations do not only need technology for efficient public service; the constant upgrading of systems and cautious migration to the newest IT developments is also equally indispensable in today's dynamic technological world. Conversely, countries in Africa are always lagging behind in technological progresses. Such deficiencies have been identified in the passport processing of Lesotho and South Africa, where to unequal extents, problems related to systems of passport production have contributed to delays and have become fertile grounds for corrupt practices.

The study seeks to identify the main impediments in the adoption of Management Information Systems (MIS) for passport processing. Furthermore, the study explores the impact MIS might have in attempting to combat long queues and to avoid long waiting periods – from application to issuance of passports to citizens. The reasonable time frame between passport application and issuance, and specific passport management systems, have been extensively discussed along with various strategies that have been adopted by some of the world's first movers in modern passport management technologies. In all cases and stages of this research, Lesotho and South Africa are compared.

The research approach of the study was descriptive and explorative in nature. As a quantitative design, a structured questionnaire was used to solicit responses in Lesotho and South Africa. It was established that both Lesotho and South Africa have somewhat similar problems – although, to a greater extent, Lesotho needs much more urgent attention. Although the processes of South Africa need to be improved, the Republic releases a passport much faster and more efficiently than Lesotho. Economic issues are also revealed by the study as unavoidable factors that always affect technological developments in Africa.

The study reveals that the latest MIS for passport processing has facilitated modern, automated border-control systems and resultant e-passports that incorporate more biometric information of citizens to passports – thanks to modern RFID technologies. One can anticipate that this study will provide simple, affordable and secure IT solutions for passport processing.

Key words: Information Technology (IT); Management Information Systems (MIS); E-Government; E-Passport; Biometrics; and RFID.

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CHAPTER 1:

INTRODUCTION, BACKGROUND AND PROBLEM STATEMENT

1.1 Introduction

Smart use of Information Technology (IT) can significantly raise a company's competitive advantage by making it possible to improve customer service, cut costs, and streamline internal processes in order to respond to changing business needs. Not surprisingly, over time businesses have strategically made considerable investments in IT (Gunasekaran, Love, Rahimi & Miele, 2001:349). However, it would appear as though the public sector in most developing countries – for example, Lesotho and South Africa – has not yet responded to this wave of change and developments with the required impetus. Passport offices are characterised by long queues – an indication that the speedy production and issuance of passports remains a big challenge – but more so for Lesotho than South Africa. Before presenting IT as a possible remedy, however, it is important to concisely define a number of terms that are commonly associated with IT – such as Information Systems (IS) and Management Information System (MIS).

1.2 What is an Information System?

An Information System (IS) is a computer based set of hardware, software and telecommunications components – supported by people and procedures to process data and turn it into useful information (Oz & Jones, 2008:14; O'Leary & O'Leary, 2005:301). The purpose of information systems is to support activities such as gathering the right information efficiently, and storing it so that it can be used and manipulated to help an organisation achieve its business goals (Oz & Jones, 2008:14). Several different types of information systems include Transaction Processing Systems (TPS), Supply Chain Management (SCM) systems, Customer Relationship Management (CRM) systems, Business Intelligence (BI) systems, Decision Support Systems (DSS), Expert Systems (ESs), and Geographic Information Systems (GIS). Nevertheless, these systems can be linked to each other or to other information systems in order to achieve business objectives (Oz & Jones, 2008:35-36).

1.2.1 Information Systems (IS) versus Information Technology (IT)

In the strictest usage of the terminology, Information System is not the same as Information technology (IT). IT is "a term that refers to all technologies that collectively facilitate construction and maintenance of

Information systems" (Oz & Jones, 2008:15). For the purpose of this study the terms will be used interchangeably, but with great caution, so that the intended purpose is not lost or distorted in the process.

1.2.2 What is a Management Information System (MIS)?

Oz & Jones (2008:35-36) hold that the MIS uses recorded transactions and other data to generate information in order to solve problems and make decisions. Correspondingly, Basco (2011:1) concurs that all information systems that cover the application of IT to support major functions and activities of either private or public sector institutions, could be referred to as MIS. According to O'Leary and O'Leary (2005:307), MIS uses data from systems that record day-to-day transactions called Transaction Processing Systems (TPS) – in order to support managers. They summarise detailed data in standard reports such as a production schedule, to ensure the apt management of an organisation. All facets of MIS run concomitantly in order to ensure overall efficiency (Nouduri, 2011:2).

1.3 Benefits of Information Systems

In business, information systems support the process of collection, manipulation, storage, distribution and utilization of an organisation's information resources, business processes and operations (Basco, 2011:1). Progress in stabilizing the macroeconomic environment and strengthening the efficiency, accountability, and transparency of government can benefit a great deal from the introduction of information technology applications. Information systems which can help governments design, implement, and assess policy reforms are now powerful instruments of public policy. Such information systems could increase the speed, volume, quality, transparency, and accountability of government transactions – so yielding large productivity increases in government services (Oshikoya & Hussain, 2008:4).

Information Technology provides excellent tools for collecting, storing and presenting facts. But to be truly effective, those facts must be manipulated into useful information that indicates the best allocation of various resources – including personnel, time, money, equipment and other assets. Regardless of the operations being managed, information systems are important tools (Oz & Jones, 2008:15). Research by Oshikoya and Hussain (2008:1) shows that the recent advances in information technology are becoming central to the process of socio-economic development. Information technology offers new ways of exchanging information and transacting business, changes the nature of the financial and other service sectors, and provides an efficient means of using the human and institutional capabilities of countries, in

both the public and private sectors. For example, in fiscal monitoring, governments can use information systems to design and follow up the process of tax collection and validate its revenue collections against its expenditure. In budgetary planning, information technology provides simulation techniques to simultaneously maximize revenue and minimize the tax burden on selected income groups and economic sectors. Also, in public procurement the adoption of information technology can help simplify purchasing procedures through electronic advertising, qualification, tendering, selection and payment. In debt management, information systems can be used to coordinate the process of borrowing and debt-payment transactions with the various bilateral and multilateral creditors in order to improve efficiency and transparency in the use of foreign capital – and avoid the problems of corruption and excessive debt burdens. Such applications are also labor-saving and can help governments keep a small, efficient and well paid civil-service (Oshikoya & Hussain, 2008:4).

1.4 Perspectives on international practices – MIS usage on passports

Recent developments in the world of technology have produced electronic passports called e-passports through integrated MIS by secure systems and application programs. This has achieved a stable and effective passport administration process. The use of MIS has helped to improve public service quality by improving existing management systems for passports and the introduction of Internet booking systems for passport applications. For example, in Korea, through centralized authorization of passports, the country managed to expand 41 centres to 250 – in order to decrease the workload in releasing passports (Hidglobal.com, 2010:1).

The e-passport has the same look as a traditional passport, except that it has encrypted biometric data that validate the identity of the passport owner. It also incorporates features unique to an individual passport holder, like fingerprints and the iris. The passport-holder's picture is also contained in an electronic chip inserted in a passport. The information in the chip is only visible under ultraviolet light. E-passports are produced to comply with international standards – to ensure interoperability which make them readable internationally (e-Government Solutions, 2008; Tale, 2011:1).

The use of e-passports started in Malaysia in 1998 and many Asian countries like Pakistan followed in 2004 – then Thailand in 2005, Singapore in 2006 and Japan in 2006. Many European countries also started using e-passports – like Belgium in 2004, Monaco, Sweden, Norway and Germany in 2005, and the UK and France in 2006 (as did the U.S.A.). A few African countries like Senegal and Nigeria (in 2007) also

adopted the use of e-passports (Security Document World, 2008). So far, there seems to be very little, if any, cases of fraudulent possession of e-passports being reported – like has been the case with other passports in use, especially in Lesotho and South Africa. The researcher believes it is highly likely that the methods that the above-mentioned European and Asian countries employed in the use of MIS could assist and also provide insightful lessons to South Africa and Lesotho.

1.5 Reflections on Lesotho and South Africa

Abrahams and Newton (2008:34) report that South Africans suffer from an information poverty – which refers to lack of access to and utilisation of information and communication technology, as well as services that they facilitate – including electronic transactions, internet banking, government services online, and access to online education content and entertainment. The South African digital divide shows major differences in ICT access between and within provinces. Given this situation, the issue of accessibility warrants some scrutiny. Are there facilities that people are not accessing? Or are there no facilities to be accessed? The findings of Mphidi (2008:1) concur with Abraham's argument on the lack of accessibility of information systems – they revealed that out of 31 government websites, only 4% have online facilities. These departments include the South African Revenue Services (SARS), the Presidency, the Department of Labour and the Department of Home Affairs.

In Lesotho, the government has also been said to be moving forward to enhance its Information and Communications Technology (ICT) capacity, and to develop its e-Government capability. There is a crafted national vision statement, which reads: 'among other things, by the year 2020, Lesotho will have technology well established'– it reports that the government of Lesotho undertook major reforms in the public sector that included introducing computerised systems aimed at improving slow and manual information handling, and for eliminating the loss of vital information and improving work flow. The report further indicates that effective record keeping could make a valuable contribution to the success of this vision, in terms of the government's ability to attain 'full accountability for use of public funds' and 'utilise information technology for ensuring an information rich society' (International Records Management Trust, 2006:1-23).

By the year 2020, Lesotho aims to have developed a global partnership for development, and also has a target (Target 18) to make available the benefits of new technologies – especially information and communications – in cooperation with the private sector (Lesotho 2006;1-23). Against this backdrop, the

researcher took the firm view that in this kind of environment, strategies for managing electronic records and digital information were needed to ensure that important evidence was not only preserved and government actions were transparent over time – but also to ensure a quick response to customer service through effective adoption of the necessary ICT systems.

1.6 Background to the problem

In 2011, South Africa embarked on the process of registration of all the various categories of expatriates in the country – starting with Zimbabweans. Frustration and stampedes were the order of the day for Zimbabweans as they queued day and night to meet the deadline for their legal stay in the country. Undoubtedly these long queues – due to the inability of the South African Home-Affairs processes to cope with the demand of speeding up the production and delivery of the required documents – were also overwhelming and exerted much pressure on the officials as they scrambled to meet the demand. The issue of passports in South Africa is governed by Act No. 4 of 1994 (RSA, 1994) – while Lesotho's is governed by Act No. 15 of 1998. These Acts provide for the issuance and revocation of passports and travel documents. For South Africa to fight corruption and long queues in Home affairs, the government has, however, developed a new system. The system allows departmental managers to trace a passport application from the moment it is lodged – through every stage of the process until it is delivered to the applicant. It also helps monitor productivity, allowing managers to establish which Home Affairs office is responsible for any particular passport application (RSA, 2007:1).

The new system is meant to cut down not only on the queues – but also on the opportunities for corruption, by clearly identifying each official responsible for every step of the process. It is also designed to allow managers to find any departmental employee who substitutes photographs and sells IDs illegally, alters details on the central registry system, or creates fraudulent ID numbers. These are the problems that existed in the old system (RSA, 2007:1). Rasool (2011:1) adds that this new system led to the increase of tariffs from R190 to R400 – due to improved security features. However, expedience in passport production and issuance still remains a challenge. Recently, the government introduced a smart card which will replace the current identity document, and which will soon be rolled out throughout the country as a measure to combat identity document fraud (RSA, 2012).

Despite these measures, recent research by the South African Fraud Services (HR Future, 2011:1) paints a

gloomy picture. In 2011, the CEO of SAFS indicated that 'firm evidence shows that there is organized crime involved in illegal procurement and forging of SA passports. SA passports are flooding in to the hands of international crime syndicates which are in various parts of SA, using modern equipment available in the market to provide anything from a fake passport to a forged university degree'. Further study by the Consumer Profile Bureau (HR Future, 2011:1) argues that the planned security measures that Home Affairs introduced will not solve the problem of passports being issued to criminals – because the passports are being sold under the counter by Home affairs officials to fraudsters, who applied with false or forged ID books. On the basis of the above evidence, the researcher's contention is that the security aspects of passport systems are still a subject of concern, and the solution could lie in the adoption of Management Information Technology systems.

While in South Africa, a passport is issued after a maximum period of three months from application (RSA, 2012) – but Lesotho differs in this regard. It is reported that Lesotho's passport services department has been struggling to sort out a huge backlog of travel document applications that date as far back as 2007. The backlog and delay in passport production is due to a high demand, because unlike South Africa, in Lesotho a passport is used more for facilitating other life aspects like job seeking – especially in the Lesotho industrial sector and the South African mines. For everyone to be employed in Lesotho, a passport is necessary, while in South Africa identity documents facilitate these aspects, and a passport is used mainly for travelling (Economic Review, 2008:1).

Following the public outcry about delays with the production and issuance of passports in Lesotho, an audit on Issuance of Passports was carried out by the auditor general. The report established that it takes three years for a citizen to obtain a passport after application. The reasons included: production that is below normal expectation because not all machines are fully functional: it actually takes two weeks to three months to attend to malfunctioning machines. During 2006 to 2009, applications for emergency passports increased because applicants were trying to avoid delays with the normal method of applying; this led to a disturbance in the normal flow of production because the focus was shifted to attending to emergency passports (Auditor General, 2011:7).

Delays are contributing factors to the Lesotho passport office being rocked by corruption – with officers accepting bribes from applicants for speedy production of their passports. In some instances it was discovered that immigration officers would refuse to release produced passports until the applicants had

paid a bribe. It was reported in 2011 that a female immigration officer and her accomplices were arrested for soliciting a M300 bribe from a client for the release of a passport (Lesotho Times, 2011:1). To respond to the above problems in Lesotho, Tale (2011:1) points out that the government is considering the introduction of e-passports.

Given the above, it can safely be deduced; therefore, that Lesotho and South Africa have relatively similar challenges with passport production and delivery – though to varying degrees. They are both challenged by long delays and also corruption in passport processing. Notably, South Africa has gradually moved ahead to reduce long queues and improve security measures, while for Lesotho, the challenge is still enormous. It is still not clear how long it takes for a Lesotho passport to be released to the applicant from the time it is applied for – while a South African passport takes a maximum of three months (RSA, 2012). Lesotho is however, in the process of considering an electronic passport to improve its security level and to reduce queues.

1.6.1 Problem statement

It is a known fact that travelling between South Africa and most SADC countries – especially Lesotho – is very regular and frequent – with most of the Basotho depending on South Africa for work and study opportunities. Although it has frequently been mooted that travel between the SADC countries will soon become much smoother, easier and quicker, with one common travel document, this dream seems far from being realized. Given the ongoing challenges of producing passports for the citizens of both Lesotho and South Africa (especially the long delays and the fertile ground for fraud), the consequences could even be dire – especially for the Basotho who use their passports main for working in other countries. Because of this, this study intends to explore the impact that a Management Information System might have in remedying the situation – for South Africa and Lesotho in particular. The introduction of self-service kiosks at the border gates and SMS to track applications, are some of the possible examples to be explored. It is the researcher's contention that MIS can bring secure, new technologies to the fore – that could solve the unprecedented delays in passport production and issuance.

1.6.2 Main objective /co-objectives

The main objective of the study is to explore the challenges and opportunities of adopting MIS for passport

management – in both Lesotho and South Africa. The following co-objectives were formulated to realise the aim of the study:

1.6.2.1 Co-objectives of the study

1. Identify the possible causes for the delay in production and issuance of passports in South Africa and Lesotho.
2. Determine the reasonable waiting period between processing and delivery of passports for the applicants – especially in Lesotho.
3. Investigate the extent to which both South Africa and Lesotho have embraced technology in the processing of passport application, monitoring and delivery.
4. Examine technological measures put in place to track the progress of an applicant's passport application in order to reduce the waiting period.
5. Determine whether both countries have adopted an integrated MIS in the processing, production and delivery of passports.
6. Suggest a possible MIS model that could help reduce the delay in the processing, production and delivery of passports.

1.6.2.2 Research questions

The above objectives can be addressed through response to the following research questions:

1. What are possible causes for the delay in the production and issuance of passports in South Africa and Lesotho?
2. How long does it take, on average, to produce and issue a passport in Lesotho and South Africa?
3. Are the current systems and procedures used to process an application and to produce and issue a passport still manually done or is technology used?
4. Are there technologies used to reduce the time delay in the production and issuance of passports?
5. Is there an integrated MIS used for the processing of passports in both Lesotho and South Africa?
6. What are the possible and available MIS technologies that can be applicable in addressing the delays in the processing, production and delivery of passports?

1.7 Methodology

The study follows a quantitative approach – employing a structured questionnaire for data collection for both South African and Lesotho respondents.

1.8 Summary and conclusion

Chapter one introduces the background to the problem. Information systems and Technology have also been differentiated in order to successfully delineate MIS. The next chapter will focus on the literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Information Technology (IT) plays an important role in modern business (Kumar, 2007:16). The adoption of appropriate IT makes it possible for companies to reduce costs, increase administrative efficiency (Shih & Lin, 2011:704), and significantly improve employee productivity (Olson, 2011:27). Despite the many benefits and opportunities that IT brings to an organization, the adoption and use of appropriate Information Systems remains low in some organizations. This is particularly the case within the public sector – especially in developing countries such as South Africa and Lesotho.

This chapter discusses various information systems, technologies and strategies applicable to passport processing. First, it describes different categories of Information Systems. Next, it provides a detailed description of numerous technologies and systems that have shaped today's passport processing and which have helped improve public service delivery. In addition, it looks into the challenges that impede the adoption and use of IT in general, before narrowing the scope to address those aspects that are specific to passport processing. With respect to Information Systems that support passport processing, the chapter gives a broad international perspective, narrows the focus to Africa, and then ultimately to the main areas of this study: South Africa and Lesotho.

2.2 Categories of Information Systems

Hardcastle (2008:8) divides Information Systems into two categories; those that support an organization's day-to-day activities called Operating Information Systems (OIS), and those that support managerial decision making – namely Management Information Systems. This kind of division seems to advance on a study by Laudon and Laudon (2006:83) which classifies IS based on the organizational level, business functions, and business processes they support in an approach called enterprise application. This spans the entire firm – integrating information from multiple functions and business processes to enhance the performance of the organization as a whole. On the other hand, Shelly, Cashman and Rosenblatt (2008:12) contend that as business changes, information use also changes in most companies, and therefore the classification of IS based on the user group no longer applies. This is because today it makes more sense to identify a system by its functions and features – than by its users.

2.3 Transaction Processing versus Management Information Systems

The attempt at this juncture has been to define systems by functions, instead of by their users. Therefore the two main functions of information systems have been described and discussed according to their related responsibilities.

2.3.1 Transaction Processing Systems (TPS)

Transaction Processing Systems are systems that monitor the status of internal operations and the firm's relations with the external environment. They are also major producers of information for the other types of systems. For example, the payroll system, along with other accounting TPS, supply data to the company's general ledger system – which is responsible for maintaining records of the firm's income and expenses and for producing reports such as income statements and balance sheets. TPS are often so essential to a business, that their malfunction for a few hours can result into a firm's failure and possibly that of other firms linked to it. As an example, imagine what the airlines would do without their computerized reservation systems (Laudon and Laudon, 2006:87). The principal purpose of traditional online transaction systems is to record the usual activities of an enterprise – assisting in monitoring or controlling of the internal operational process. Thus its design emphasis is on dealing with huge volumes of data entry and data updating, the accuracy of data operation, and the efficiency enhancement for data input instead of the functions of online instant analysis and report generation (Wang & Kuo, 2010: 316).

2.3.2 Management Information Systems (MIS)

MIS is defined as the study of information systems in business and management. The term also describes a specific category of IS serving management-level functions. MIS serve the management level of the organization, providing managers with reports and often online access to the organization's current performance and historical records (Laudon & Laudon, 2006:90). Wang and Kuo (2010:321) use the term MIS to describe IS used for routine operations. Additionally, Kendall & Kendall (2008:3) state that MIS incorporates TPS. Similarly, Oz & Jones (2008:35-36) posit that MIS are computerized information systems that work because of the purposeful collaboration between people and computers. They also remark that MIS requires people, software and hardware to function in concert: it supports users in accomplishing a

broader spectrum of organizational tasks than TPS – including decision analysis and decision making. In other situations, information systems are linked to each other, and consequently MIS uses recorded transactions and other data to produce information for problem-solving and decision-making. The following figure (2.1) illustrates how a typical MIS transforms transaction-level data from inventory, production, and accounting – into MIS files that are used to provide managers with reports.

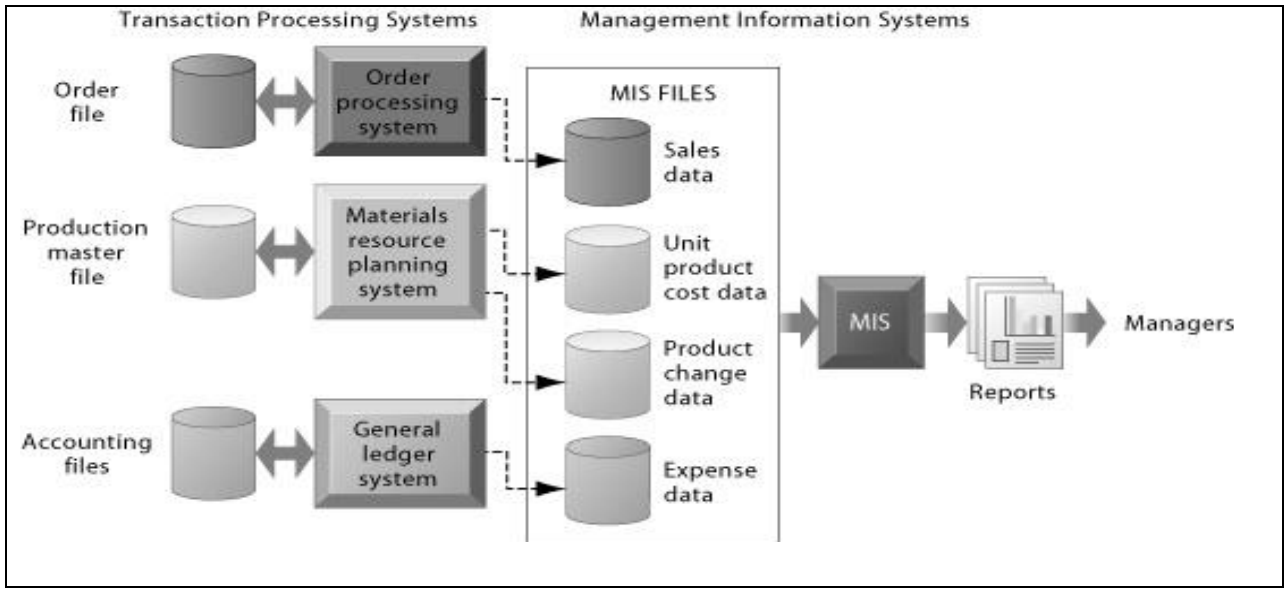

Figure 2.1: How MIS obtain their data from the organization's TPS: Source: (Laudon & Laudon, 2006:90).

Another study on MIS (Laudon & Laudon, 2006:89-90) pronounces that MIS are usually focused exclusively on internal and not environmental or external events. They primarily serve the functions of planning, controlling, and decision making at management level. Generally, they depend on the underlying TPS for their data – in order to summarize and report on the company's basic operations. The basic transaction data from TPS are compressed and are usually presented in long reports that are produced in a regular schedule. For the purpose of this study, the term MIS means all IS that cover the application of IT to support essential functions and activities – of either private or public sector institutions (Basco, 2011:1). It is understood that "In the present world, passport delivery service is one of the essential services in any country" (Haque, 2011:17). Management Information Systems for passport processing are those systems that support, among other things, the speedy and secure application, processing and issuing of passports. Management Information Systems for passport processing come in handy with solutions like electronic cover delivery and modules that issue passports and identify authentic user. They utilize smart-card technology with the up-to-date biometric solution (Hidglobal.com, 2010:1).

2.4 The background of MIS for passport processing: The international perspective

Globally, since the middle 1990s, governments have been implementing major programmes, in order to utilize the potential benefits of the internet for refining and improving their processes. For that reason the internet has turned out to be central in everyday government administration (United Nations, 2009:1). The modern-day e-government administration is the result of these endeavours. The developments and functions of MIS in passport processing are subsequent to other inventions and substantial background information. Numerous government departments all over the world are being challenged to transition from paper-based identity systems (Hidglobal.com, 2010:2). Since e-government practice spans the entire public-administration process, such initiatives evidently affect passport processing and MIS – and e-passports are its substantial outputs.

2.4.1 E-government developments

A study by the Division for Public Economics and Public Administration (2002:1) defines e-government as "all information and communication technology (ICT) platforms and applications in use by the public sector". It goes on to suggest that e-government involves the utilization of the internet by public administrations to distribute services and information to the general public. Kumar, Mukerji, Butt, and Persaud (2007:72) also define e-government as "the delivery of information and services by the government online through the Internet or other digital means". We can therefore succinctly conclude that e-government includes, but is not limited to, e-passport management. According to a Department of Economic and Social Affairs Division for Public Administration and Development Management (2008:2) "Most governments around the world started their e-government initiatives with a focus on providing information and services to the citizen while service delivery platforms remained separate and parallel across various government agencies. In this model, service delivery was built around individual agency functions, structures, information, systems and capabilities. With the private sector leading the way, advances in accessibility and a greater use of technology have allowed an expansion of innovative ICT solutions. Now citizens and businesses around the world are increasingly demanding that their governments follow suit. Citizen Groups have come to expect a 24/7 convenient user interface with ease of use, in a language the user understands and which is tailored to individual needs."

The United Nations Report (2008:17) defines five different stages in e-government: the first stage one is called *Emerging*. It is a stage at which government has used websites in order to maintain their presence online. The same online presence is used to link different government ministries. However, at this stage there is very little interaction with the citizens. Stage two is called *Enhanced*: more information on public policy and governance are provided by governments at this stage. Links to archived information (documents, forms, reports, laws and regulations, and newsletters) are made easily accessible to citizens. At stage three, *interactive*, governments provide online facilities such as downloadable forms for tax payments and applications for license renewals. Additionally, the early phases of an interactive portal or website with services to enhance the convenience of citizens, are evident. IN stage four - *transactional* – "Governments begin to transform themselves by introducing two-way interactions between 'citizen and government'. It includes options for paying taxes, applying for ID cards, birth certificates, passports and license renewals, as well as other similar G to C interactions, and allows the citizen to access these services online 24/7. All transactions are conducted online". In stage five - *Connected*: governments convert themselves into a connected entity that responds to the needs of its citizens by developing an integrated back-office infrastructure.

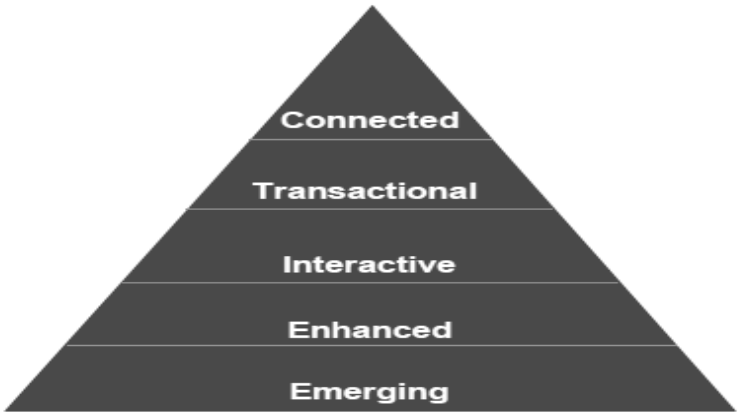

Figure 2.2 Five stages of e-government: Source: United Nation Report (2008:15).

It is professed that as nations go uphill towards the *connected* stage, there are many challenges that they face. Those challenges are infrastructure developments, delivery of content, business re-engineering, management of data, security, and customer management.

In order for e-government implementation to be achieved successfully, there are many factors that demand attention – and those factors depend mostly on the local context of any nation. In 2007, Canada was found

to be the most successful country in e-government implementation, as a result of its commitment to establishing connections with its people (Kumar *et al.*, 2007:63). E-government projects require regular utilization of online services so that the public can access information and interrelate with the government. Since e-government services are provided using ICT, the understanding and comprehension of IT adoption is imperative. Such consideration can additionally be extended to help understand the taking up of e-government systems. Also, before creating any model of e-government adoption, the constructs thereof must be known comprehensively. The objectives of researchers have been to understand the ideas that motivate adoptions in various environments (Bwalya, 2009:3-6). In subsequent sections, this chapter will also discuss different strategies and models that have been implemented in other nations – around e-government. The intention is to adopt such models for passport technology adoption. The next section delves more into the background of MIS in relation to passport processing.

2.4.2 Passport processing and MIS

At the forefront of MIS for passport processing, are technologies like Radio Frequency Identification (RFID) and biometric technologies used in a new generation of identity cards which governments are targeting for security around the world and easy identity checks (Mohamet, Hamid & Mohamet, 2009:114). Following the 9/11 attacks in the U.S.A., where inquiries established that the hijackers included known al-Qaida operatives who could have been watch-listed and identified, it was found that they were able to get into the U.S.A. through border control using fraudulent passports. In the light of such findings, the commission responsible recommended that the U.S.A. government should use biometric identification to build a comprehensive screening system across agencies and governments. The report called for a biometric entry and exit system for the U.S.A. and for an international biometric standard that could intensely toughen the world's ability to intercept dangerous individuals (David, 2004:1).

Correspondingly, the International Civil Aviation Organization (ICAO) begun to recommend the use of e-passports in an attempt to respond to the spread of international crime and terrorist threats (Hidglobal.com, 2010:2). The objective of ICAO is to implement a strong authentication through documents that clearly identify their bearers. ICAO defines the biometric file formats, organization and communication protocols used in passports (Mohamet, Hamid & Mohamet, 2009:1). They also control specifications for passport standards (David, 2004:1).

In an effort to secure the borders, Visa Waiver countries were also issued with the requirements for an e-passport in which any passport issued by a partaking state, after October 2010, was expected to be machine-readable with an electronic facial image encoded on a secure chip. Furthermore, all visitors to the U.S.A. must have their photo, and a fingerprint of their index finger, taken for electronic comparison. In a reciprocal move, the U.S.A. has started issuing e-passports to its citizens from all domestic issuance agencies – since August 2007. European Union (E.U.) countries have advanced to this second-generation electronic passport and countries like Germany, France and the Czech Republic are said to have passports at the next level – whereby biometric information is stored in a secure passport chip. Likewise, Asian countries like Malaysia have already advanced to biometrics and Extended Access Control (EAC). However, any effort to make passports electronic and secure, requires adding new hardware, firmware, and software at different levels – to the existing verification infrastructure (Sinah, 2011:203-204).

2.5 First Movers in to modern passport technology

The automated verification of credentials was first implemented by Malaysia, followed by Australia. In Malaysia, citizens at an international airport pass through automated gates that read the thumb print from the chip and compare it to the thumb pressed on a scanner (Mohamet, Hamid & Mohamet, 2009:1). Malaysia was also the first country to introduce an e-passport in 1998 (Haque, 2011:22; Mohamet, Hamid & Mohamet, 2009:1). That first passport had a chip that contained an image of a thumbprint of a passport holder. The second generation of e-passports that contained only extracted fingerprint information were developed in 2003. The specifications of these passports were based on the guidelines issued by the ICAO, even though the first Malaysian passport predated the ICAO standards (Mohamet, Hamid & Mohamet, 2009:1).

Since 2004 there has been a steady flow of countries joining the ranks of e-passport issuers, with the latest being Taiwan – which began its issuance of chip-based passports in December 2008. While the initial group of e-passport rollouts was reported to be approaching completion in 2008, there were numerous countries still to convert to the new technology. The focus in many countries now switches to the physical use of e-passports at the border and the upgrading or replacement of existing documents to include more biometrics – such as the fingerprint in what is called Extended Access Control (EAC) – or to add new applications such as trusted traveler (Security Document World, 2009:1)

On their website, the U.S.A. passport office offers helpful information to the applicant – like processing days, price, documentation necessary for application, and reporting a stolen or lost passport. America processes a normal passport within 4 to 6 weeks at most. The U.S.A. began with the issue of diplomatic e-passports in 2005. From August 2006 the rollout to the general public was set to start, with the deputy assistant secretary of state for passport services having announced that the country expects to issue 13 million passports in 2006 – increasing to 17 million in 2008 (Card Technology Today, 2006:1). It has already been mentioned that the actual production of e-passports in the U.S.A. began in August 2007. In Canada, when Canadians apply by mail, it takes 20 processing days – as opposed to 10 working days when an application is done in person at the passport office (Passport Canada, 2012). Security Document World (2009:1) has also predicted a range of future development projects in the use of e-passports after 2008:

- In 2008 Canada had introduced biometrics in the use of passports with the help of digitized photos. Because of that, it was predicted that the future passports may contain a chip that holds a picture of the person, and personal information such as name and date of birth. In the year 2008 federal budget, Jim Flaherty, the Minister of Finance, announced that electronic passports will be introduced in 2011.
- On 12 December 2008, the Croatian government reportedly announced that an e-passport will be introduced from 1 July 2009.
- On 25 June 2008, the Indian Passport Authority issued its first e-passport to the President of India. This was the first phase of deployment in the country, and was initially restricted to Diplomatic Passport holders. It was, however, expected to be made available to ordinary citizens from September 2009 onwards.
- The Philippines government announced its intention to implement the issuance of biometric passports by the end of 2008. The passport has the same features as the normal passports that were previously issued – with the addition of a page that contains the microchip for the passport.
- Israel was expected to start issuing its new electronic ID card before the end of 2009. This followed the signing of a contract, in 2008, by the Israeli Ministry of the Interior and a consortium led by Hewlett-Packard Israel. The biometric enrolment solution was implemented in 2009, with the expectation that the same project will serve the country's planned e-passport project.
- To respond to the global trends and to increase people's convenience, other governments like Korea have introduced an e-passport. With its e-passport, Korea can join the U.S. Visa Waiver Program (VWP) and enhance the security and reliability of the passport (Hidglobal.com, 2010:2).

- Brazil has decided to roll out its e-passports with all ten fingerprints and a facial image encoded on the chip (Card Technology Today, 2006:2; Sinah, 2011:219).

Since e-passports are being issued in place of traditional paper passports, which do not have secure enabled contactless chips, the security of e-passports must be better than paper-based passports. They are not supposed to be vulnerable to threats like skimming, eavesdropping, or tracking attacks – which will be discussed later. Sinah (2011:221) is unequivocal that the convenience and security of contactless access-control transactions are here to stay, and that the second generation passport with biometric access control will be more prevalent in coming years. He predicts that the future of passports may shift from single-chip electronic to multi-chip modules, with a combined data-storage capacity from multiple chips. He foresees that the future e-passport may look like a secured, solid disk with onboard sensors and with limited or no printed information. In his view, this will be a true generation shift from paper electronic to fully electronic passports. Such a passport may have its own inherent sensors to validate its holder. Some other interesting security features like Radio Frequency-DNA can be used as certificates of authenticity in lieu of electronic certificates. These methods rely on the physical creation of fingerprints which would identify each passport.

So far, the discussion has been about some of the latest developments around passport production and technologies developed in the same sphere. For the reasons stipulated above and below, countries that implement these changes will seemingly be better off in terms of efficiency, security and speedy public service. The following discussion will deal much more with the specific systems that have been implemented by some of the first movers into new passport-processing technologies. Their methods and systems are worth closer study in order to realize what might be applicable for the environments in this study. If their achievements are factual, then it can be determined that these developments are important to alleviate the many problems in the public sector. Clearly the challenge to produce a new and secure passport system and the integration of technologies like RFID and biometric technology – would compel governments to find new systems and models of passport production. Such systems and technologies that have been implemented by nations to improve passport processing and the security associated with it are discussed below.

2.5.1 Biometric passport system: Indonesia

Indonesia was one of the first movers into new technologies for passport processing. The nation has about 100 passport offices distributed around the country, but for a country that is ranked fourth in the world in terms of population – that number was not enough. The Directorate General of Immigration saw a need to speed up the passport-issuance system with more accurate and reliable technology. So they developed a distributed passport-issuance system with a centralized biometric matching component that delivers fast and accurate processing of passport applications. The system is said to be able to capture data and images at any immigration office across the country – and then automatically forward them to the headquarters in Jakarta for consolidation and identification. The results are returned to the immigration office to proceed with the production of passports for those found eligible (Neurotechnology, 2009:1-5). Some of the key features of this system are listed and explained below.

2.5.1.1 The Mega Matcher

The Mega Matcher accurately and rapidly enrolls applicants and identifies duplicate face and fingerprint records in Indonesia's large database. It is said to be fully automatic, robust and fault tolerant software that efficiently manages the large workload. It is enabled to function with inter-operability and flexibility – so that it can easily work with other software and hardware. Mega Matcher is also said to be a cost effective solution, because it operates at low cost per unit and has low hardware system requirements. Again it helps monitor and reconcile related revenue. The following figure illustrates how the system functions.

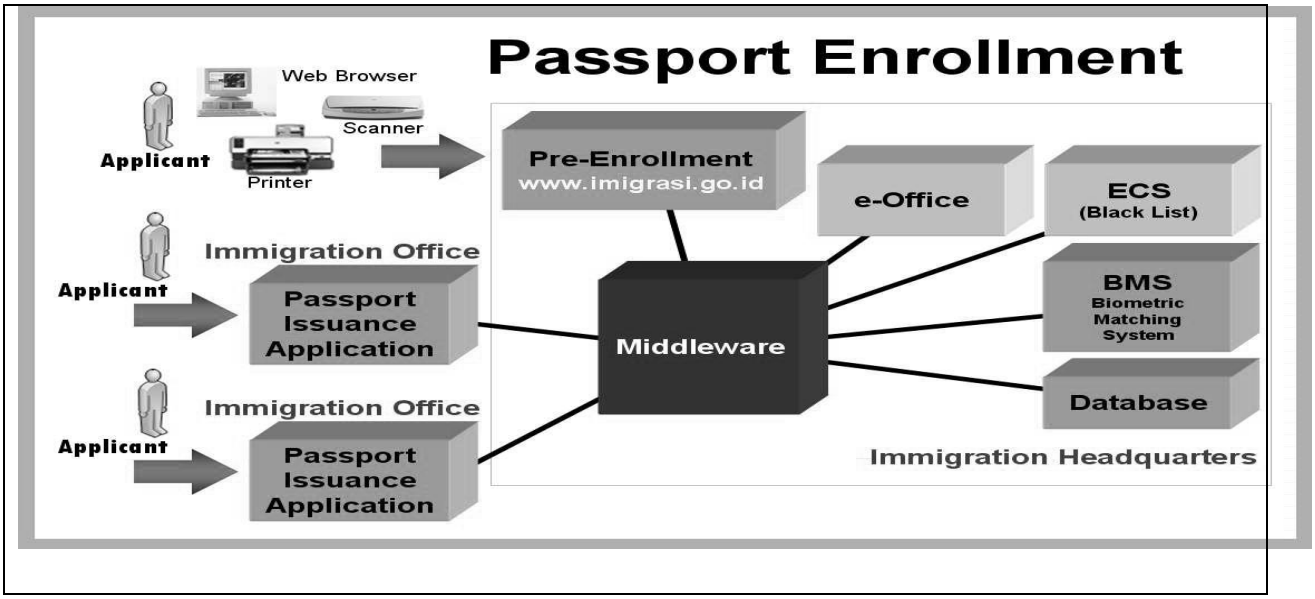

Figure 2.3: Indonesia's Passport Enrollment: Source: Neurotechnology (2009:3).

2.5.1.2 Face and fingerprint capturing

The Application Service Provider, X/Link, was used to build the application that is web-based and in accordance with specifications that suit the immigration office environment. At an immigration office, personnel input demographic information of a passport applicant and scan the supporting document. The application captures a photo of the applicant directly from an integrated digital camera and automatically checks the quality of the image – and in accordance with the ICAO standards it adjusts the photo and saves it in the relevant format. The same software then captures the ten fingerprints directly from the fingerprint scanner and checks the quality of the image before saving it. Thereafter, the face, fingerprint images and demographic information are stored in a database on the local server at the immigration office.

2.5.1.3 Template generation

The application, using Mega Matcher Client, reads images from the database and generates attached face and fingerprint templates.

2.5.1.4 Store And Forward System (SAF)

An SAF is a system that forwards stored data automatically from the immigration office to the Biometric Matching System at headquarters – for identification. The same system (SAF) returns the results to the immigration office safely and accurately, without human intervention.

2.4.1.5 Middleware

To simplify system connectivity and to control the traffic queue, interfaces between servers at all immigration offices and the Biometric Matching System at immigration headquarters are handled by Middleware created by X/LINK. X/Link also developed a tool that enabled the transportation of data to the new system, without errors, over the course of two months. The Mega Matcher fingerprint is reported to have received certification for use in U.S. government applications.

2.5.2 The integrated E-Passport Management System: Korea

It is through e-passport Management Systems that Korea has also seen the credibility of e-passports. Korea's development of an e-Passport Management System was through the services of an Application Service Provider, LG CNC, which implemented the project in three ways. First, an e-passport integrated information system was established with disaster recovery, 24-hour and 365-day continuity services, and forecasting models of issuance. Second, the decentralized enrollment system was implemented in about 250 agencies for convenience. Third, the centralized issuance system was introduced to increase security and to save costs. LG CNS established the system covering the whole life-cycle of the e-passport – including manufacture, issuance and discard – with integrated security management and quality/supply management. Korea also implemented a high-season demand estimation model that enables the reflection of different demand levels at different times. The major achievements include decreasing the issuance period to three days. The number of forged or fake passports are now said to be zero, and the same is reported about defect passports (Hidglobal.com, 2010:1).

2.5.3 The Central Passport Office (CPO) and the Seva Project: India

In September 2007, the Indian Union Cabinet approved a new passport issuance system under a project called Passport Seva Project (PSP) (Haque, 2011:22). In India, the Consular Passport and Vis (CPV) division of the Ministry of External Affairs (MEA) provide passport and consular services to Indian citizens through the Central Passport Organization (CPO) and visa services to foreign nationals and Indians overseas. Various efforts by the CPO have led to significant improvements in productivity – yet it was still inadequate to handle the growing demands of passports on the CPO. The quality of services provided to the citizens was being badly affected by the huge increase in workload – without an increase in manpower and infrastructure. Thus the PSP was launched by the MEA to redeem the situation with the infusion of technology, process reengineering and staff motivation and commitment. The end objective was the delivery of passport services to citizens in a timely, transparent, more accessible, and reliable manner, and in a comfortable environment (Nayak & Sharma, 2011:2-7).

The Seva project is part of the Indian National e-Governance Plan (NeGP) – whose main function is to make all government services accessible to citizens where they live, through common service-delivery

outlets, and to ensure efficiency, transparency, and the reliability of such services at affordable costs, and to realize the basic needs typical citizen.

2.5.3.1 How the system works

The Indian regional officer coordinates the various activities of the stakeholders – like service provider, employees and police – at the regional passport office. The design brings under one roof both the application service provider and government employees. Since implementation in March 2010 to January 2011, 100,000 passports have been issued through this new system (Nayak & Sharma, 2011:2). At first, the PSP envisaged setting up of 77 Passport Seva Kendras (PSKs) across the country, a Data Centre and Disaster Recovery Centre, a Call Centre operating 18 hours/7 days using with 17 languages, and a centralized, nationwide computerized system for the issuance of passports. The entire operation functions in a 'less paper' environment – with an attempt being made to deliver passports within 3 working days (Indian Ministry of Communication and Information technology, 2010:1).

The new system has enhancements that allow the applicant to view the status of his passport online – from the day of application to the day of delivery. India has also widened the number of relevant options, namely online or a physical application – with enhancements for the applicant to trace his passport status on the web whilst waiting for it. The figure below further shows different features that are offered by the new Indian passport-processing system. The applicants have two options: they can apply for passports online or present themselves physically at the passport office or outlet.

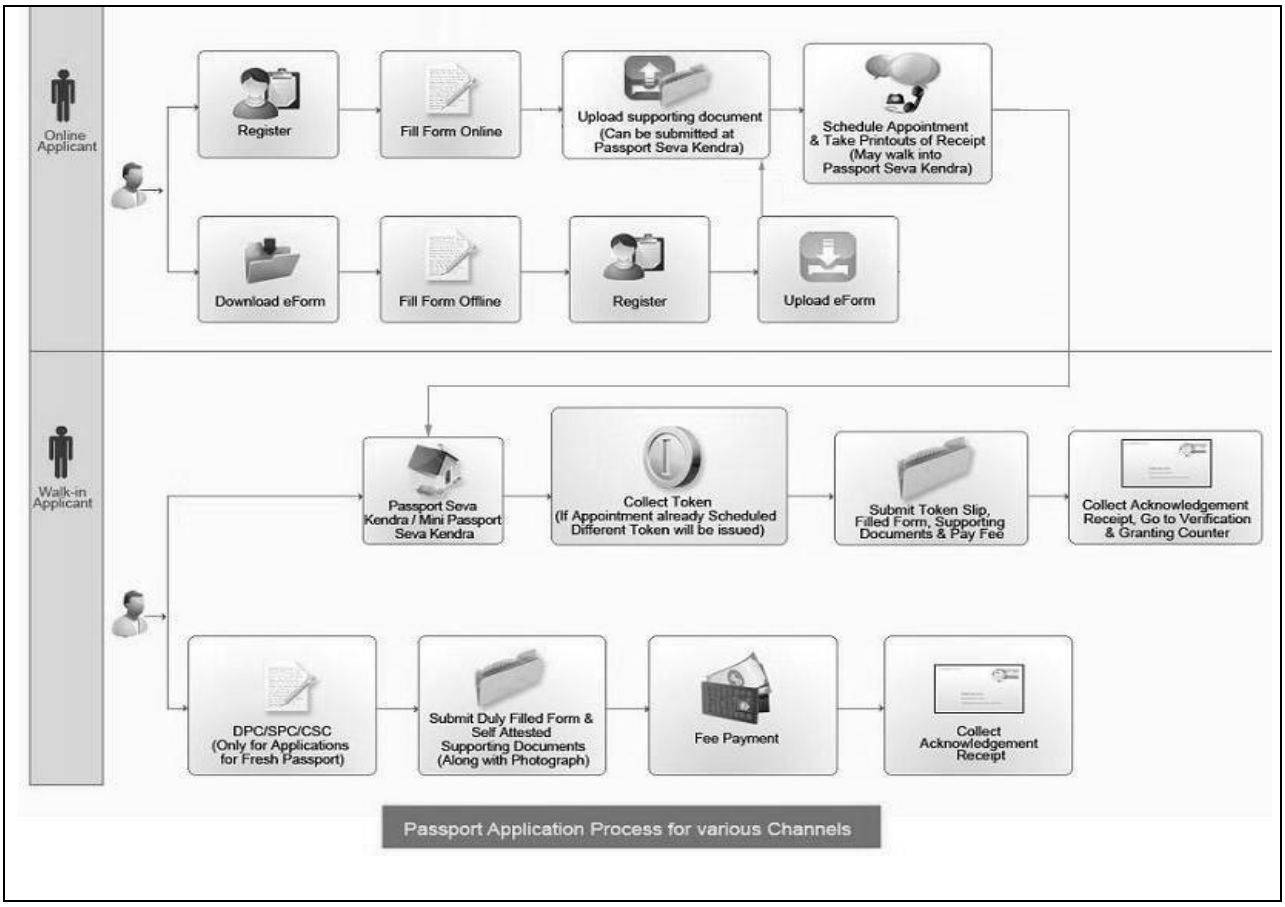

Figure 2.4: India's Passport Application Process: Source: Indian Ministry of External Affairs (2006:8).

Table 2.1 (below) summarizes the improvements that have been achieved by using the new system in India.

Item of Passport Issuance	Existing System	Proposed system
Time taken for Tatkaal (Emergency)	7 to 14 days	1 to 3 days
Time taken for Normal passport	30 to 45 days	7 to 30 days
Number of Passport Outlets	48	77 (including 2 to 3 in each metropolitan city)
Number of public dealing counters at passport outlets	345	1250
Public dealing hours, per working day	4	7
Scope for expansion of passport outlets/counters	Limited; could be time consuming	Will be expanded in keeping with growing demand

Waiting period to submit passport application	2 to 3 hours in crowded conditions	45 minutes in decent and comfortable conditions
Accountability of employees	Accountability is there, but is difficult to monitor across the country using a manual system	Complete digital signatures trail each issuance process
Information for applicants	Only through the website; limited features.	Effective through national call centres and the internet.
Grievance handling through service level phone, on-line and mail.	Limited	Immediate
Paperwork	80% manual, involving paperwork	100% on computers
Exchange of information with police	By post – time consuming	Online
Management Information Systems	Limited	Wide range of information available to management for effective control
18 hour/7day call centre	No	Yes
Police verification	Manual	Electronic

Table 2.1: India's existing and proposed systems at a glance: Source: Nayak and Sharma (2011:7).

As already mentioned, in passport processing. MIS have brought into existence the modern-day e-passport and they function in integration with other systems like immigration-control systems and the police fingerprint-management system (Hidglobal.com, 2010:1). The discussion of the e-passport, together with other resultant technologies and related developments, follows below.

2.5.4 Electronic passports

The electronic passport is similar to regular passports, but it has a tiny contactless integrated computer chip that is inserted inside the back cover, which functions as a secure storage device of the same data that is visually displayed on the photo page of the passport. In addition, it includes a digital photograph that enables biometric comparison through the use of facial recognition technology at international borders. Moreover, the e-passport has an interface incorporating additional anti-fraud and security features (Mohamet, Hamid & Mohamet, 2009:114). E-passports, e-visas and other forms of secure electronic identification erase traditional barriers to international travel (Hidglobal.com, 2010:2). The passport is equipped with contactless communication capability and its Integrated Circuit Chip enables cryptographic functionality. Cryptography refers to the digital signatures contained in the passport chip – whose primary

function is to help the receiving countries verify that the stored data are authentic (i.e. generated by the issuing country, and not altered), just as the physically readable passport booklet is secured from unauthorized alteration or substitution by strong physical security measures. For e-passport production, functionality and interoperability, three state-of-the-art technologies must be incorporated: the RFID, Biometrics, and the Public Key Infrastructure (PKI) (Lekkas & Gritzalis, 2010:379-380).

2.5.5 Radio Frequency Identification (RFID)

RFID uses a microchip to transmit product information such as type, manufacturer and serial number to a scanner or other data-collection device. Before it found modern functionality and purpose, the use of RFID technology first started in stores, warehouses and factories for tracking stock (Want, 2005:1). A scanner reads the information from an RFID from several metres away, making it ideal for tracking items stacked on high shelves in warehouses. Compared with its predecessors, RFID can also encode more data than a bar code, and in some systems it tell merchants if an item is out of place in the store – providing excellent anti-theft characteristics (Crosby, 2012:2). RFID helps speed up the handling of manufactured goods and material and enables identification from a distance, and unlike earlier bar-code technology, it does so without requiring a line of sight (Want, 2005:1). Furthermore, RFID systems can discern many different tags located in the same general area, without human assistance. As already mentioned, today RFID's usage has been extended to produce secure features in passport production.

2.5.6 The Public Key Infrastructure (PKI)

For issuance of e-passports that achieve security and international compliance, the PKI is an essential resource (Hidglobal.com, 2010:1). While ICAO provides the system developers with the technical standards for the implementation of a simple worldwide PKI to support digital signatures applied to e-passports, countries that issue e-passports are requested by the ICAO to implement their own nation-wide PKI. The function of PKI is to support digital signatures applied to Machine Readable Travel Documents, following specific interoperable standards. They also assist countries to properly manage their own keys, which are used to digitally sign the data stored in the e-passports. Areas of focus for a PKI are: the adoption of the proper trust architecture, the legal status of the certification provider, key and certificate management, and interoperability and the technology used. Most of the European countries have already implemented this infrastructure. While RFID is used for practical reasons in the communication with the inspection systems,

biometrics and PKI are considered capable of reducing fraud and enhancing security in worldwide digital identification (Lekkas & Gritzalis, 2010:379-395).

2.5.7 Biometrics

The biometric authentications verify human identity through measurement of biological characteristics. As human beings authenticate one another by the use of biometric authentication, computers are also able to perform authentication to the biological characteristics – with more efficiency than humans. Biometric authentication is gaining currency as a means for people to authenticate themselves to computing systems. The biometrics includes head, fingerprints, thermograms, iris images, hand geometry, retinal scans, DNA, and voice (Mohamet, Hamid & Mohamet, 2009:115). Although Sinah (2011:119) points out that facial images and fingerprints are the most useful biometrics for e-passports, Mohamet, Hamid and Mohamet (2009:115) state further that e-passports use head shots, fingerprints, and iris images. Sinah (2011:119) additionally articulated that biometrics increase another dimension to the authentication of e-passports – by allowing checks for "what you have" and "what you are" at the same time. David (2004:1) concludes that biometric passports store digital records of an individual's identification traits, such as fingerprints or retinal pattern, inside an RFID chip. They work with biometric readers which verify the stored record with the traits of the people presenting themselves at the security checkpoint.

2.5.8 Opportunities of e-passport and biometrics developments

Biometrics can help the move from manned border-crossing stations to unmanned border verification stations (Sinah, 2011:119). The strength of e-passports lies in many aspects. They are developed under a strict security technique undertaken to personalize them, and there is strong worldwide trust and interoperability that gives them great potential to be used for other applications like the internet or point of sale. The wide use of e-passports exhibits important advantages, such as worldwide trust and standardization, high security, mobility and legal conformance for secure signature-creation devices. Actions that strengthen the security of the e-passport include the assignment of random document numbers, the implementation of a revocation mechanism for active authentication keys, and the separation of access control on the biometric data. E-passports seem to have the potential to be used as global digital identification devices in everyday activities. The infrastructure that supports them may prove to be the first

worldwide Public Key Infrastructure that will bring certificates, keys, and digital signatures close to all citizens and applications (Lekkas & Gritzalis, 2010:395).

Apart from improving the detection of forged travel documents, a primary benefit of e-passports is automated passenger clearance at border control points. In such situations, a passenger presents the travel document to an automated reader device, which reads the passenger's biographical information and biometrics from the contactless chip or a central database. Then, when the passenger's facial, fingerprint or iris image is captured in the reading system, the stored biometric image is compared to the one presented. If the images match, then the traveler passes through immigration without interacting with an immigration officer. This process takes place quickly, and has vastly reduced queues at immigration control points in countries where automated passenger clearance with biometrics has already been implemented. The Hong Kong Special Administrative Region of China (HKSAR) is a key example of this (ACI Worldwide, 2006:1-2).

2.5.9 Strategies around passport production and issuance

The basic similarities in passport-processing methods that have been discussed are that the production units are centralized to the headquarters of immigration office or home affairs. That model is popular for most nations worldwide. The apparent reasons are mainly security, ease of control, and low costs. However, an important dissimilarity exists in Indonesia in which the only centralized services are the identification and consolidations of data – while the production of passports is done at immigration offices around the country.

2.5.9.1 Decentralization versus centralization of passport services

The principle of decentralization demands that tasks and responsibilities be newly distributed between local and central government. It permits local communities to make many decisions in order to promote good governance, economic development, efficiency of delivering public services, and to satisfy the interests of different communities (Seferi & Zeqo, 2013:452-455). According to Haque (2011:18), "A universally recognized development lesson is that the most successful program with a high degree of customer satisfaction is decentralized. The fewer the layers, the better the services. The ultimate test of any service

is customer satisfaction. Making public organization more customer-driven should be given high priority. Customer driven services are more efficient and less wasteful."

Even though the strategy of centralizing production and issuance of passports has been adopted in many countries – with the understanding that it improves security and reduces costs – it is questionable whether the advantages of decentralizing the production and issuance have actually been extrapolated. In 2006, some countries were still moving towards centralized personalization models, because they considered them more secure. But this view is opposed by the proponents of decentralization because of its implications – that decentralized personalization is less safe. They argue that the execution of secure, high-tech remote issuance systems can overcome many of the inherent problems of storage and personalization of passports from multiple locations (Card Technology, 2006:15).

In centralizing passport issuing, there is a disadvantage of citizens travelling distances to cities in order to obtain passports. For example, in Nepal, citizens had to cross mountain ranges to get to Kathmandu for passports. In its raw form, centralization of passport issuing is a barrier to obtaining a passport (McKenzie, 2005:16). Some countries, however, have developed decentralization of applications and issuing, while very few have gone further to decentralize even the very production of passports. The advantages of decentralization comprise the reduction in costs of postage because citizens collect e-passports from locally decentralized centres. Decentralization also results in faster personalization times (Card Technology, 2006:15)

There are numerous other countries around the globe which have decentralized different services or components of passport processing. Seferi and Zeqo (2013:452-455) report that in Albania, passport services – amongst other public services – have been made available to citizens on a decentralized basis. In Dhaka, Bangladesh, passport processing has been decentralized to 52 Deputy commissioner offices, apart from existing regional offices, while other passport-related services have been extended to banks and post offices (Haque 2011:16-18).

Correspondingly, through a decentralization strategy of production and issuance, Indonesia is reported to be releasing passports to citizens within three days after application. In Indonesia, decentralization of passport issuance was motivated by the geographic spread of its citizens. Indonesia, also the world's fourth most populated nation, has the geography that encompasses more than 17,000 islands. With such difficult

topography, and over 100 passport offices around the country, the Directorate General of Immigration had to make it possible for different immigration offices to produce passports – although the headquarters had to retain an exclusive control and authority to identify and approve data that qualify individual citizens eligible for passports. Compared with centralization strategies, the passport office of Indonesia is not faced with other uncontrollable and expensive factors of distributing daily applications, because all or most of the work is done within the Home Affairs Department, and with its staff and resources (Neurotechnology, 2009:1).

A study by Neurotechnology (2009:1) indicates that the total costs of ownership and cost per unit in Indonesia have been reduced. Indonesia has also managed to secure the technical support from the service provider. Their decentralization strategy has also been shown to be able to manage the workload and speedily produce and issue passports within few days. The fact that each immigration office produces passports only for its region, rather than centralized strategies that produce passports for the entire nation, has proven to be effective and manageable. Of course there are numerous advantages that should be acknowledged from centralization strategies of other countries, but one can also argue that these advantages cannot be attributed exclusively to centralization of production and issuance of passports. In fact, if the apparent reasons for centralization strategies like security issues can be well addressed, all or most of the advantages of passport-management systems that have been discussed can possibly be integrated into decentralization strategies for better public service delivery. The subsequent sections will continue to assess other strategies that have shaped the adoption of e-government and/or passport processing.

2.5.9.2 Performance Improvement Projects

Performances Improvement Projects (PIPs) are small projects that are meant to introduce progress in places where clients can get improved services. In Bangladesh, such projects were put into operation to minimize the suffering of the public. Two PIPs were implemented for passport services. The first was Simplification of Passport Services (SPS) with regard to collection and submission of application forms: facilities were made available in seven different offices of the Dhaka metropolitan area, in addition to existing facilities at passport offices. The second form of PIP was the “One Stop Service Centre for urgent endorsement of passports in the regional passport office” – that ensured the “expeditious disposal of urgent

passport endorsement application in an effective, transparent and time bound way" (Haque 2011:17). It is reported by Haque (2011) that these projects enabled the passport department to reduce inconveniences for passport applicants, and the one-stop service centre is said to have circumvented difficulties related to administration and verification protocols that hamper speed.

2.5.9.3 Public versus private sector competition

Historically, government services have mostly been rule and regulation-based processes that pay little attention to the real needs of better quality service and a convenient time and location for citizens. However, for developed nations, service delivery is the area where government is competing with the private sector to meet the needs of the citizens. This factor is achieved through rearranging government services, implementation of management that is based on performance and results, and development of institutions and processes. Similar to this concept is public/private partnership through which the government of Bangladesh has selected agents from the private sector to collect applications for passports from the public. This collaboration is also meant to publicize and inform the general public on rules and regulations – at a cost to the government (Haque, 2011:18).

This study is specifically focused on challenges that management face in adopting MIS for passport processing. But the implementation of new systems is meant to serve the citizens, as the intended users. The success of e-government implementation depends a great deal on the extent to which intended users make use of them (Kumar *et al*., 2007:72). Put differently, systems must be customer-centric. In several cases, governments have disbursed huge sums of money constructing systems – only to find out that the intended citizens do not make full use of them. This could be due to a lack of willingness to consider the needs of the public they serve. Additional causes include: infrastructure that is inadequate, poor service delivery, content availability, accurateness and usefulness, language, social and cultural issues, lack of trust, lack of marketing, and/or lack of privacy (United Nations Report, 2008:13). Various studies have assessed and developed different models that address the drives of intended users to embrace technologies. Kumar *et al.* (2007) also mention that unique features of the citizens – and the factors that create satisfaction need – to be clearly understood before generating any e-government model.

In responding to the problems of implemented ICT not being utilized by citizens, an e-government survey (United Nations, 2008:13) reviews the methods of delivery – such as access to personal computers, the internet, cellular phones and the ability of nations to absorb services and content. Its report also suggests that "governments need to take into consideration their citizens' level of comfort with the various ICTs available in order to deliver effective online services. For the youth, it might mean providing online services via cellular phones and/or an efficient and robust portal that can respond to their need for speed and portability. For senior citizens, it might mean providing one-stop centers where they can receive assistance to access online services without needing an even moderate knowledge of ICTs. For others, it might mean providing integrated portals, whose back office operations are interlinked; thereby providing a seamless transition from one service to another. For the disadvantaged, it might mean providing more ICT centers that allow them free or subsidized access to services. For the functional illiterate, it might mean providing different forms of communication such as audio in lieu of text. For the physically impaired, it might mean designing tools that enable them to easily access online services". Figure 2.5 (below) displays an e-government model that focuses on Government to Customer (G to C) and Government to Government (G to G) aspects.

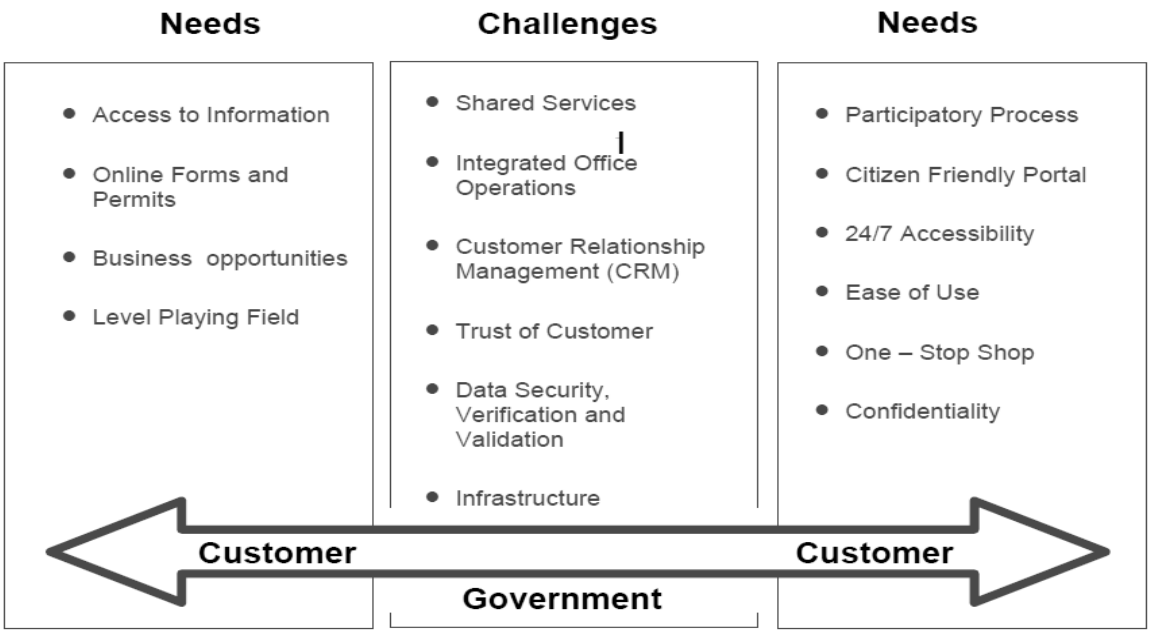

Figure 2.5: E-government Model: Source: United Nations Report (2008:14).

The following section is an overview of some of the early movers into passport technology around the globe.

2.6 The African perspective

Many countries in Africa have now embraced the idea of e-government, and nations like Egypt, Senegal, Mozambique, South Africa and Kenya have long since initiated their strategic plans. Implementation of e-government in Zambia started before 2009, because like many other African countries, Zambia has identified e-government adoption as one of the most effective ways for efficient and transparent decision making. The country is reported to be doing away with old systems that have proven to be inefficient – especially under a lot of red tape in public service and fraudulent activities (Bwalya, 2009:1). With these endeavours, Zambia has managed to produce the Zambian Immigration Management System (ZIMS). ZIMS is an electronic, integrated visa and permit approval system – including a component on border management. The Zambia Immigration authority's purpose is to efficiently offer public services to its citizens – specifically immigration service delivery. The aim is also to reduce by 50% the time it takes to issue permits, visas and deal with people at the ports of entry (United Nations, 2009:9).

In order to respond to the issues of transparency, accountability and service delivery, Nigeria has also announced that it has established different programmes – with most government ministries, agencies, and radio and television stations having their presence on the web. Even the Corporate Affairs Commission is engaging in e-registration of business names, while immigration departments have introduced the e-passport (Iwhiwhu, 2009:5). Nigeria offers an online passport application, Senegal introduced e-passports in 2007 and Ivory Coast in 2008 (Security Document World, 2009:1-2). However, the first country in Africa to introduce e-passport was Somalia in 2007 (Tale, 2011:1-2). Africa has also seen a raft of biometrics-based e-ID developments. In Ghana, biometric passport application centres have been installed in six pilot regions – in line with the government's policy to decentralize biometric passport application (Elsevier ltd, 2011:1-2). In sub-Saharan Africa, Botswana was heading to become the first country to introduce e-passports in 2010 when it issued a batch of 150 000 passports. The same country was also moving towards equipping its border-control system with card readers and the installation of acquisition and personalization systems for travel documents (African Business, 2009:1).

2.6.1 South African (SA) perspective

On their website, the South African Department of Home Affairs states that "permanent South African passports and travel documents (machine-readable documents) are now printed in Pretoria, South Africa, from where they are dispatched to the offices of application. Applications made within South African borders can be submitted to any office of the Department of Home Affairs; applications made outside of the country can be submitted to your nearest South Africa embassy or mission (http://www.home-affairs.gov.za/)."

Following reports of high incidences of South African passport and ID-document fraud – locally and abroad – the British High Commission announced in February 2009 that South Africans would require visas with to enter Britain (Rasool, 2011:1). Thereafter, the SA Department of Home Affairs (DHA) announced in 2009 that from 9 April that year, anyone who applied for a passport will be receiving a new secure electronic version. Such passports were expected to include a technology upgrade like RFID – with biometric information and other security features, in order to bring them in line with international standards and to reduce fraud related to travel documents (Dingle, 2009:1). Dingle further states that research for this type of passport took four years, and was originally intended to be introduced in 2007.

Smith (2011:1) confirms that the addition of biometrics in passports has been implemented with some success – even though SA and other developing nations have struggled to complete the enhancements. The challenges of implementing new passports had delays caused by high costs and bureaucracy. But, according to Smith, SA is finally issuing passports that include the updated measures. The new passport is alleged to include a micro-chip that stores fingerprint and other biometric information. The back page of the new passport is made up of 7 layers of polycarbonate – that makes it about the thickness of a credit card, and each layer has its own security feature. While in the old passports a photo was laminated onto a page, the current passport has the photo that is laser-engraved into the back page. The passport number is also imprinted into the top of every page within the passport, and each page has its own unique makeup – using micro threads.

On the other hand, the above claims are can be considered debatable. The South African Home Affairs website (http://www.dha.gov.za/) states that the application for a passport must be in person at Home

Affairs, because the passport officer must be satisfied that the identity of the person concerned is legal and valid. Secondly, the passport officer must check that a photograph is a true image of the applicant, and fingerprints must be taken (for people who are aged 16 years or older) and checked against the National Population Register. Upon arrival at the Department of Home Affairs (DHA), applicants complete form DHA-73, which is submitted together with proof of identity and two passport photographs. The applicant then leaves his application with the Department. The normal passport costs R400 and takes ten (10) weeks to process and issue. The researcher contends that it is still not clear what kind of passport is issued in South Africa – if it is electronic, or the extent to which it is electronic are not very clear. This all remains to be clarified.

There are also several different passports issued in South Africa. The Tourist Passport (also called a Visitor's passport) is issued to South African citizens over the age of 16. It is valid for 10 years. A Child's Passport is issued to South Africans under the age of 16, but is only valid for five years. It takes about ten weeks to process and issue it. The Official Passport is issued to South African officials who are travelling on official government business. It is also valid for five years. An Emergency Travel Certificate is a document issued to South African citizens who need to travel urgently – when there is insufficient time to process a passport application. It takes about a week to process and issue this certificate – at a cost of R140. This certificate is valid for nine months and can only be used for a single journey. A Temporary Passport is issued to South African citizens who must travel urgently for a valid reason, but cannot wait for their proper passports to be issued. It takes approximately one week to process and issue it at a cost of R180. It is only valid for 12 months. A document for travel purposes is issued to people with permanent residence in South Africa, but who cannot get travel documents from their own countries – for example refugees and stateless persons lawfully residing in South Africa. It takes about ten weeks to process the application and issue this document. It is also valid for five years (http://www.home-affairs.gov.za/).The following technologies are some of the developments in the DHA that relate to passport processing.

2.6.1.1 Passport Live Capture System

The 2009/10 annual report of the DHA states that a Passport Live Capture system was rolled out to 40 offices in the country. The system is reported to have improved the turnaround time for passport applications and has enhanced security (SA Home Affairs Annual Report, 2011:32). On the other hand, the 2010/2011 annual report reveals that the number of days taken to issue a passport was targeted to be

reduced to 10 days on average. On the contrary, because of some disputes between Gijima (Application Service Provider) and the government, only 24 days in the case of manual capturing and 12 days (both an average) in the case of live capture, were achieved. It also reported that "Who Am I Online **(**WAIO)" live capture at passport regional offices was not rolled out, and that the manual capturing of passports at offices without live-capture technology, continued for the duration of the financial year. There were also challenges of a prolonged public-sector strike and technical problems with the machine-readable passport system. A decline in the number of passports issued was also witnessed during 2009/10 – from 1 439 837 to 987 086 – and was attributed to the global recession which impacted on the local demand for passports (SA Home Affairs Annual Report, 2011:32).

2.6.1.2 Who Am I Online (WAIO)

The DHA signed a contract with an Application Service provider (ASP), Gijima, in 2008, to modernize various department's IT infrastructure and systems, through a project known as Who Am I Online (WAIO). The WAIO project was tasked to re-engineer and digitize most of the key processes of the department, together with an enhanced national population register, including birth and death certificates. It also involved the processing of identity document (ID) and passport applications, visa and other permit applications, and enhanced movement control for South Africans and foreigners at the country's borders (SA Government Services, 2011).

2.6.1.3 Online fingerprint verification

At front offices, DHA has been expanding the use of online fingerprint verification. During 2010/11, 31 additional offices were equipped with this technology. The total number of offices with online verification by the end of the review period – was 304. This technology eliminates the need for manual fingerprint verification in respect of citizens whose fingerprints are already registered on the Automated Fingerprint Identification System (AFIS). DHA can now issue all forms of temporary enabling documents more securely and within a reasonable turnaround times (SA Home Affairs Annual Report, 2011:32).

2.6.1.4 Queue Management System

It is said that a queue management system was piloted in Khayelitsha during the review period, and also that it proved to be effective in addressing the client-flow challenges – whilst providing important queue management and processing data to various levels of management. The system was subsequently rolled out to 12 regional offices (SA Home Affairs Annual Report, 2011:32). It has improved the management of queues in the office and has decreased the waiting times substantially (SA Home Affairs Annual Report, 2010:35).

Another system – the Track and Trace system – was rolled out to all offices and enables the public to trace their applications online. This system, which exists for products like passports and IDs, has been extended to Permits and Late Registration of Birth (LRB). It enables visibility of applications, tracking and response to enquiries. Access to services is said to have been improved through the implementation of the birth registration system in 127 hospitals. In addition, 65 mobile trucks have been installed with IT infrastructure and satellite connectivity – to be able to render services in deep rural areas (SA Home Affairs Annual Report, 2010:32-32).

2.6.2 Lesotho perspective

The Lesotho Passport and Travel document Act states that different passports that may be offered to different citizens. A Regular passport may be issued to every citizen of Lesotho for travelling in or out of Lesotho, and is valid for ten years. An Official passport may be issued to a person who is in the service of the government and who holds a senior position and is travelling on official business. A Diplomatic passport may be issued to their Majesties, the Prime Minister, ministers, and other senior citizens and their spouses. A certificate of identity may be issued to a person who is not a citizen of Lesotho, but who is permanently and lawfully resident in Lesotho, is unable to obtain a passport from his home country, or does not have citizenship of any country (stateless). An emergency travel document may be issued to a person who is at the time not in possession of a valid passport, but who qualifies to hold one or whose passport is at the time not available and has to leave or enter Lesotho in an emergency such as serious illness, death, deportation or repatriation (Lesotho Passport and Travel Document Act, 1998).

2.6.2.1 Passport usage

The normal usage of passports in Lesotho is for travelling and as a form of identification. For that reason, there is high demand for passports – that has led to a huge backlog and delays in issuing. The Poverty Reduction Strategy discovered in 2008 that the delays are costing people job opportunities – especially in the industrial sector in Lesotho and the mining sector in South Africa. The reason for all this was the importance of a form of identification required for employment (Central Bank of Lesotho, 2008:1).

2.6.2.2 Employed strategies

Several strategies have been employed to remedy the situation. An example is the use of temporary permits at the borders. However, although it helped residents to at least cross borders while waiting for permanent passports, its usage was abolished because of criminal activities that were associated with it inside and outside Lesotho. In 2010, the Ministry of Home Affairs hired 60 temporary staff to help manage increased workloads. The Ministry was also planning to further establish another centre in Mohale's Hoek for secure passport issuance. The Ministry also announced its plan to introduce national identity documents to reduce the high demand for passports (afriqueavenir.org, 2010:1). In 2011, following the public outcry about delay in issuing passports, the Office of the Auditor General did a study to investigate the problems. The findings are now discussed.

It was found that different districts used different ways of communication with applicants – such as notice boards in the case of queries. Some queries were sent by post. These methods of communication were ineffective because some applicants would get answers to their passport queries only after a year. The audit established that there was a huge backlog of application forms in the Production Unit – waiting to be processed. During observations in the Production Unit, it was discovered that not all the machines were fully operational or manned. The maximum daily production was less than 500 passports per day or 7,310 passports per month. What made the problem even worse was shortage of staff within the Production Unit. It was indicated that the unit was manned by 15 staff members, while it required 34 to meet the planned maximum daily and monthly passport production. However, it was established that the department was being restructured and that a recruitment process was underway.

The Production Unit experienced frequent breakages of printing and laminating machines, and there were delays in responding to these breakages by the supplier. It took approximately two weeks to three months to attend to malfunctioning machines. The cause of this was that the supplier seemed to be committed to serve other countries and disregarded the terms and conditions of the contract. There were no records, for example, of system incident reports to determine the waiting time for response relating to the breakage of machines.

There was an increase in the number of applications for emergency passports during the period 2006 to 2009. The reason was due to delays in obtaining a regular passport and weak controls such as leniency in ensuring that applications are supported with valid proof of identity when applying for an Emergency passport. The increase in the applications for emergency passports resulted in a disturbance in the normal flow of production of passports – as some application forms were misplaced when tracing application forms for emergency passports. The focus on attending to regular applications was being shifted to the issuance of emergency passports. At the same time, it was reported that there were 834 uncollected emergency passports.

It was also discovered that applicants made several applications for regular passports, without submitting the required evidence. Some citizens would apply several times after the initial application. Other citizens applied for passports at different places – hoping that they might get at least one issued to them. People applied in different names in order to defraud retailers, creditors or banks, and to avoid heavy penalty Charges at the border posts; also, some people who lost or claimed that they lost their passports also applied for new ones (Auditor General, 2011:16-35).

2.6.2.3 Summary

When one carefully assesses the Lesotho situation – the problems with regard to passport and related systems becomes obvious. If the solution for the passport office is increasing staff numbers, one can argue that the use of information systems is possibly not a well known solution for management. Yet, on the other hand, it was reported in May 2011 that the long awaited solution for Lesotho passports had been found. The solution was reported to be the e-passport, which would be acceptable in South Africa and

Internationally. At that time, Lesotho Home Affairs reported that it was waiting for quotations from Israel, France, Germany and Malaysia for a possible service provider and solution. When the new system is implemented, the then Lesotho Passport Office Director stated that the production room will also be moved to Mohale's Hoek, and that this will be done with the help of the ICAO – to manage the new system. The new system was expected to produce 300 000 passports per year. The huge backlog of passports is reported to be in Maseru, Mafeteng, and Berea – while Quthing and Mount Moorosi have smaller problems because of small number of applicants (Tale, 2011:1). To the researcher's knowledge, the passport office in Lesotho has not yet implemented any new systems. In fact, the only solutions that seem to have been implemented are increasing the staff complement.

2.7 Challenges of MIS adoption

Despite the enumerable benefits that come with IT adoption, it cannot be seen through rose-colored glasses as a panacea (Garson, 2007:1). There are innumerable challenges of implementation before the investment in IT can translate into governmental accountability. At the same time, investing in IT presents special challenges, due to high costs coupled with rapid obsolescence (Kumar, 2007:29). Although IT is advancing at an astonishing rate, there is nothing easy or mechanical about building and using IT. The literature on challenges in the adoption of IT for passport processing is inadequate, and, for that reason, in looking at the challenges relating to the adoption of MIS for passport processing, this study explores the challenges spanning the entire sphere of IT – with an intention to discover those that also affect passport processing.

A study by Laudon & Laudon (2006:76-78) identified five key issues confronting managers regarding the adoption of IT/IS in organizations. They are: 1) the investment challenge; 2) the strategic business challenge; 3) the globalization challenge; 4) the IT infrastructure challenge; and 5) security and ethics. Research by Ruipeng and Guo (2007:200-204) established that the rank of the issues – also known as challenges in IS/IT management – would much likely be influenced by four dominating factors: the economic structure, national culture, political/legal environment, and technological status. Based on data collected from 286 Chinese companies, 12 top main challenges (over the next three to five years) in Mainland China were ranked and compared with the results of earlier studies – as well as those from western countries. Similarly, the rate of adoption of ICT – such as those necessary to provide e-

government services by African countries – is found to be slow due to factors such as infrastructure, economic development, culture, and literacy. But in spite of the obstacles, some African countries have made noticeable progress over the last few decades (Rorissa & Demissie, 2009:1).

2.7.1 Interoperability of MIS and e-passports

The perpetual growth in international trade and the emerging universal economies, are driving IT focus towards the issues of interoperability between nations. Previously, local organizations focused on resolving their own distinct challenges. Today – because of language, cultural, and political disparities among nations, this approach often results in turmoil and the breakdown of fundamental management controls. To build up integrated, conglomerate ISs, organizations must create international hardware, software, and communications standards (Laudon & Laudon, 2006:76).

On their own, biometrics have proven to be effective (David, 2004:1), but some complications of interoperability arise when they have to work with other systems (Hidglobal.com, 2010:2). Such challenges are more visible when implementing a cross-border system allowing interoperability of biometric readers and passports. One nation cannot unilaterally move smoothly into these improvements; therefore, it is essential to work with the ICAO. The fact that foreign immigration systems will be able to read the e-passport of a country, need to be carefully considered. To ensure that data in an e-passport can be read by existing systems, Indonesia had to purchase a system called certificate of authority (CA) and the key management system (KMS), which is the data chip inserted inside an e-passport. Also, in Zambia, there were a range of challenges inhibiting e-government implementation: lack of collaboration between applications like the immigration website, staff unwilling to adapt to a system, limited ICT infrastructure, and a weak sustainability framework of new systems (Bwalya, 2009:1-9).

2.7.2 Costs of e-passports

One of the problems that managers are confronted with today is the possibility of obtaining good returns from investments in IT. An organization may implement new systems in order to design, produce, deliver or maintain new production – but it is another challenge to make profits using the same systems. So, managers are normally faced with the problem of how investments in IT can be used to contribute value to

an organization (Laudon & Laudon, 2006:76). Evaluating the productivity and effectiveness of an IS application is by no means an easy task. It could be even harder for state-owned companies to accurately estimate the outcomes of IS application – since in these companies some decisions on IS investments are made upon mandatory instructions, instead of economic analyses. The importance of this issue may rise significantly when strategic IS management becomes more essential to businesses (Ruipeng & Guo, 2007: 203).

Since low quality e-passports could easily be copied by terrorist groups, another challenging factor about e-passports is their high costs. In Indonesia, an e-passport project invoked public concern when the government declared that each passport would cost more than three times the price of the currently issued passport (Adamrah & Khalik, 2012:1). In South Africa, as well, challenges of implementing new passport systems have also been linked to high costs (Smith, 2011:1). Due to the increased cost of passports with a crypto-processor chip, the active security mechanisms which could protect the e-passport's data against eavesdropping and cloning are not mandatory, and this permeates through a weak e-passport implementation (Lekkas & Gritzalis, 2010:380). An embedded RFID with processing capability for cryptographic computations can unfortunately cause security problems. The wireless link between this passport tag and a passport verification reader can lead to security and privacy threats. E-passports must prevent the known attacks common to secure, radio frequency-based identification and access control systems (Sinah, 2011:204).

2.7.3 Service providers

There are very few companies in the world that deal with e-passports – and the capacity for undertaking such projects is a challenge (African Business, 2009:1). For example, in the U.S.A., the Government Printing Office (GPO) produces blank e-passport books. Two foreign companies are used by GPO to produce e-passport covers, including the computer chips embedded in them. At ports of entry, the Department of Homeland Security (DHS) inspects passports. When the Government Accountability Office (GAO) was given the responsibility to examine potential risks to national security posed by using foreign suppliers for the U.S. e-passport computer chips – their report established that the DHS whose responsibility it is to inspect passports, does not have the capability to fully verify the digital signatures, because it had not deployed e-passport readers to all ports of entry and it has not implemented the system

functionality necessary to perform the verification. Because the value of security features depends not only on solid design, but also on an inspection process by those that use them, the additional security against forgery and counterfeiting that could be provided by the inclusion of computer chips on e-passports issued by the U.S. and foreign countries – including those participating in the visa waiver program – is not fully realized. However, GAO recommended that DHS implement the systems needed to fully verify e-passport digital signatures at U.S. ports of entry, and in coordination with the state, implement an approach to obtain the necessary data to validate the digital signatures on the e-passports of U.S. and other nations (GAO, 2010:1).

2.7.4 Manufacturing process

The manufacturing and personalization process for the e-passport booklet is complex, and involves many handoffs between different sites, companies, and sometimes different countries. For example, in the U.S., both e-passport cover contractors originate chip manufacturing in Europe, and they also send the chips to various third-party companies in Asia for additional manufacturing steps. The overall process can take almost two years from the time the chip leaves the fabrication plant until it is finally issued to a bearer as part of an e-passport (GAO, 2010:23).

2.7.5 Infrastructure problems

Too many organizations are burdened with costly and unmanageable technologies that cannot adjust to modernism and modification. These systems are so complex that they hinder new execution of business strategies. Always achieving new business and technology needs will necessitate redesigning the organization and building a new IT infrastructure. At the same time, generating the IT infrastructure for a digital firm is an especially difficult task (Laudon & Laudon, 2006:77).

Investing in IT infrastructure can facilitate business processes and create potential advantages (Wang, Chang & Heng, 2004:90), but a common problem in many African countries is lack of enough IT infrastructure and a weak sustainability framework of new systems (Bwalya, 2009:1). One can deduce then, that even if there are good policies and IT plans, the lack of necessary and relevant buildings and roads will inhibit the implementation and smooth installation of technologies. Accordingly, in order to make passports

electronic and secure, there will always be need for new hardware, firmware, and software at different levels to the existing verification infrastructure (Sinah, 2011:203-204).

More challenges on the broad-spectrum of ICT adoption are discussed below.

2.7.6 Support and acquaintance with IT by high-level managers

According to (Ruipeng & Guo, 2007:200), some countries are still transforming from centrally-planned economic systems to an open-market economy. In such nations, organizations still adopt a highly centralized decision-making mechanism. With such a management style, top executives usually play a critical role when an innovation penetrates the organizations. Many top executives of Chinese companies, especially those of state-owned ones, are not sufficiently acquainted with IT and therefore are unable to provide strong support for IS applications. In situations like this, change is expected to occur only when the new generation of senior managers develops. Ezz, Papazafeiropoulou and Serrano (2009:214) are of the view that public administrations have to consider changing their organizational structure in order for them to fully exploit the benefits of Information Technology.

2.7.7 Internal managerial and organizational level of IS Departments

Generally, companies that are weak in IS department management are also inefficient. This issue may significantly affect the basic functions of IS departments, including software development, data integration, and building a responsive IT infrastructure upon which businesses could keep pace with the market. In countries where IS applications started relatively late – compared with the practice in developed countries – the results are lack of experience, 'know how' and skillful staff in various degrees in the organizations concerned. More and more IT skills have become necessary for ordinary employees and training has become more significant. Although the education system in countries like China has produced much more IT professionals than before, IT training for other personnel remains at a relatively low level, which demands particular attention (Ruipeng & Guo, 2007: 202).

2.7.8 Support of middle-level manager

Resistance to change is one of the internal difficulties that the IT age has to face (Ezz, Papazafeiropoulou, & Serrano, 2009:214). At the early stage of IS applications, ISs mostly affect low-level employees and most resistance would come from those levels. As the application has been gradually deepened, it becomes possible for companies to build flatter and more flexible organizational structures, in which the interests of mid-level managers would be most possibly affected. Consequently, the support or rejection by middle managers, of the implementation and development of new IS applications, becomes more critical to IS success (Ruipeng & Guo, 2007: 202).

2.7.9 Applications of advanced IT in enterprises

In most organizations, utilizing advanced IT is regarded as an issue that needs to be considered constantly, but is not among the most important ones. After a period of IT practice, it has been widely accepted that new or advanced technologies are never equivalent to successful IS management (Ruipeng & Guo, 2007: 204).

2.7.10 Organizational structure that manages the IS Department

This issue can again be attributed to the particular management style of companies – relying highly on the individual personalities and behaviours of top executives instead of solid mechanisms. Another plausible reason to account for the importance of this issue, is that IT has not yet become a strategic resource for many state-owned organizations (Ruipeng & Guo, 2007:204), and so the impact of IS plans on business plans is not as significant as that in developed countries.

2.7.11 The status and power of IS managers

It is no longer a critical mission to endow senior IS managers with a proper position and sufficient power. Based on interviews and observations, this has already been done in many Chinese companies, where the top persons in charge of IS departments are now CIO or Vice-Presidents. Hardcastle (2008:27) points out that IS projects receive the necessary support – depending on their source of initiation. Systems initiated by

senior managers are likely to have the support necessary for successful development, while ISs which are initiated by an IS department as part of an overall IS strategy, will still need high-level management support to achieve success. This is possibly because the status and power of IT managers are no longer regarded as being important as before (Ruipeng & Guo, 2007:201). On the other hand, a system initiated by functional areas competes for attention with all other development projects being undertaken. Often an organization will have a steering committee to decide on development priorities.

2.7.12 Staff's ability to utilize computers

The user's ability to utilize computers and other information technologies is still a challenge. For example, in implementing ZIMS under e-government initiatives in Zambia, staff were found to be unwilling to adopt new technology (Bwalya, 2009:1). New IS requires that people in an organization learn new ways to do their jobs – but because people become comfortable with how they do their jobs, they find it challenging to change. (Olson, 2011:27).

2.7.13 Security issues in e-passports

Although ISs have provided huge paybacks and efficiencies, they have also created new ethical and social problems. These issues include threats to individual privacy and intellectual property rights, computer-related health problems, computer crimes, and the elimination of jobs. A major management challenge is to make informed decisions that are sensitive to the negative consequences of IS, as well to the positive ones (Laudon & Laudon, 2006:78). Also, in developing e-passports, Sinah (2011:206-207) has identified different threats that are related to electronic passports.

Security issues are:

- *Forging*: A passport can be forged by replacing its complete chip with a different one. Such a modified, secure chip is embedded into a passport from which the original chip was removed. A secure chip has hardware mechanisms built in to protect it from data alteration.
- *Skimming*: An e-passport can be skimmed to read the unprotected contents. The skimmer may gather sensitive details like the passport holder's name, age, address, and travel information. The

skimmer could utilize readers which are modified or extended – to read data from distances greater than designed for.

- *Eavesdropping*: Eavesdropping is an attack to intercept communication between card and reader. The stolen information could either be a document or personal information or system related cryptographic information which can be replayed to illicitly communicate with other passports.
- *Illicit verification*: Illicit verifiers are like fake ATM(s) installed at locations to falsely retrieve the PIN of a banking card. The personal information could be skimmed if such a system with copied keys is installed.
- *Data/noise injection*: A data injector is a device which can manipulate or alter the data being sent by a secure chip to a reader or vice versa. It can interject data with its own data frames which may not only interfere with communication – but also alter add or subtract data exchanged between secure reader and chip.
- *Imposter/false biometrics*: An impostor can fake the biometrics of an authentic passport holder with methods like wax fingers or face masks – to fool the system. Impostors break the security of a system by faking the identity of the actual passport holder.
- *Rouge reader/hardware*: A modified reader can be used to read the contactless data from a card beyond its normal operating range. Other modified hardware can store communications while legitimately communicating with a reader.
- *Duplication/cloning*: Cloning of a chip and duplication of its complete or partial data is an attack requiring sophisticated machinery and means. Such attacks are conducted only by advanced attackers who have the finances to invest in such systems.
- *Tracking*: A tracker is a person who is only interested in knowing where the passport holder is traveling. A tracker may not have access to all the information which is stored in the secure chip. The tracker skims the data which could be used to trace a passport holder's location.

To counter the threats to e-passports, ICAO has defined two different mechanisms to authenticate secure chips embedded in e-passports: active and passive authentication. In active authentication, the secure controller processes cryptographic information in the chip; in passive authentication, no computation is involved and the contents of a tamper-proof chip are read only by a verification device. Thus, passive authentication is implemented on secure memory devices – whereas active authentication requires a processor. Lately, a new type of authentication for Extended Access Control called Chip Authentication,

and requiring faster cryptographic capabilities, has been proposed (Sinah, 2011:207). Security features designed into the e-passport computer chips, including the digital signature, provide protection from the introduction of malicious code onto the chip during the e-passport booklet production process. For example, among other features, the chips includes physical tamper protections that aid in sensing physical attacks, a cryptographic authentication procedure to lock the contactless interface and protect from unauthorized access, and incorporation of a digital signature that can be used to identify any unauthorized modification of the user data areas (GAO, 2010:21).

2.8 Conclusion

The functions and benefits of IT have well been extrapolated and documented. Such discussions are well known and understood in the Twenty First Century – to the extent that there might be a temptation to conclude that they should be closed episodes in the biosphere of research. But before such conclusions are taken, careful consideration should still be made of the fact that many organisations are still lagging behind in these developments. On the other hand, others which have introduced them, have not been able to realise all the potential benefits these systems inherently have. Various challenges that affect the adoption of new technologies for passport processing were discussed in this chapter – but those that are specifically related to passport processing in Lesotho and South Africa will be the outcome of this research.

If only developed countries had moved into significant developments in passport processing and border controls, then a benefit of a doubt would be given to countries like Lesotho. But developing countries and some African countries have made significant improvements in this regard. MIS for passport processing has produced e-passports that is said to be secure. Not only that, but countries have also reduced the number of days it takes to process a passport. They have contributed to electronic border controls that are now free from stampedes. In some countries, the border controls allow immigrants to pass through borders without having to report to an immigration officer – thereby saving time and eliminating queues.

It is also apparent that new technologies do not operate completely in isolation from staff, which is why countries like India also had to include staff motivation and process re-engineering as part of their strategic moves. Attitudes of people towards new systems, and their knowledge and competency, cannot be overlooked in this type of research – because they are directly related to production outcomes. Managers

are also the key agents of any technological implementation in every organisation, because they are decision makers. Their knowledge and attitude towards new technologies determine the reception thereof. It is important in this research to include them when searching for underlying factors that affect the adoption of IT in passport processing in Lesotho and South Africa.

It does appear that South Africa has improved its passport processing with technologies and electronic passports. But the researcher considers that there is no clarity on the reality of these claims. It is important to find out exactly what type of passport is produced and why it still takes about three months to produce a passport, if new systems have been introduced. At the same time, South Africa shares borders with other countries, and this means that it might not be easier to make individual improvements – especially with border processes. The problems of interoperability should also be considered when border processing is infused with new technology. Corruption still appears to be an issue in the South African DHA. The researcher strongly believes that South Africa's systems, processes and passports still have to be scrutinized in comparison with other countries processes – to determine what could be done to mitigate problematic situations.

In Lesotho, announcements have been made for some years that the country is about to introduce e-passports. This followed the major problems that everyone faces in Lesotho about the delays and long queues for passport applications and border controls – and the marked corruption associated with these inefficient services. It is understood that the nation and government is not pleased with this situation and wants a solution, and it has tried to implement certain strategies like hiring part-time employees. But when it comes to technological improvements, little or no changes have been made. But what are the underlying challenges to these improvements and how can they be addressed? Looking at what other countries have done to improve their passport services, this research seeks to respond to these questions – and others similar to it.

By drawing upon the extensive literature of this chapter, the researcher has identified different challenges that need to be investigated in Lesotho and South Africa. The initial stage will be to investigate the causes of delay in passport processing in Lesotho and South Africa – together with the average time it takes for both countries to issue a passport. The study will also explore the level to which passport application and processing procedures has been infused with modern technology. The availability of the modern

technologies that have been listed and reviewed in this chapter will also be explored. The table below is a list of the different challenges in IT adoption, and also their respective literature sources.

Challenges of IT Adoption	Literature Sources
Benefits of MIS vs risks	Laudon & Laudon, 2006:76-78
Financial resources	Kumar, 2007:29; Laudon & Laudon, 2006:76-78; Smith, 2011:1
Infrastructure challenges	Sinah, 2011:203-204; Bwalya, 2009:1; Rorissa & Demissie, 2009:1
Hardware challenges	Laudon & Laudon, 2006:76-78.
Lack of expertise on Information Systems	Ruipeng & Guo, 2007: 200-204
Fear of possible drastic change	Laudon & Laudon, 2006:76-78
Fear of job loss	Laudon & Laudon, 2006:76-78
Difficulty of finding MIS that fits well into strategies	Laudon & Laudon, 2006:76-78
Burdensome tasks of migration to new systems	Laudon & Laudon, 2006:76-78
Information security	Ezz, Papazafeiropoulou and Serrano, 2009:211
Little priority for MIS	Laudon & Laudon, 2004:76-78
Management's limited or total lack of knowledge of IS	Laudon & Laudon 2006:76-78; Hardcastle, 2007:27
Management's limited authority to initiate change	Laudon & Laudon, 2006:76-78
Management structure and style	Ruipeng & Guo, 2007: 200-204
Bureaucracy	Smith, 2011:1

Table 2.2: Literature sources for IS-adoption challenges.

This chapter looked at literature relating to what other nations have done to improve passport processing. It also looked at challenges affecting IT adoption – and the benefits. To find out about Lesotho and South African passport processing, the way forward was to design methodology for collecting information that pertains to the passport offices of the two countries. This will be the topic of the next chapter.

CHAPTER 3: METHODOLOGY AND DATA COLLECTION

3.1 Introduction

This chapter discusses the methodology used to conduct the study. The main focus of this chapter is on how the study was carried out. Much emphasis is put on research design, instrumentation, data-collection procedures, and the population and sampling. The data-analysis procedure is described last. The quantitative approach – that is descriptive and exploratory in nature – has been adopted in this study. For data collection, a survey questionnaire was used.

3.2 Research method

According to Opie (2004:16), methodology is the theory of finding the best way, methods or procedure to use data to provide the evidence basis for the construction of knowledge about whatever is being researched. Generally, research philosophy (also called a research paradigm) is classified as positivist or interpretivist. The guiding research paradigm for this study is positivism. According to the positivist research paradigm, knowledge is gained from 'positive' verification of observable experience. Scientific methods or experimental testing and deductive reasoning are the best way of achieving this knowledge (Cohen & Crabtree, 2006:1; Kumar, 2011:94). Even though this study adopts a positivist research approach, it is important to briefly reflect on the differences between quantitative and qualitative approaches.

3.2.1 Qualitative research approach

A qualitative study holds no single, ultimate truth to be discovered. The technique is extremely useful when a subject is too complex to be answered by a simple 'yes or no' hypothesis (Leedy & Ormord, 2010:135). Multiple perspectives held by different individuals might exist and each of the perspectives has equal validity or truth. A qualitative study then tries to reveal the nature of these multiple perspectives (Shuttleworth, 2008:1).

3.2.2 Quantitative research approach

Quantitative research is the systematic scientific investigation that is used to measure the feelings and thoughts of people, and the way things are done and why they are done. It is a method of research that is used in analysis in the natural sciences and social sciences. Everything that is measurable can be used to

gather quantitative data (Rajeev, 2011:1). As mentioned earlier, the researcher deemed the adoption of a positivist quantitative approach to be suitable to meet the aim of this study.

The quantitative approach was used to measure the extent to which challenges revealed by the literature could be true in the case of this study. The motive for choosing this positivist approach is that it allows the collection of data in the form of numbers – and uses statistical types of data analysis (Blanche, Durrheim & Painter, 2006:47). Using the quantitative approach, the researcher was able to measure attitudes and perceptions of officials in passport departments, in a quantifiable procedure, to determine how far these perceptions and attitudes could be challenges to the adoption of MIS in Lesotho and South Africa.

3.3 Research design

According to Coldwell and Herbst (2004:36) and McMillan (2008:11), the research design refers to the strategy or plan of carrying out the study. It is a detailed plan outlining how observations will be made – and through it the researcher describes how the participants will be involved, with a view to reaching conclusions about the research problem. Research design – in short – specifies methods and procedures for the collection, measurement and analysis of data, and always addresses certain key issues such as who will be studied, how people will be selected, and what information about them will be gathered (Bless, Higson-Smith & Kagee, 2006:71; Sullivan, 2001:255). The study is also descriptive and exploratory in nature, and a survey strategy was used in the form of a semi-structured questionnaire. The survey was chosen given that the purpose of the research is to collect and analyse empirical data using statistical techniques. The descriptive and exploratory nature of the study is explained below.

3.4 Descriptive and exploratory research

In descriptive research the procedure is to either identify the characteristics of an observed phenomenon or to explore possible correlations among two or more phenomena. It also examines the situation as it is, without changing or modifying the situation under investigation or determining cause-and-effect relationships (Leedy & Ormorod, 2010:182-187). On the other hand, “Exploratory research makes preliminary investigations into relatively unknown areas of research. They employ an open, flexible and inductive approach to research as they attempt to look for new insights into a phenomenon” (Blanche, Durrheim & Painter, 2006:490).

This study was stimulated by the research problem; what are the challenges of adopting MIS for passport processing in Lesotho and South Africa? The main objective of the study is to explore the challenges and opportunities of adopting MIS for passport management in both Lesotho and South Africa. The nature of the research questions suggest that a descriptive inquiry be undertaken, in order to achieve the objectives and to respond to the research problem. Descriptive research helped identify "what" the barriers to MIS adoption in passport management are. Specific attitude and perception variables of management revealed by the literature review were investigated in Lesotho and South Africa, and were compared. Exploratory research helped find out underlying and undiscovered areas of challenge that may have been overlooked or undiscovered.

3.5 Objectives of the study

The following co-objectives were then formulated to realise the aim of the study:

- Identify the possible causes for the delay in the production and issue of passports in South Africa and Lesotho.
- Determine the reasonable waiting period between the processing and delivery of passports for the applicants – especially in Lesotho.
- Investigate the extent to which both South Africa and Lesotho have embraced technology in the processing of passport application, monitoring, and delivery.
- Examine technological measures put in place to track the progress of the applicant's passport application – with the purpose of reducing the waiting period.
- Determine whether both countries have adopted an integrated MIS in the processing, production and delivery of passports.
- Suggest a possible MIS model that can help reduce the delay in the processing, production and delivery of passports in both countries.

The above objectives were addressed through response to the following research questions:

- What are possible causes for the delay in the production and issuance of passports in South Africa and Lesotho?
- How long does it take on average to produce and issue a passport in Lesotho and South Africa?

- Are the current systems and procedures used to process an application, and to produce and issue a passport, still manual or is technology used?
- Are there technologies used to reduce the time delay in the production and issuance of passports?
- Is there an integrated MIS used for the processing of passports in both Lesotho and South Africa?
- What are the possible and available MIS technologies that can be used to address the delay in the processing, production and delivery of passports?

3.6 Population and sampling

It is often impossible and too costly to study the entire population – hence the need for researchers to use sampling techniques to save time and resources. The population is the aggregation of elements from which the sample is actually selected, and the universe from which the sample will be selected (Burger & Silima, 2006:2). The sample is representative individuals that are randomly selected to provide insights into the entire population under study (Dale, 2006:27). Researchers then make generalizations about the entire population – but only if the sample is truly representative of the population (Leedy & Ormrod, 2010:204)

The total population in this study comprised all staff members working in the passport sections of the four regional passport offices of the Free State Province in South Africa: Bloemfontein, Ficksburg, Welkom and Bethlehem, and the four regional passport offices in Lesotho: Maseru, Berea, Mafeteng and Mohale's Hoek. The sampling method used was stratified random sampling which involves identifying subgroups, and then randomly sampling the subgroups – with each member of the subgroup having an equal chance of being selected.

In Lesotho, it was discovered that passport office and immigration had recently been separated into two departments – and employees had been moved around. Therefore, the proper determination of the population and sample size was difficult. The researcher had initially planned to distribute 400 questionnaires to get the maximum return of 200. But through enquiry with management of the Lesotho and South African passport offices, it was found out that there are about 150 staff members working in the passport sections of the selected four regional offices in the Free State and about 70 staff members working in the passport sections of the selected four regional offices in Lesotho.

In random sampling, a population is first defined and then the sample size is determined. At the same time, such a population must be specific enough to indicate the applicability of the study to the particular situation (Dale, 2006:1-2). In each country, each passport office formed a stratum – whose employees were selected randomly. The basic rule of Gay and colleagues, adopted by Leedy & Ormord (2010:213) was used. The rule suggests that: for a smaller population size, say, N=100 or fewer, there is little point in sampling the entire population; if the population size is around 500, 50% should be sampled; and if the population size is around 1500, 20% should be sampled. Beyond a certain point (about N=5000), the population size is almost irrelevant, and a sample size of 400 will be adequate.

3.7 Data collection

According to Dusick (2011:7), researchers must describe how they collected data. The procedures for collecting data and the reasons for a particular data-collection procedure must be thoroughly and clearly stated. A survey, in the form of a structured questionnaire, was used for data collection in this study. Survey research typically employs face-to-face interviews, or a written questionnaire (Leedy & Ormrod, 2010:188). Sullivan (2001:255) defines a survey as a data-collection technique in which information is gathered from respondents by having them respond to questions or statements, in order to determine the current status of that population with respect to one or more variables. Sullivan (2001) further stipulates that a survey typically involves collecting data from large samples of people. It involves presenting respondents with a series of questions that may address matters of attitudes and opinions, future expectations, or virtually any other kind of information that can be elicited from people. The survey questionnaire was used because survey designs are often more quantitative and require questionnaires for data collection with randomized sampling methods (De Vos, Strydom, Fouche & Delport, 2005:136).

In survey research, the practice is to acquire information from one or more groups of people – about their characteristics, opinions, attitudes, or previous experiences. The researcher asks questions and tabulates responses. This kind of survey is called a descriptive survey, because the eventual target is to study a large population by surveying a sample of that population (Leedy & Ormorod, 2010:182-187). Also of the same view are De Vos *et al*. (2005:137) who add that survey designs are frequently more quantitative in nature, involve the use of a questionnaire, and respondents are selected using random sampling techniques. The researcher investigated the effect of certain identified independent variables on dependent variables.

3.7.1 Independent and dependent variables.

An independent variable is a possible cause of something else, while a dependent variable is that 'something else' that is potentially influenced by the independent variable (Leedy & Ormord, 2010:224). A dependent variable registers the effects of variation or manipulation of an independent variable (Blanche, Durrheim & Painter, 2006:558). Literature has shown that adoption of MIS – which is a dependent variable of this study – may be affected by many variables. The independent variables tested in this study that may affect adoption of MIS, include, *inter alia*: attitudes of management and staff towards MIS, staff competencies in the field of IT, and the extent to which infrastructure challenges can be a problem in two countries. In this chapter the researcher was able to realize similarities and differences in the challenges faced by the two countries.

3.7.2 The questionnaire

A questionnaire is a type of survey that directly collects information from people or organizations that we are interested in. The type of information collected may involve attitudes, personalities, beliefs and preferences (Leung, 2001:1). The same author further states that a well designed questionnaire is highly structured to allow the same type of information to be collected from a large number of people, in the same way, and to allow the data to be analyzed quantitatively and systematically. The self-developed structured questionnaire consisting of a mixture of rating scales was used in this study, and the same questions were asked of Lesotho and South African respondents.

3.7.2.1 Questionnaire Structure

Questionnaires use checklists and rating scales which are the techniques used to facilitate the evaluation and quantification of characteristics, behaviours, attitudes and opinions. With a checklist, the researcher checks whether each item on the list is observed, present, or true – or is not observed, present or true. With a rating scale, behaviour, attitude, or other phenomena of interest are evaluated in the range of "inadequate" to "excellent", "never" to "always", or "strongly approve" to "strongly disapprove" (Leedy & Ormrod, 2010:189). To test attitudes and perception variables of employees and management on MIS and its usage, and checklists to identify the availability of MIS or any technology in the processing of passports, the rating scales "strongly agree = 1" to "strongly disagree = 5" were employed.

Blanche, Durrheim and Painter (2006:94) have identified closed questions and open-ended questions as two types of questions that a questionnaire may contain. The former leads respondents to select one or more choices from a fixed list of answers provided, while the latter allows respondents to communicate their experiences or opinions about a specific issue in their own words – without any restriction. The use of closed questions was employed in this study – because according to the above authors – they have the advantage of eliciting a standardized set of responses from all the respondents. This function allows comparisons in data analysis.

Leung (2001:1) pointed out different ways to maximize the response rate to the questionnaire: The questionnaire has to be administered carefully and the researcher must establish rapport. The purpose of the survey must be explained and those who have not responded must be reminded. The length of the questionnaire should also be appropriate. In order to obtain accurate and relevant information, researchers must give some thought to the questions they ask, how they ask them, the order in which they ask them, and finally the general layout of the questionnaire.

The questionnaire consisted of two sections: Section A addressed respondents' demographic data; gender; age; region; working experience; and highest qualification. Section B addressed all the research questions, mainly through the rating scales of "strongly agree = 1", "agree = 2", "neutral = 3", "disagree = 4", and "strongly disagree = 5" – where respondents had to indicate by marking answers that best expressed their opinions. This use of rating scales helped the researcher to collect – in a quantifiable manner – information about attitudes and perceptions of officials, and the extent to which those attitudes and perceptions are challenges to MIS adoption. The use of checklists was again used to check the availability of certain technologies that are used for passport processing and in border controls today. The questionnaire had six main questions that are the replica of the research questions – so that responses in the questionnaire are actually responses to the research questions. The six main questions have sub-questions – building up to every main question.

The questionnaire addresses the following objectives, laterally, with their research questions:

Co-objective number one is aimed at identifying the possible causes for the delay in the production and issuance of passports in South Africa and Lesotho. It is addressed by research question number one: "What are possible causes for the delay in the production and issuance of passports in South Africa and Lesotho?" Question one in section B of the questionnaire deals with this question and objective.

Co-objective number two is aimed at determining the reasonable waiting period between the processing and delivery of passports for the applicants. It is addressed by research question number two: "How long does it take on average to produce and issue a passport in Lesotho and South Africa?" Question two in section B of the questionnaire is designed to address this question and objective.

Co-objective number three is to investigate the extent to which both South Africa and Lesotho have embraced technology in the processing of passport applications, monitoring and delivery. It is addressed by research question number three: "Are the current systems and procedures used to process an application, and produce and issue a passport, still done manually or is technology used?" Question three in section B of the questionnaire is designed to address this question and objective.

Co-objective number four examines technological measures put in place to track the progress of the applicant's passport application – for the purpose of reducing the waiting period. It is addressed by research question number four: "Are there technologies used to reduce the time delay in the production and issuance of passports?" Question four in section B of the questionnaire is designed to address this question and objective.

Co-objective number five aims to determine whether both countries adopted an integrated MIS in the processing, production and delivery of passports. It is addressed by research question number five: "Is there an integrated MIS in the processing of passports in both Lesotho and South Africa?" Question five in section B of the questionnaire is designed to address this question and objective.

Co-objective number six aims to suggest a possible MIS model that can help reduce the delay in the processing, production and delivery of passports. It is addressed by research question number six: "What are the possible and available MIS technologies that can be applicable in addressing the delay in the processing, production and delivery of passports?" Question six in section B of the questionnaire is designed to address this question and objective.

3.7.3 Data-collection procedure

Dusick (2011:7) declares that researchers must disclose if they were granted permission to collect data. The researcher obtained from the university a letter that requests – on his behalf – permission to conduct the study in the Lesotho and South African Departments of Home Affairs. In South Africa, the letter was e-mailed to the provincial Manager of the Free state Department of Home Affairs – who also responded by e-

mail to grant the researcher permission to conduct the study. In Lesotho, a typed letter was hand delivered to the Director of the Passport Office – that then granted verbal permission and assigned the manager under him to assist with all the relevant information and the administration of the questionnaires. In order to secure appointments and to explain the purpose of the study, the researcher made telephone calls to all the regional offices where the questionnaires were to be administered. The telephone calls were done after being given written permission by the management of relevant offices to conduct the study. In all the passport offices in Lesotho and South Africa, management preferred that all questionnaires be issued from their offices – and returned to the same office after completion.

Three hundred questionnaires were printed; 100 were distributed in Lesotho and the other 200 in South Africa. The reason for printing 300 questionnaires was to target a maximum return of at least 200 questionnaires, in all. The researcher had to travel twice to each of these offices; the first time was to distribute questionnaires, while the second time was to collect them for analysis. A total of 100 completed questionnaires were collected for analysis after six weeks. The research was conducted in the premises of the Home Affairs Department in both Lesotho and South Africa.

During questionnaire administration, some of the difficulties encountered were unwillingness by some staff members to respond to the questionnaire. The managers also informed the researcher that it was difficult to get adequate responses because many employees are normally unwilling to participate in academic research. In some cases it was clear that the employees were very busy – because of the nature of their work and the many clients they serve. To get the maximum return, the researcher himself had to spend days in their offices, since it was apparent that some participants would put the questionnaires aside once the researcher left the premises – and that had led to their loss in some cases. For Lesotho, what made the data collection relatively easier was that the passport office was in the process of transitioning to new procedures and systems, and therefore many free employees were available to respond. In Mohale's Hoek, the researcher was not be allowed to enter the premises due to tight security measures, given that the office is being turned into the new central production base. The researcher was only allowed to hand over questionnaires during lunch time, at the reception. The other offices – Maseru, Berea and Mafeteng – were easily accessible, and questionnaires were filled in at the premises. When most of the questionnaires were filled in, the researcher was available to clarify where misunderstanding arose, and to assist other respondents where necessary.

In South Africa, due to limited resources, the researcher sent questionnaires by courier to Welkom, Bethlehem and Ficksburg. However, the researcher was available in Bloemfontein, where they were easier to distribute, and could even wait for questionnaires to be completed in some cases. In cases where employees were too busy, some questionnaires were left with one immigration officer to distribute and collect. Upon the realization that questionnaires had been misplaced by employees, the researcher had to return repeatedly to replace them and to remind the employees to please respond urgently. In spite of the difficulties encountered during data collection, it is also important to mention that what was equally encouraging – in both Bloemfontein and Maseru – was that managers volunteered to show the researcher how the whole passport-application procedure actually works. They also gave the researcher other important information about passport processing in their countries. That information was documented by the researcher and was used for analysis and interpretation in the next chapter.

3.8 Pilot study

To help identify potential problems with the design of the questionnaire, a preliminary study based on small samples called a pilot study (Blanche, Durrheim & Painter, & 2006:94) was carried out. Pilot study is a small-scale trial before the actual investigation – intended to assess the adequacy of the research design and of the instruments to be used for data collection (Sapsford & Jupp, 2008:104). A pilot study is also necessary because conducting research involves costs (Blanche, Durrheim & Painter, 2006:94), and therefore it is necessary to undertake it before attempting a major research endeavour (De Vos *et al.*, 2005:83). The first administration of the questionnaire was done at the Bloemfontein passport office, because, as purported by (Blanche, Durrheim & Painter, 2006:490), pilot studies are conducted with either a sub-sample of the proposed sample, or a small sample that represents the proposed sample. Only 10 members of staff working in the Bloemfontein passport office participated. Of all the passport offices in the study, Bloemfontein was most easily reached by the researcher.

3.8.1 Results of pilot study

The pilot study showed that the DHA is a very busy place and that this could affect participation of employees in the actual study. It was initially aimed at 20 people, but it was difficult to find employees who could readily respond to the questionnaire – thus only 10 employees responded to questionnaire. During

the pilot study, respondents suggested that some questions were ambiguous and that they needed to be rephrased. This advice was taken into consideration by the researcher, and the necessary changes were made. It was also discovered that respondents were not sure how to fill in the questionnaire – because they were in fact using the space provided for data-analysis purposes. The researcher responded by writing clear and bold instructions on the questionnaire.

3.9 Data analysis

Analysis means the categorizing, ordering, manipulating and summarizing of data – to obtain answers to research questions. The purpose of analysis is to reduce data to an intelligible and interpretable form, so that the relations of the research problems can be studied and tested, and conclusions drawn. In analysis and interpretation of data, statistics are used often to describe some characteristics of a sample group and also to test for similarities or associations, and differences between groups. In professional studies, quantitative data can be analyzed manually or by using computers. Today's information age benefits greatly from the use of many statistical applications (De Vos *et al.*, 2005:218).

There are a number of appropriate computer programs for the analysis of data, and few can ignore the contribution of technologies such as the Statistical Package for Social Sciences (SPSS) computer software. Babbie, Halley and Zaino (2000:52-53) define SPSS as a powerful, state-of-the-art statistical package that allows users to accomplish numerical tasks and procedures. Dawson (2006:124) adds that SPSS is a common package currently used by social scientists, which has become increasingly user-friendly over the last few years. An alternative computer program, that is also used in the statistical analysis of data, is the well known Excel Computer Program – the benefits of which, in the view of the researcher – can be underestimated or overlooked. Whichever program is used, modern programs enable researchers to input data and compute statistics with ease (De Vos *et al.*, 2005:218). For the purposes of this research, the Excel spread sheet was not found to be wanting.

In this study, the services of a qualified statistician were solicited for the analyses of data using the Microsoft Excel computer software. Spread sheets were used to record and recode data – and the common principle is to assign each row to a particular participant and to assign each column to a particular variable being assessed for each participant. There are numerous functions accessible in spread sheets; they include, but are not limited to, pre-programmed statistical analysis, coupled with the ability to reorganize and sort data by one or more variables (Leedy & Ormorod, 2010:314-316). Similar sentiments are shared

by Blanche, Durrheim and Painter (2006:191), who comment that any spread sheet can be used to input data for each case in a row – while columns represent scores on a specific variable. However, the same authors caution that, because of unavoidable errors when coding and entering data, it is essential to clean data before using it for statistical analysis.

In analyzing the data, each participant was assigned a value according to questionnaire number and their responses recorded. The procedure was to calculate statistics like averages, mode, median, and variances – which are measures of central tendency used in statistics to estimate values that describe a set of data by identifying the central situation within a data set or distribution (Blanche, Durrheim & Painter, 2006:196). The final stage was to rank averages through tables, according to the highest value that indicates the most popular impediment to passport-system adoption – as perceived by respondents in the Lesotho and South African passport offices.

The researcher categorized the questions for analysis according to the respective research questions that they were addressing – and results were presented in percentage tables, pie charts and frequency tables. Figures and frequency tables are procedures usually used to analyze and report data, and tables are a quick way to organize and report information, while graphs are used to show comparisons. De Vos *et al.* (2002:229) state that another type of frequency distribution involves calculating the data in percentages. Percentage tables were used to present the demographic results of the analysis, while the convenience of pie charts was employed to present attitudinal and perceptional variables.

3.10 Reliability and validity of measuring instruments

3.10.1 Validity of measuring instruments

Quality research depends on a commitment to testing and increasing the validity and reliability of your research results. Validity is used to determine whether research measures what it is intended to measure, and to approximate the truthfulness of the results (Tariq, 2009:218). Validity looks at the truthfulness, accuracy, authenticity, genuineness, or soundness of the results (Bashir, Afzal & Azeem, 2008:3). Tariq (2009:1) and Roberts and Priest (2006:41) identified different types of validity:

3.10.1.1 Internal validity and external validity

"Internal and external validity relate to the overall study design" (Twycross & Shields, 2004:1). Internal validity is achieved when the effect on the dependent variable is only due to the independent variable. So internal validity is the extent to which a certain effect on the dependent variable can, with certainty, be attributed to an independent variable. To ascertain internal validity, the similar approach to ascertaining construct validity will be applicable. In fact, Roberts and Priest (2006) argue that content validity, construct validity, and criterion-related validity are approaches to internal validity.

The extent to which the research findings can be generalized further than the sample is external validity. It means that one can apply findings of a study to other people and settings (Twycross & Shields, 2004:1). To ensure external validity, Roberts and Priest (2006:41) disclose that "the sample of participants drawn from the population of interest must be representative of that population at the time of the study. Finally, representative samples should be drawn with reference to relevant variables in the study, such as gender and age." The random sampling method was used to select respondents who represent the population of interest. With the assistance of management, specific employees from which relevant data could be gathered – were identified.

3.10.1.2 Face validity and content validity

With face validity, the research instrument must appear to measure – on the surface – what it is intended to measure, while content validity checks whether the instrument covers the full domain of the content. To ascertain the face validity and content validity of the data collected, the researcher conducted face-to-face interviews with respondents – to demonstrate to the research assistants how to deal with possible respondents' questions (Robert & Priests, 2006:41). This activity was preceded by the pilot study done at the Bloemfontein passport office. To ascertain content validity of an instrument, Twycross and Shields (2004:1) suggest that another more accurate way is to solicit help from a professional in the vicinity – to give their opinion on the validity of the measuring instrument. For that reason, the questionnaire was discussed with the Manager of the passport office at Bloemfontein, and the contents were clarified with the respondents.

3.10.1.3 Construct validity

A construct is a group of behaviours that can be associated meaningfully in order to create a certain image or idea – for the purposes of research. Construct validity is the degree to which inferences can be made from connecting various constructs in a study. In this study, the researcher looked at certain attitudes and perceptions of officials and employees. Different patterns and relations between results were checked in order to conclude that, indeed, a certain variable is a challenge to MIS adoption. For example, for the purposes of this study, one cannot conclude that slow or old machines are sources of delay in passport productions – without relating the idea to the demand for passports.

3.10.1.4 Criterion-related validity

The accuracy of a measure is demonstrated by comparing it with a measure that has been demonstrated to be valid; n other words, correlations with other measures that have achieved validity are made (Roberts & Priest, 2006:41). Criterion validity is usually measured using a correlation coefficient. When the correlation is high, the tool can be considered to be valid. One measure of criterion validity that uses a pre-existing and well-accepted measure against which the new measure can be compared – is called concurrent validity, and another measure that measures the extent to which a tool can predict a future event of interest, is called predictive validity (Twycross & Shields, 2004:1). However, Roberts and Priest (2006:41) argue that where no other measures to be compared are present, criterion-related validity is impossible.

3.10.1.5 Statistical conclusion validity

This is a determination of whether a relationship or co-variation exists between cause-and-effect variables. It requires ensuring adequate sampling procedures, proper statistical tests, and reliable measurement procedures. This determines the degree to which a conclusion is believable. Since the study is descriptive in nature, it cannot ascertain cause-and-effect variables. However, it is sufficient to say that the random sampling technique was used for this study because of its appropriateness for quantitative research designs (De Vos *et al.*, 2005:137). Also, the services of a qualified statistician to undertake the statistical tests, will ascertain this type of validity.

3.10.2 Reliability of measuring instruments

According to (Leedy & Ormrod, 2010:93), reliability of a measuring instrument is the extent to which the instrument yields consistent results when the characteristic being measured has not changed. Something that is reliable will perform in the future, as it has in the past. A reliable test or measure of behaviour can measure the same thing more than once and it will result in the same outcome. Reliability looks at consistency, stability and predictability (synonyms for reliability) (Bashir, Afzal & Azeem, 2008:3). In this study, the same instrument was used to solicit responses from respondents in both countries – so that inferences to be drawn later could be as conclusive and reliable as possible. During the use of these instruments, there will be standardization in use from one person or situation to the other.

3.11 Ethical consideration and informed consent

Research ethics is often described as the responsible conduct of research (Marion, 2004:1). Marion divides these ethical issues into one of four categories which the researcher undertakes to adhere to. Firstly, *protection from harm*: the researcher made sure that participants were not exposed to any unnecessary physical discomfort or psychological discomfort like stress, embarrassment or loss of esteem. Secondly, *informed consent*: participants in the study were informed of its nature and were given a chance to participate or not participate. Thirdly, *right to privacy and confidentiality*: the nature and quality of participants' performance was strictly confidential. And lastly, *honesty with professional colleagues*: the researcher will report findings in a complete and honest fashion, without misrepresenting what was done or intentionally misleading others about the nature of the findings (Brownlow & O'Dell, 2002:6).

Before the respondents participated in this survey, the researcher ensured that participants did so with full consent and that they were supplied with information regarding confidentiality and anonymity relating to the information supplied (Dusick, 2011:5):

a) Participants were informed that they are being asked to participate in a research study.
b) The researcher provided participants with an explanation of the purpose of the study and the likely length of their participation.
c) The researcher supplied the participants with guidelines to follow, when they answer the questionnaire.

d) Participants were given a statement describing the extent to which confidentiality of records identifying the subject/participant would be maintained.
e) The respondents were assured that information supplied by them, would be dealt with in a confidential manner.
f) All participants were given the necessary contacts to direct any questions pertaining to the questionnaire or study as a whole.
g) The researcher informed participants that their participation was voluntary and that they could discontinue their participation at any point in time.

3.12 Limitations

- The focus of the study is the Free State Province and Lesotho only, and therefore inferences and deductions made cannot be generalized to the whole country concerned.

- The study concentrates only on the customized adoption of MIS in the speedy production of passports – with the exclusion of identity documents, birth certificates and other documents.

3.13 Conclusions

This chapter focused mainly on the research methodology and design of the study. The quantitative approach has been adopted – with the survey strategy and its applicability in descriptive research being explained, given that these are the approaches used in the study. Since the study was also exploratory in nature, exploratory research was also explained and also its applicability.

The reasons for using a survey questionnaire have been presented. A questionnaire enables the collection of information in a quantifiable manner. The research instrument was chosen because the researcher adopted a quantitative approach. The population and sampling techniques have also been explored in this chapter – and also their applicability in quantitative research. The stratified random sampling used in the study has been explained. The following chapter will deal exclusively with the analysis and interpretations of the data collected.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

The previous chapter dealt with the methodology and research design used in the study. It also focused on the data-collection process that was followed. In this chapter, the results of the study – together with their interpretations – are presented. The main objective of the study was to explore the challenges and opportunities of adopting a MIS for passport processing – comparing Lesotho and South Africa. The study also intends to explore whether MIS might be a remedy for the delays and long queues that occur with passport processing in South Africa and Lesotho.

4.2 Method of reporting results

In analysis of results, Dusick (2011:9) states that researchers should give an analysis plan that identifies statistical techniques that were used. For the purpose of this study, reporting on each co-objective was done by analyzing the related research question in a quantitative approach. The tool for soliciting responses was a structured questionnaire – where descriptive and inferential statistics were used to interpret results. Using stratified random sampling to select respondents for the study, the target number of respondents was 200 for Lesotho and South Africa combined. The effective response rate was 50% – meaning that the actual number of respondents from both countries was 100. According to Wang, Chang and Heng (2004:89), lower response rates are considered usual in IT adoption – because of the nature of questions concerned. The researcher was also given an opportunity to go around the passport offices of Lesotho and South Africa, with both their respective managers, in order to observe the practical daily operation of systems and procedures. Moreover, the managers supplied the researcher with additional information on passport processing and technologies in Lesotho and South Africa. Supplementary to the results of the questionnaire, the findings of such observations and additional information are also reported in this chapter – to support and provide other necessary insights into the survey results.

To interpret demographic and attitudinal variables of the study, measures of central tendency like the average, mode and median were used, with the aid of percentage tables. A measure of central tendency is an estimate value that describes a set of data by identifying the central situation within a data set or distribution (Blanche, Durrheim & Painter, 2006:196). The last part of this chapter responds to the research questions through informal inferential statistics.

On challenges relating to the delay in passport processing (Research Question 1), variances, averages, pie charts and ranking of averages were used. Pie charts and percentage tables were used again to interpret and compare opinions on the time frame it takes for the two countries to produce and issue a passport (Research Question 2), to check the level at which passport processing has been infused with technology (Research Question 3), and to find out if there are technologies that reduce time delay in the processing of applications and the issuing of passports (Research Question 4). Through the use of variances and averages, the interpretation of attitudes and perceptions of officials on challenges in MIS adoption (Research Question 5) was done. The last analysis on modern integrated passport MIS and technologies (Research Question 6) was done using score tables.

4.3 Demographic representation of respondents

It has been mentioned that the total response rate of both countries combined was 100 individuals. During the time of questionnaire administration, the passport office of Lesotho was piloting the new system of passport processing – so it was easier to find respondents in Lesotho, who were not as busy as those in the South African passport office.

4.3.1 Response rate according to country of origin: Les=Lesotho and SA=South Africa

Country	Frequency	Percentage
Les	58	58%
SA	42	42%
Total	**100**	**100**

Table 4.1: Demographic profile of respondents according to country of origin.

4.3.2 Gender

Table 4.2 (below) shows respondents represented by gender. There are higher percentages of female respondents than males for both countries. The response rate of males in Lesotho is lower than that for South Africa, and that of South Africa is lower than Lesotho for female respondents.

Frequency	Gender		
Gender	Male	Female	Total
Les	32%	68%	100%
SA	47%	53%	100%

Table 4.2: Respondents classified according to gender.

4.3.3 Age

Participants were further classified according to their age group (Table 4.3, below). Most are below the age of 40 for both countries. There are about the same number of respondents between the ages of 40 and 60 for both Lesotho and South Africa. Those above the age of 60 comprise 2% for Lesotho and 3% for South Africa.

Age	21-25	26-30	31-35	36-40	41-45	46-50	51-55	55-60	61-65	66→	Total
Les	2%	26%	9%	26%	12%	12%	7%	4%	0	2%	100%
SA	0%	15%	26%	23%	13%	10%	10%	0	3%	0	100%

Table 4.3: Respondents classified according to age.

4.3.4 Regional Office

Table 4.4 (below) presents the response rate of participants by region. There were more participants in the main cities – namely Maseru (64%) and Bloemfontein (52%) – followed by Mohale's Hoek (20%) and Bethlehem (29%). This is possibly because bigger cities are highly populated and there is a high rate of passport applications there. The Ficksburg office has only one or two employees who are accountable to the Bethlehem manager – hence the zero record under that regional office.

Les	Maseru	Mafeteng	M. Hoek	Berea	Total
Regional %	64%	9%	20%	7%	100%
SA	Bloemfontein	Welkom	Bethlehem	Ficksburg	Total

Regional %	52%	19%	29%	0%	100%

Table 4.4: Respondents classified according to region.

4.3.5 Work experience

The level of experience in the Lesotho and South African passport offices is presented in Table 4.5 (below). South Africa has a higher percentage of respondents with more experience than Lesotho. Forty percent (40%), 25% and 10% from 5 to 20 years – compared with 11%, 23% and 18% respectively for Lesotho. On the other hand, Lesotho has the highest percentage (18%) with more than 20 years of work experience compared with 10% for South Africa. Most respondents in South Africa have between 5 to 10 years of work experience, while for Lesotho (in this category) it is 2 to 5 years of experience.

Experience	2 years or less	2 to 5 years	5 to 10 years	10 to 20 years	More than 20 years	Total
Les	17%	31%	11%	23%	18%	100%
SA	10%	15%	40%	25%	10%	100%

Table 4.5: Respondents classified according to work experience at the Home affairs or Passport Office.

4.3.6 Qualifications

With regard to qualifications, a large number of respondents in both countries have obtained a diploma or degree. There is a large difference in the diploma or degree qualifications between Lesotho (74%) and South Africa (44%). The largest percentage in South Africa is that of officials with matric (51%) – while Lesotho has 15% with matric. The largest percentage in Lesotho is diploma/degree qualifications, with 74%, while South Africa has 44%.

Qualification	No Matric/Form 5/COSC	Matric/Form 5/COSC	Diploma/Degree	Post Graduate	Total
Les	2%	15%	74%	9%	100%
SA	3%	51%	44%	2%	100%

Table 4.6: Respondents classified according to their educational qualifications.

4.3.7 Job Title

Lastly, respondents were classified according to their job titles. Table 4.7 (below) reveals that most of the workforce in both countries comprises mainly junior staff, and South Africa has a higher rate (50%) in this regard. Supervisors and managers make up more or less the same percentage in both countries.

Job Title	Director	Senior Manager	Manager	Supervisor	Senior personnel	Junior personnel	Other	Total
Les	0%	4%	4%	17%	23%	34%	18%	100%
SA	0%	0%	5%	16%	26%	50%	3%	100%

Table 4.7: Respondents classified according to their job titles.

4.4 Attitude and perception variables: Comparison of Lesotho and South Africa on passport processing delays, passport technologies and the challenges of adoption of MIS for passport processing

4.4.1 Research question 1

Research question 1 aimed to identify possible causes of delay in the production and issuance of passports in South Africa and Lesotho. Respondents' opinions were measured on a five-point rating scale from 1 = Strongly Agree, to 5 = Strongly Disagree. When a measure of central tendency is below 3, it means respondents agree that a variable in question is a cause of delay for passport processing, whereas the measure above 3 means that respondents disagree. The subsequent tables, together with pie charts, are used to interpret and compare results on identified variables that were used to explore possible causes of delays in the production and issuance of passports for the two countries. Where pie charts are used, the percentage values of respondents in agreement or disagreement are displayed. The first stage was to examine the ranges of averages and variances in Table 4.8 (below).

Item	1a	1b	1c	1d	1e	1f	1g	1h	1i	1j	1k	1l	1m
SA													
Average	3	2.79	4.38	4.02	3.29	3.72	3.03	3.98	2.9	4.22	4.14	2.88	4
Variance	2.11	2.42	1.16	1.67	2.16	2.1	2.54	1.47	2.24	1.28	1.2	2.06	1.46

Les													
Average	3.45	1.93	2.34	2.86	2.79	3.02	2.17	1.97	2.75	3.35	3.51	2.38	3.84
Variance	2.36	2.07	1.97	3	1.96	2.13	1.62	1.79	2.08	2.66	2.25	1.95	2.03

Table 4.8: South Africa versus Lesotho on items mean and variance.

In South Africa, averages ranged from 2.79 (Item 1b, "Some applicants tend to apply more than once for a passport") to 4.38 (Item 1c, "our passport production systems are very slow to meet current demand"). Variances ranged from 1.16 (Item 1c, "our passport production systems are very slow to meet current demand") to 2.54 (Item 1g, "An external IT service provider is responsible for fixing broken systems").

In Lesotho, averages ranged from 1.93 (Item 1b, "Some applicants tend to apply more than once for a passport") to 3.84 (Item 1m, "Working hours are not enough to meet the current demand for passports"). Variances ranged from 1.62 (Item 1g, "An external IT service provider is responsible for fixing broken systems") to 2.66 (Item 1j, "We do not have Information Technology personnel at our regional office").

4.4.1.1 Statement (a) explored opinions on whether passport-production procedures are manual for both countries

Table 4.9 (below) illustrates the opinions of respondents on the level at which procedures of passport processing are infused with technology, in Lesotho and South Africa. The average (3.45) opinion in Lesotho is that most procedures in applications and processing of passports are not manual. It means that some technologies are available for passport applications and processing. The same point is strengthened by the modal value of 5 – showing that there are a number of respondents who disagree with the statement that their systems are manual. However, for South Africa, most people are neutral – hence the average value of 3 and the modal and median of the same value, which means that there are equal numbers of officials who agree and disagree.

A	All	SA	Lesotho	SA	Lesotho	SA	Lesotho	SA	Lesotho
1	Σf	Σf	Σf	Average	Average	Mode	Mode	Median	Median
a	95	39	56	3	3.45	3	5	3	4

Table 4.9: Respondents' opinions on whether passport production procedures are manual.

Figure 4.1 (below) below displays the same results on a pie chart – where the average of 3.45 (Table 4.9) in Lesotho is made up of 36% (who strongly agree) and 21% (who agree) – respondents in Lesotho who believe that their procedures are performed by some technology. Of the average of 3 in South Africa – 23% (who strongly disagree) and 13% (who agree) is balanced by the 20% and 18% who strongly disagree and disagree.

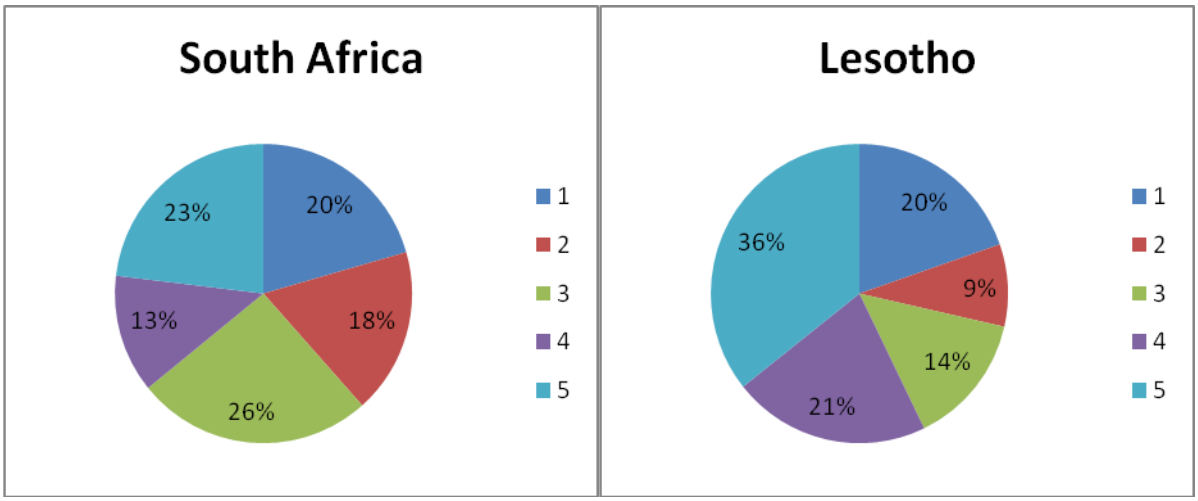

Figure 4.1: Respondents' opinions on whether passport-production procedures are manual.

4.4.1.2 Statement (b) explored the possibility of redundant passport applications for both countries

For the purpose of this study, "redundant applications" refers to the situation where applicants make several passport applications – sometimes at different immigration offices – with the hope that one might be successful (Lesotho Auditor General, 2011:4). The Average and median of Lesotho (1.93 and 1) and South Africa (2.79 and 2.5) mean that for both countries, there is a tendency for citizens to make multiple applications for passports. In Table 4.10 (below), the modal value of 1 for both countries reveals that there were multiple responses – in agreement with this.

A		All	SA	Lesotho		SA	Lesotho		SA	Lesotho		SA	Lesotho
1		Σf	Σf	Σf		Average	Average		Mode	Mode		Median	Median
b		98	42	56		2.79	1.93		1	1		2.5	1

Table 4.10: Respondents' opinions on redundant passport applications.

Another way to look at the above results is through the use of pie charts Figure 4.2 (below) displays the highest percentages of respondents in agreement and strong agreement for both countries. Evidently Lesotho is higher (7% and 64%) than South Africa (21% and 29%) in this regard.

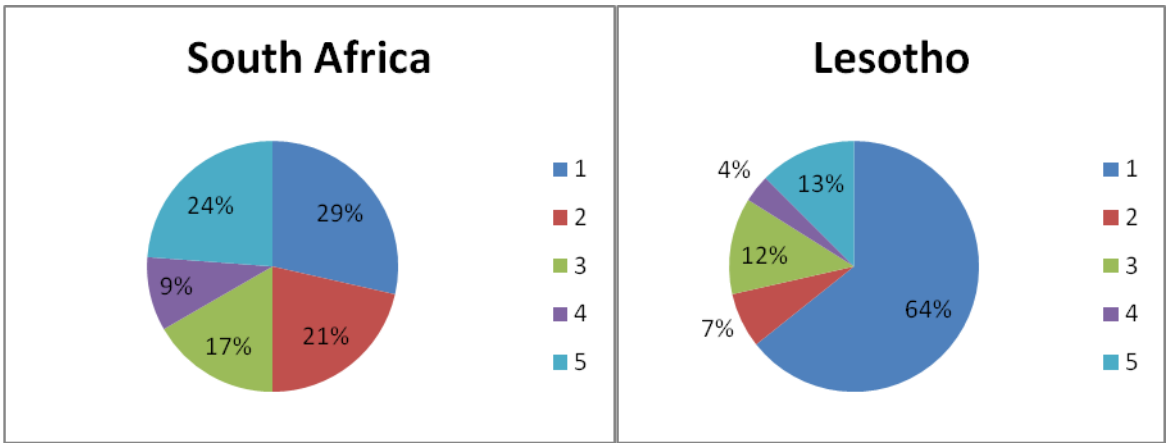

Figure 4.2: Respondents' opinions on redundant passport applications.

4.4.1.3 Statement (c) was aimed at finding out the opinions of officials on the speed of passport production and issuance systems

Comparing the South African average (4.38) with that of Lesotho (2.34) (Table 4.11, below), it is clear that the existence of slow passport production procedures is agreed to in Lesotho – but not in South Africa. The modal value of 1 for Lesotho also reveals that there were many respondents – with a view that their passport systems are slow and cannot cope well with the current demand.

A		All	SA	Lesotho		SA	Lesotho		SA	Lesotho		SA	Lesotho
1		Σf	Σf	Σf		Average	Average		Mode	Mode		Median	Median
c		96	40	56		4.38	2.34		5	1		5	2

Table 4.11: Respondents opinions on the level of speed of production versus demand for passports.

Furthermore, the following pie charts (Figure 4.3) show that most Lesotho officials admit that their systems are very slow to serve the current demand for passports. Forty one percent (41%) of respondents strongly agree, while 16% only agrees. On the other hand, in South Africa, only 5% and 2% strongly agree and agree, while 65% strongly disagree.

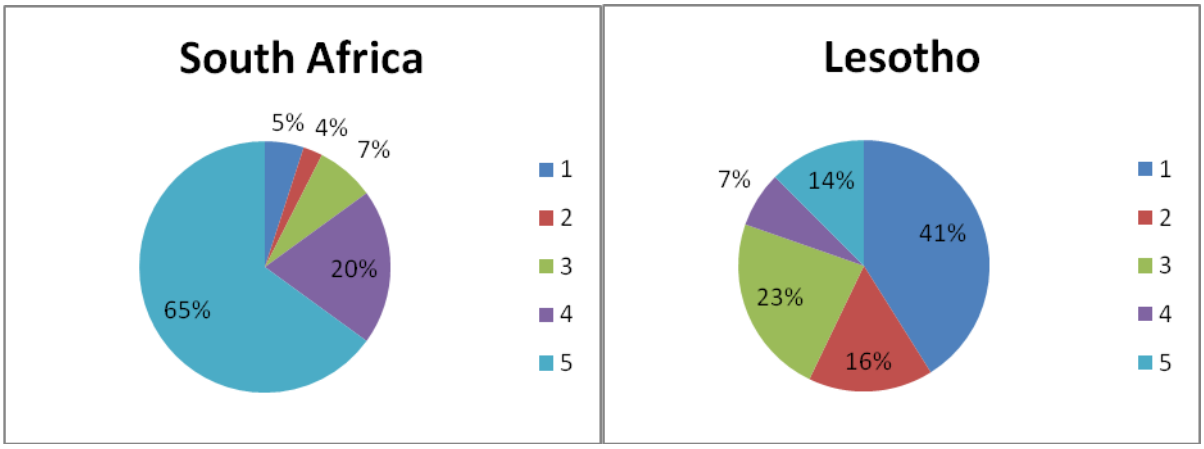

Figure 4.3: Respondents' opinions on level of speed versus demand for passports.

4.4.1.4 Statement (d) investigated how old the systems of passport production are

The last time South Africa made a change to passport technology was in 2011, while for Lesotho it was 2008. The average of 4.02 (see Table 4.12, below) in the case of South Africa means that the respondents from South Africa disagree with the statement that their systems are old – while the average of 2.86 in Lesotho reveals that the respondents agree that their passport production systems are old. The mode of 1 (Lesotho) versus 5 (South Africa) is in agreement with the fact that Lesotho officials see their systems as old, and those in South Africa do not. However, it does not mean that the South African passport systems are effectively functional. It has already been established in the preceding questions that there are flaws which already warrant attention.

A		All	SA	Lesotho		SA	Lesotho		SA	Lesotho		SA	Lesotho
1		Σf	Σf	Σf		Average	Average		Mode	Mode		Median	Median
d		97	41	56		4.02	2.86		5	1		5	2.5

Table 4.12: Respondents' opinions on age of passport-production systems.

In South Africa, 17% of respondents disagree and 54% strongly disagree, while in Lesotho, 38% strongly agree and only 14% agree.

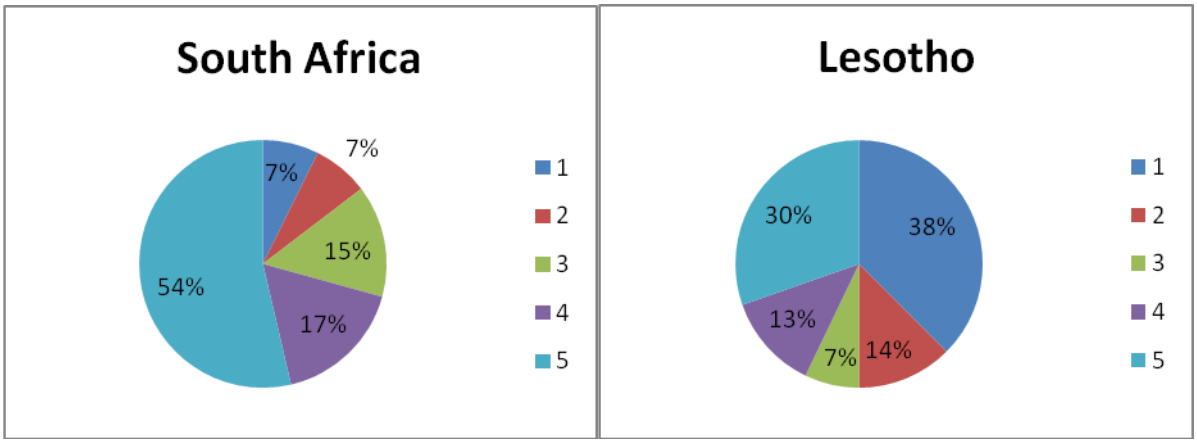

Figure 4.4: Respondents' opinions on age of passport-production systems.

4.4.1.5 Statement (e) investigated opinions on how often systems/machines break down

In Lesotho, an average of 2.86 considers that the speedy production of passports is hindered by system breakages, compared with South Africa (4.02) which has few breakages (see Table 4.13, below). A modal value depicts the same view; many responses in Lesotho (1) agree with this, while many responses in South Africa (5) disagree.

A		All	SA	Lesotho		SA	Lesotho		SA	Lesotho		SA	Lesotho
1		Σf	Σf	Σf		Average	Average		Mode	Mode		Median	Median
e		100	42	58		3.29	2.79		5	1		3	3

Table 4.13: Respondents' opinions on frequency of breakages of passport-production systems.

When considering data on the pie charts for both countries (Figure 4.5, below), it is evident that the number of opinions are not much different in terms of percentage. The same view is evident above – where averages for both countries are around the value of 3. Therefore, the issue of system breakages cannot be said to have been fully dealt with by South Africa, where the average is a little above 3. However, only in comparison with Lesotho can South Africa be actually commended.

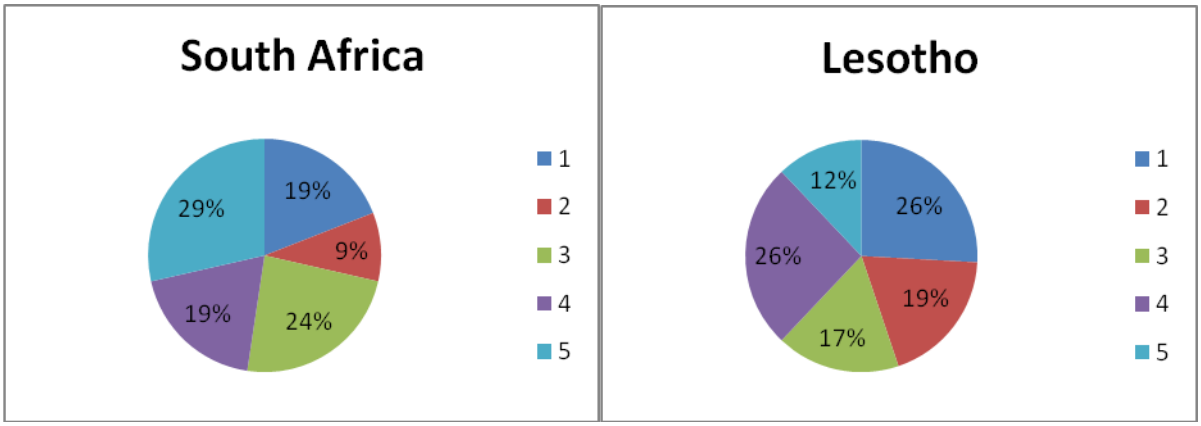

Figure 4.5: Respondents' opinions on frequency of breakages of passport-production systems.

4.4.1.6 Statement (f) examined how quickly the broken systems are fixed

According to previous findings of the Lesotho Auditor General (2011:2), "The Production Unit experienced frequent breakages of printing and laminating machines and there were delays in responding to these breakages by the supplier. It took approximately two weeks to three months to attend malfunctioning machines. The cause of this was that the supplier seemed to be committed to serve other countries and disregarded the terms and conditions of the contract. System incident reports to determine the waiting time for response to breakages of machines were unavailable. As much as passport systems break down frequently, Table 4.14 (below) shows that the fixing of broken systems is rapid for both countries. The average, mode and median of both countries are above or equal to 3 – showing that this is not a common problem, especially for South Africa.

A		All	SA	Lesotho		SA	Lesotho		SA	Lesotho		SA	Lesotho
1		Σf	Σf	Σf		Average	Average		Mode	Mode		Median	Median
f		95	39	56		3.72	3.02		5	4		4	3

Table 4.14: Respondents' opinions on the quick response to repair broken systems.

However, when examining the pie chart (Figure 4.6, below), Lesotho has 21% and 20% with the view that may be linked to the findings of the Auditor General's report – that their systems are not fixed as quickly as they need to be. The chart further shows that the respondents are equally spread in the chart. For South Africa, up to 46% strongly disagrees and 13% only disagree.

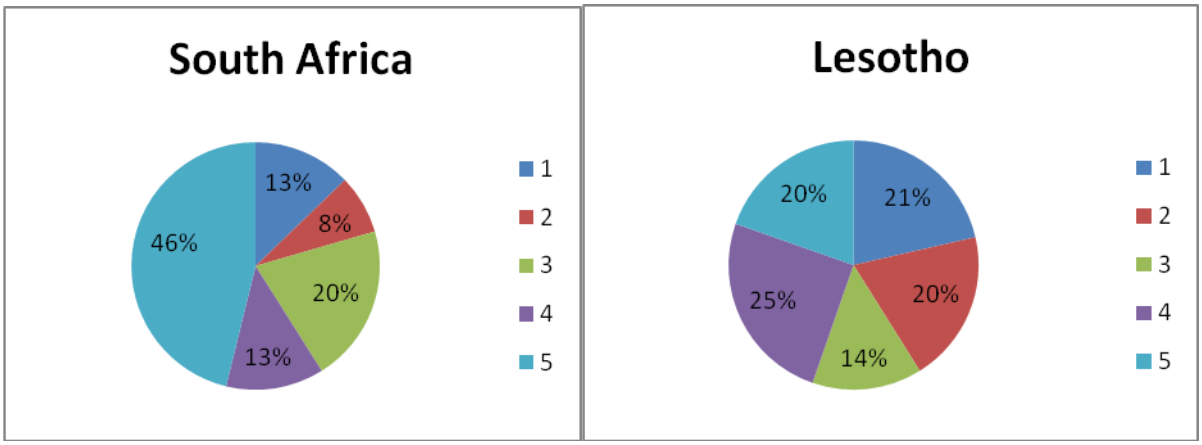

Figure 4.6: Respondents' opinions on quick response to repair broken systems.

4.4.1.7 Statement (g): Respondents' opinions on proximity of IT service provider:

On average, South Africans (3.03) believe that their passport systems are fixed by an internal IT department, while Lesotho respondents say their passport systems are fixed by an external service provider. The median value in Lesotho (2) represents respondents in the affirmative. Inversely, the median of South Africa (3) shows that there are an equal number of people for both beliefs.

A		All	SA	Lesotho		SA	Lesotho		SA	Lesotho		SA	Lesotho
1		Σf	Σf	Σf		Average	Average		Mode	Mode		Median	Median
g		98	40	58		3.03	2.17		5	1		3	2

Table 4.15: Respondents' opinions on proximity of IT service provider.

When using the pie chart (Figure 4.7, below), the average of 2.17 above is reflected by 43% of respondents in strong agreement and 19% in agreement – that the proximity of a service provider affects speedy production of passports. In South Africa opinions are equally spread, although more opinions (25% and 17%) agree as in Lesotho.

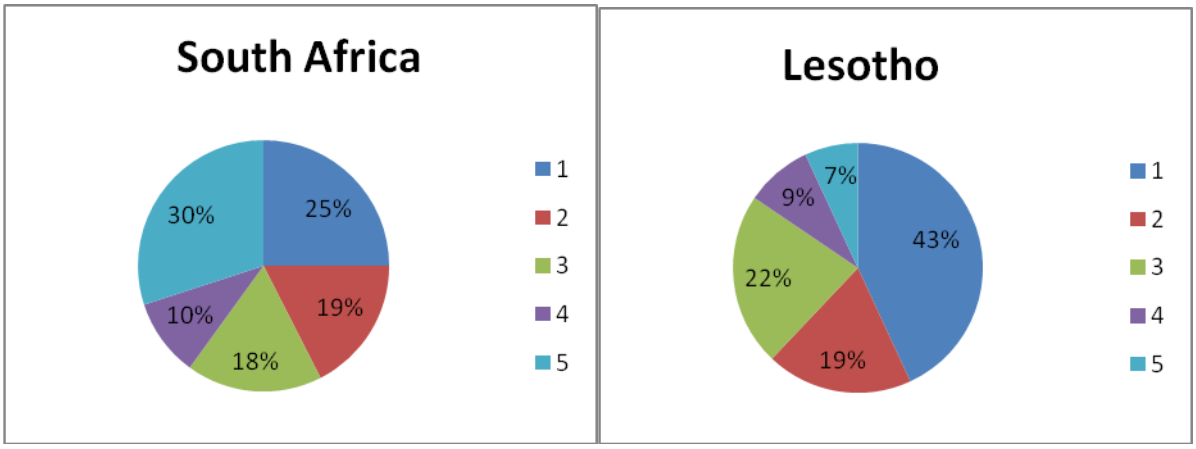

Figure 4:7: Respondents' opinions on proximity of IT service provider.

4.4.1.8 Statement (h): Country of residence of IT service provider: While waiting for the external service provider, the passport services might be on hold every time a problem occurs

The average of 3.98 for South Africa shows that South Africa uses an external IT service provider who resides in South Africa. Lesotho (1.97), on the other hand, uses the services of an external IT service provider who resides abroad. Looking at the modal value in South Africa (5) and Lesotho (1) – in Table 4.16 (below), we discover the same facts.

A		All	SA	Lesotho		SA	Lesotho		SA	Lesotho		SA	Lesotho
1		Σf	Σf	Σf		Average	Average		Mode	Mode		Median	Median
h		99	41	58		3.98	1.97		5	1		4	1

Table 4.16: Respondents' opinions on IT service provider's country of residence.

When systems are malfunctioning in the South African passport office, they are attended to by an external service provider who resides locally – while in Lesotho, passport-production systems are attended to by someone abroad. This issue is in agreement with the afore-mentioned statement (g) which showed that respondents felt that the proximity of the service provider affects the speedy production and issuance of passports. In the figure below, 55% and 19% affirm that the IT service provider resides outside the country. Additionally, it was also seen initially (g) that the response to broken systems is not fast enough in Lesotho. However, in South Africa, most percentages (22% and 46%) are to the contrary.

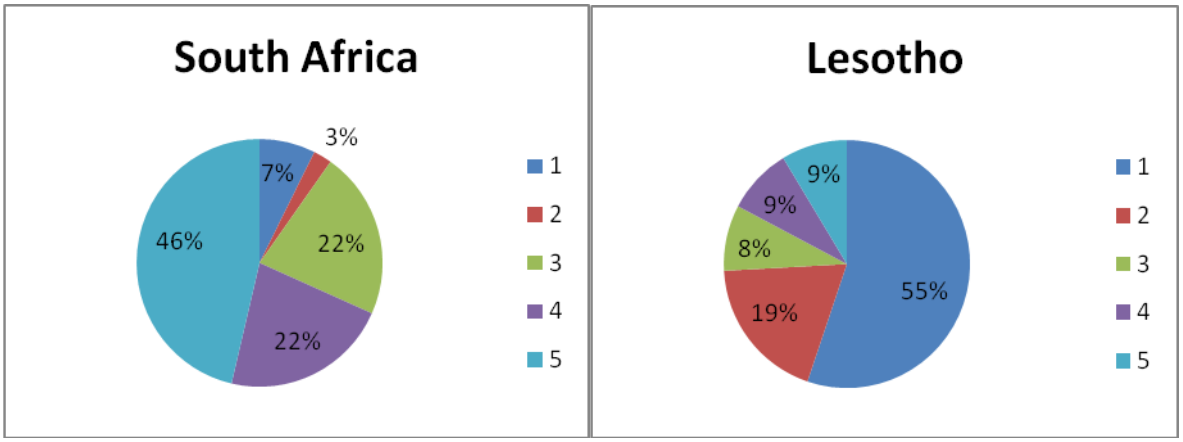

Figure 4.8: Respondents' opinions on IT service provider's country of residence.

4.4.1.9 Statement (i): Respondents' opinions on responsibilities of internal IT personnel: If the responsibilities of an internal IT department are limited, then production might at some point be in a recess, while waiting for help from elsewhere

In Figure 4.9 (below), data are evenly spread throughout the pie chart – meaning that some officials state that technological problems like malfunctioning systems are fixed by the internal IT department, while some think technology-related problems are fixed by an external service provider. It has already been mentioned that most technological problems are attended to by the external service provider. So, attendance to broken systems is a question of the magnitude of the technological problem.

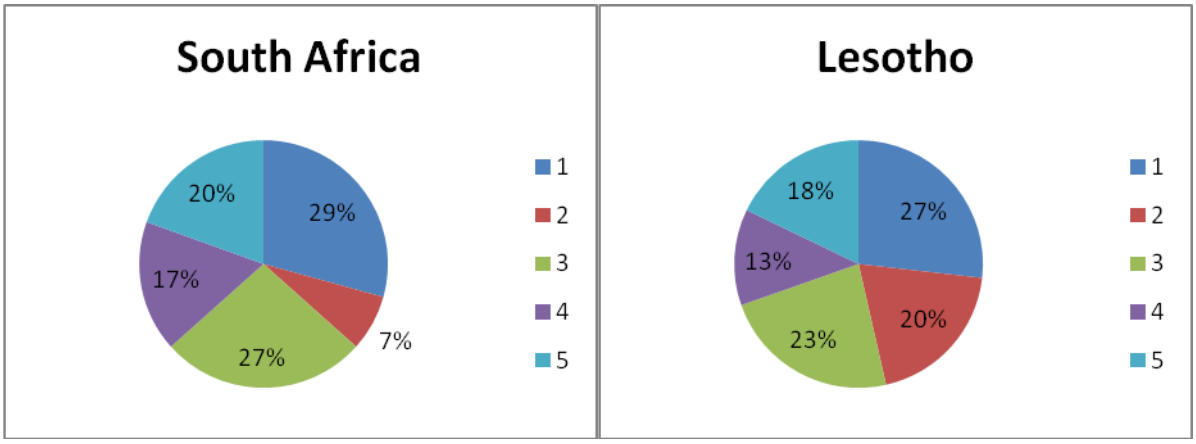

Figure 4.9: Respondents' opinions on the responsibilities of internal IT personnel.

4.4.1.10 Statement (j): Respondents' opinions on availability of IT personnel

Figure 4.10 (below) simply confirms the existence of IT departments in both countries. Evidently, most of the respondents (South Africa: 59% and 17%; Lesotho: 33% and 26%) are in the disagreement side of the pie chart – which means that most are aware of the existence of an IT service provider in the passport office of their country.

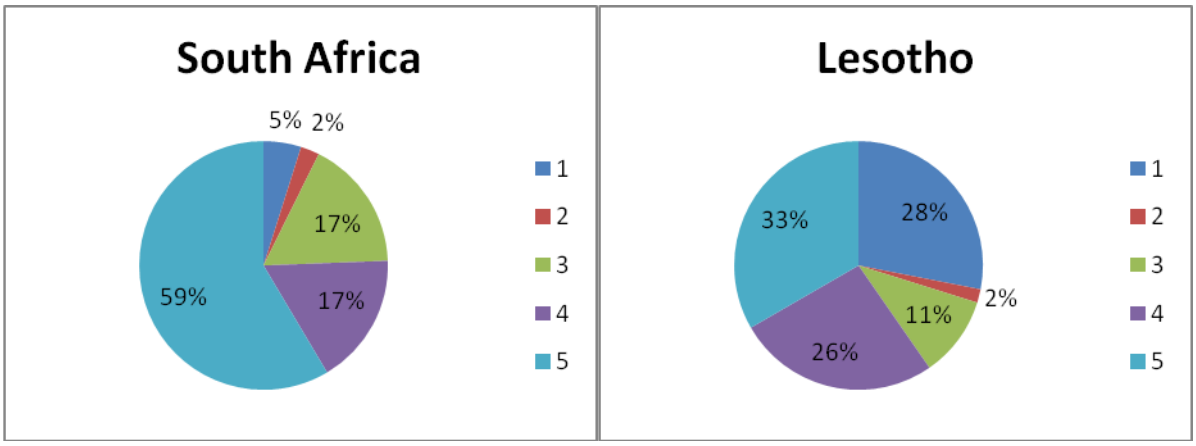

Figure 4.10: Respondents' opinions on availability of IT personnel.

4.4.1.11 Statement (k): the ability of staff at passport offices in Lesotho and South Africa to effectively use systems (the assumption is that if they are unable to use systems effectively, then speedy production and issuance will be hampered)

Responses to this question are displayed on the pie chart below (Figure 4.11). For both countries, the largest percentages are those of value 4 and 5. This means that staff in both countries feels that they are well able to use the systems to their best capacity.

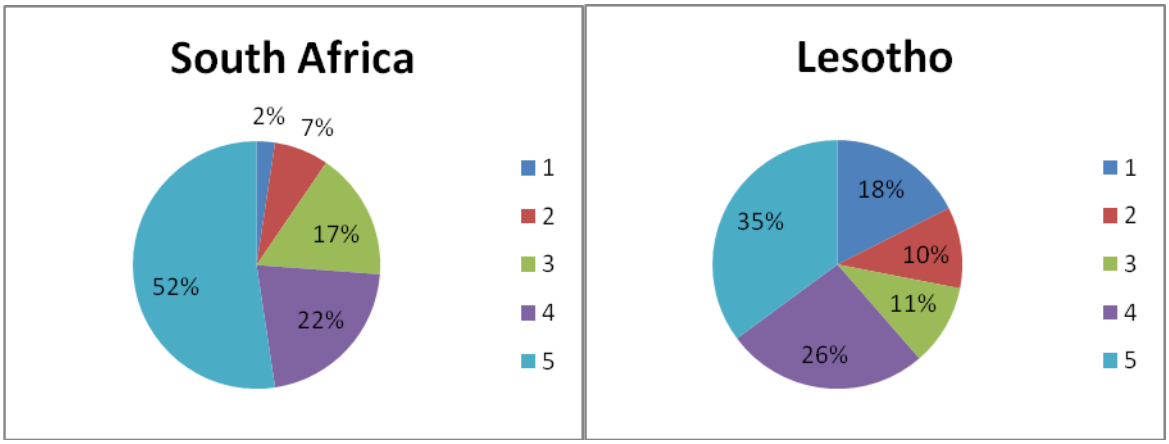

Figure 4.11: Respondents' opinions on knowledge of staff on the system.

4.4.1.12 Statement (l): Respondents were asked if shortage of staff could be a problem hindering the speedy production and issuance of passports.

Figure 4.12 (below) shows that staff in Lesotho feel that the workload is too much for the number of employees – hence the largest sector (Sector 1) that is in agreement with the statement that there is a shortage of staff. This is in agreement with the Auditor's Report (2011) that revealed that the production department was too small. However, on the subject of staff shortages, South African opinions seem to be balanced in Figure 4.12 – meaning there is more or less the same number of respondents in agreement and disagreement.

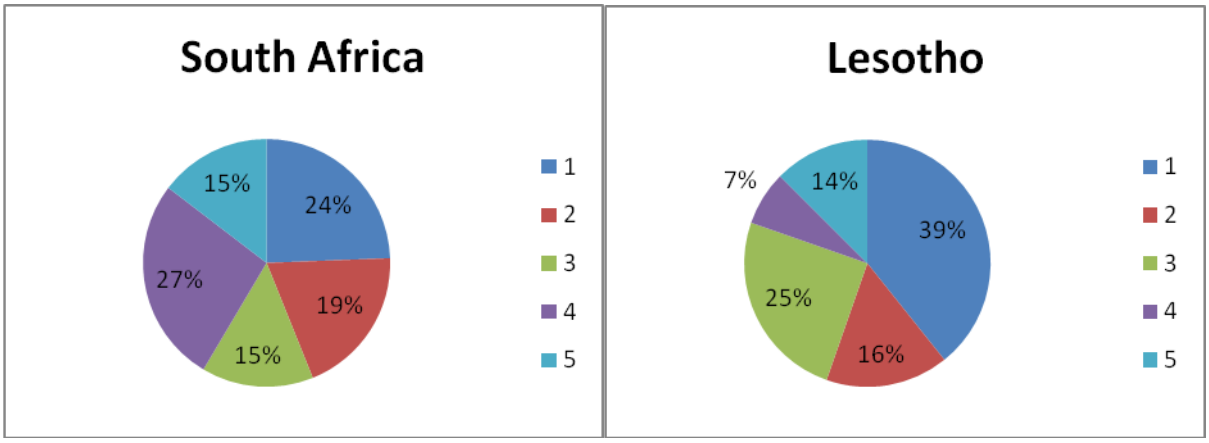

Figure 4.12: Respondents' opinion on the availability of enough staff.

4.4.1.13 Statement (m): investigated if working hours are inadequate to produce and issue passports speedily

Most respondents seem to disagree. They feel that working hours do not affect the speedy production of passports – meaning that the hours do not have to be increased or altered in order for the required daily output of passports to be achieved.

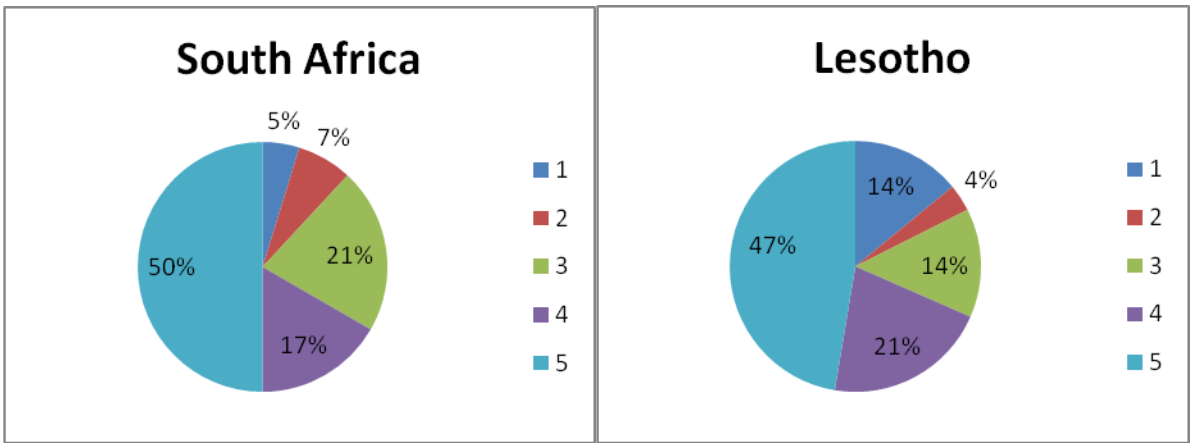

Figure 4.13: Respondents' opinions on adequate working hours

Another way to look at the results was to rank the averages. Table 4.17 (below) was developed by comparing and ranking averages. Individual contributors to the delay in passport processing of both countries are also ranked to show the challenges that officials believe to be the most pressing. Challenges that get the lowest average (below 3) are the main causes of delay in passport production and issuance in South Africa and Lesotho.

South Africa			
Rankings	**Averages**	**No**	**Question**
1	2.79	1b	Redundant applications
2	2.88	1l	Shortage of staff
3	2.90	1i	Internal IT Department
4	3	1a	Manual procedures
5	3.03	1g	External IT provider
6	3.29	1e	Frequent breakage of systems
7	3.72	1f	Response rate to broken systems
8	3.98	1h	Proximity of IT service provider
9	4	1m	Working hours

10	4.02	1d	Status of production systems
11	4.14	1k	Knowledge of staff on systems
12	4.22	1j	Availability of IT personnel
13	4.38	1c	Speed of passport-production systems vs demand

Table 4.17: South African ranking of possible causes of delay in passport processing.

In South Africa, there are three main causes of delay in passport production and issuance. Table 4.17 shows that the issue of applicants applying more than once for the same passport, ranked number 1. The implication is that even though the passport 'Live Capture' is present in South Africa, it is not always up and running, or otherwise the same system has some faults which prevent it from picking up redundant applications. This issue also relates to the fact that other regions like Bethlehem do not have the passport Live Capture at all. In that case, a redundant application will only be picked at the production unit.

The issue of staff shortages is ranked number 2. This challenge is related to the use of manual procedures, because the effective use of technology is supposed to reduce the workload of staff on unnecessary paper work. Staff is possibly feeling this way because much of the work is still done, by them, through manual procedures.

Ranked number 3 is the issue of the internal IT Department. If the internal IT Department is responsible for fixing broken systems, the challenge can only arise if they are not sufficiently knowledgeable. In the case of South Africa, it has already been discovered that the response to broken systems is done relatively faster. But the fact that respondents perceive this factor as a problem shows that the response rate is not satisfactory and that their knowledge of passport systems is not as thorough. This leads to longer waiting periods for the external service provider.

Lesotho			
Ranking	**Average**	**No**	**Question**
1	1.93	1b	Redundant applications
2	1.97	1h	Proximity of IT service provider
3	2.17	1g	External IT provider
4	2.34	1c	Speed of passport-production systems vs demand
5	2.375	1l	Shortage of staff
6	2.75	1i	Internal IT Department
7	2.79	1e	Frequent breakage of systems

8	2.86	1d	Status of production systems (newness)
9	3.02	1f	Response rate to broken systems
10	3.35	1j	Availability of IT personnel
11	3.45	1a	Manual procedures
12	3.51	1k	Knowledge of staff on systems
13	3.84	1m	Working hours

Table 4.18: Lesotho ranking of possible causes of delay in passport processing.

Table 4.18 (above) shows that there are at least 8 issues that are perceived by officials to be the main contributors to slow passport production and issuance in Lesotho. Like South Africa, ranked number 1 is the issue of redundant applications. It also originates from lack of the passport Live Capture or the biometric authentication system. In Lesotho even the production area is unable to pick up redundant applications. As a result, multiple passports are normally produced and issued for one individual. Ranked number 2 is the proximity of the service provider. Unlike South Africa, most officials in Lesotho agree that their service provider is located outside the country. As has already been discussed, the service provider's slow response to broken systems and machines has contributed to slow services in Lesotho. The problem of an external service provider is ranked number 3. It has been realized that Lesotho's contract with the service provider was not clearly stipulating the acceptable response rate or time limit to fix broken systems. Another contributor to delays in passport production – that is ranked number 4 – is the problem of the speed of systems to produce passports in relation to the demand. Most officials agree that their passport-production systems are unable to produce in accordance with the demand for passports.

During an interview with the manager (Mrs Mamookho Phiri: 24/07/13) it was established that problems of passport processing in the Lesotho Passport Office started in 2008. By this time, local passports had reached their expiry dates and citizens were applying in huge numbers for new passports. Lesotho responded to the backlog and increasing demand for passports by issuing a Temporary Travel Document (also known as a Permit). In 2010, the government of South Africa revoked all Temporary Travel Documents and wanted a more secure document when Lesotho residents crossed the border into South Africa. Lesotho tried to respond to this challenge by issuing a new temporary travel document, but the new challenge was that South African machines could not read this document. This issue, coupled with the problems of the high demand that begun in 2008 – exerted more pressure on the Lesotho passport office and the backlog increased even more.

Shortage of staff (rank number 5) is also a problem in Lesotho, but not to the same degree as in South Africa. While the same argument can be given that workload can be reduced by technology, the Lesotho Auditor General's report (2011:2) also pronounced that "there was shortage of staff within the production unit". The report established that the production unit was manned by 15 staff members – while it required 34 staff members to meet the planned maximum daily and monthly passport production. According to the report, the planned daily and monthly production was 500 and 7310 passports respectively – but the production unit was producing well below this standard/number.

Problem number 6 (rank number 6) is the issue of the internal IT Department. As in South Africa, the internal Department does not fix all the problems related to the systems and machines. This factor leads to long delays while waiting for the systems to be fixed – especially when systems break frequently (rank number 7). The challenge ranked number 8 agrees concurs with this, because it reveals that Lesotho's systems are very old.

4.4.2 Research question 2

Research question 2 investigated the average time it takes for Lesotho and South African passport offices to produce and issue a passport – after an application has been received. A checklist was used to solicit responses: 1 Week=1, 2 Weeks=2, 3 Weeks=3, 1 Month=4, 2 Months=5, 3 Months=6, >3 Months=7, and > a year=8.

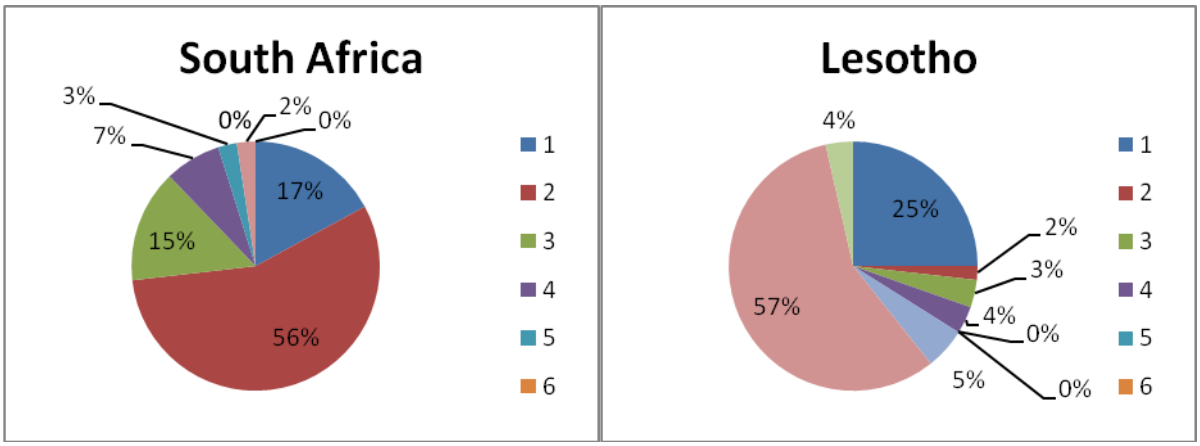

Figure 4.14: The opinions of South African and Lesotho respondents on the time-frame for passport production and issuance

Figure 4.14 (above) is explained by Table 4.19 (below). A considerable percentage (56%) in South Africa say it takes at least 2 weeks to produce and issue a passport after application. Seventeen percent (17%) of

officials say it takes 1 week. The combined percentage strongly suggests that it takes at least 2 weeks to produce and issue a passport in South Africa, while the opinion of 57% of officials in Lesotho is that it takes over a year to produce and issue a passport after application. When comparing the higher percentages in Lesotho and South Africa, there is a difference of about one year. This means that when an applicant applies for a passport in Lesotho, (s)he will usually get it after a year – while an applicant in South Africa will usually receive it after 2 weeks. Another important group is the 4% of Lesotho officials that say there is no standard time for issuance of a passport after an application has been received.

Time frame	1wk =1	2wks =2	3wks =3	1Mth =4	2Mths =5	3Mths =6	> 3Mths =7	> a year =8	NS=No standard	
South Africa	17%	56%	15%	7%	3%	0%	0%	2%	0%	1
Lesotho	25%	2%	3%	4%	0%	0%	5%	57%	4%	1

Table 4.19: South Africa vs Lesotho respondents' opinions on the timeframe of passport production and issuance.

There are another 2% of South Africans who believe that it takes over a year to produce and issue a passport. This percentage group cannot be ignored; it suggests that it is not always that the South African passport office will take a week or two to produce and issue a passport. The same can be said about Lesotho; the 25% that say it takes a week, and the 2% to 4% that say it takes 2 weeks to over 3 months cannot be overlooked. It also reveals that it is not in always the case that a passport will take over a year for Lesotho to issue and produce.

4.4.3 Research question 3

This research question investigated the availability of technology in the main procedures of passport application and processing, in Lesotho and South Africa. It explored the extent to which both countries have embraced technology – specifically in the passport application and production areas. As such, it sheds more light on previous questions. Research question 1 explored the main causes of delay in passport production and issuance, research question 2 investigated the average time it takes for Lesotho and South Africa to produce and issue a passport – and so this section helps establish in more detail how procedures are done – with the intention that the causes of delay (research question 1) and the reason for the timeframe (research question 2) will be more fully exposed. Respondents were asked to tick the availability

of technology for a specific procedure, where: 1 = Manual, 2 = Technology, and 3 = Both Technology and Manual. Percentage pie charts were used to analyze and interpret the results.

4.4.3.1 Data capturing

Some 16% in South Africa and 24% in Lesotho say that data capturing in their offices is done manually, while 26% in South Africa and 37% in Lesotho state that the same procedure is done using technology. The reason for this little uneven percentage groups lies in the fact that the higher percentage groups (58% for South Africa and 39% for Lesotho) state that data capturing is done using both manual and technological procedures. It has already been stated previously (research Question 1) that Lesotho and South Africa use both manual procedure and technology. The extent to which this procedure is manual in Lesotho seems to be more so than in South Africa – hence the 24% in Lesotho and 16% in South Africa in the pie chart (Figure 4.15, below).

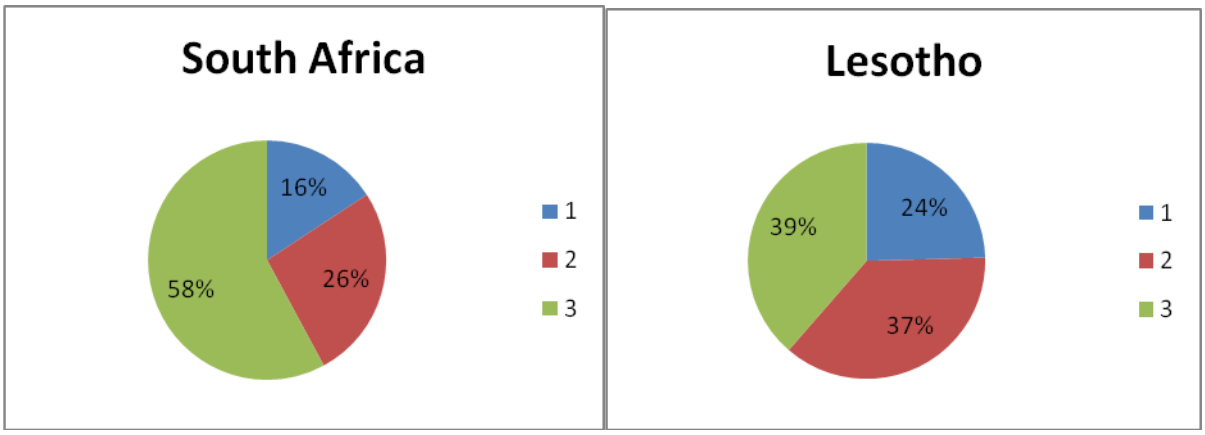

Figure 4.15: South Africa versus Lesotho on data capturing.

4.4.3.2 Data verification

This function verifies the authenticity of an applicant's data during application. The system that performs this function is the passport Live Capture that is used in South Africa, or Biometric Authentication that was recommended by the Auditor General in 2011 in Lesotho, or The Mega Matcher that is used in Indonesia. Eleven percent (11%) of officials in South Africa and 22% in Lesotho consider that the function of data verification is performed manually in their offices, while 49% in South Africa and 53% in Lesotho state that technology that is used to perform this procedure. However, a considerable 40% in South Africa fall state that both technology and manual procedure are used. In this category, Lesotho has 25%.

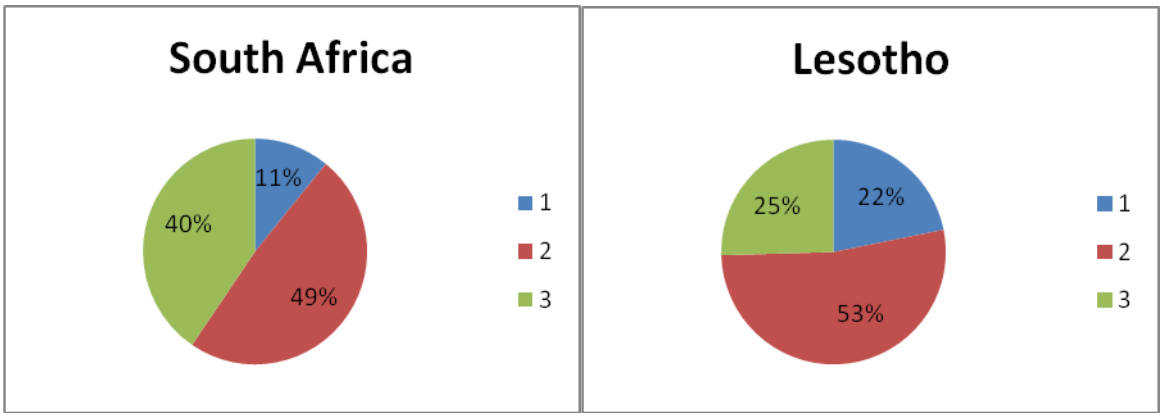

Figure 4.16: South Africa versus Lesotho on data verification.

4.4.3.3 Finger-print taking

Finger-print taking is nowadays done through the passport Live Capture system or Biometric Authentication System. In South Africa, most officials (69%) say they perform this procedure using technology and a manual procedure (see Figure 4.17, below). It has already been stated that the passport Live Capture is not always functional in South African passport offices, and in fact some offices do not have this technology. That is why there is another 18% that falls in the category of manual. Only 5% of Lesotho officials fall into the category of both manual and use of technology, but about 57% says the procedure is done manually. Only 38% claim some use of technology for the procedure. It was mentioned earlier that the audit report had long recommended the use of Biometric Authentication System for Lesotho.

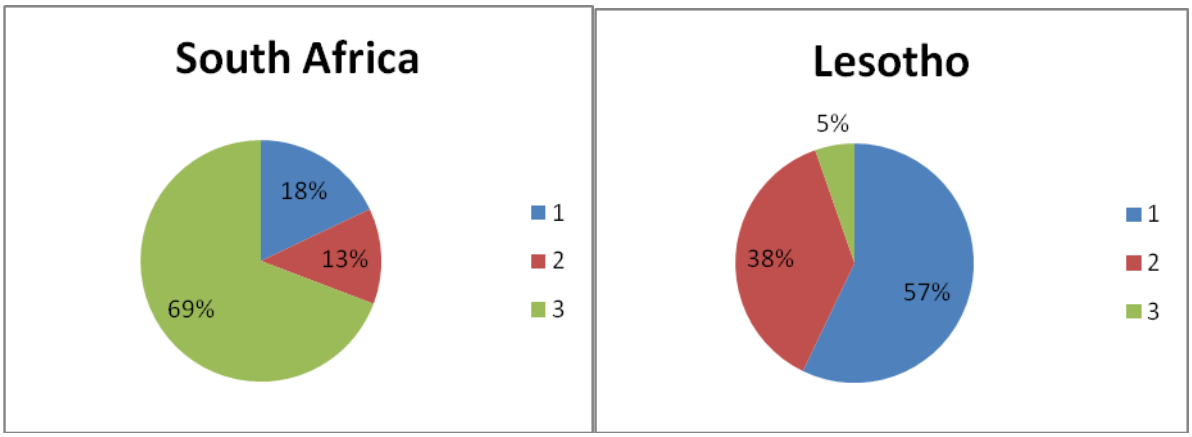

Figure 4.17: South Africa versus Lesotho on finger-print taking.

4.4.3.4 Queue management

It is clear that Lesotho does not have a technology that manages queues for applicants – hence the 88% in the blue portion. This fact was witnessed by the researcher during the study. South Africa uses a system called QUEMATIC, which manages queues from when applicants arrive at the office until they are assisted by the immigration officer. Some 46% of officials acknowledge the existence of Queue Management Technology in South Africa. However, 23% and 31% confirm the use of manual, and both manual and technological ways of controlling queues.

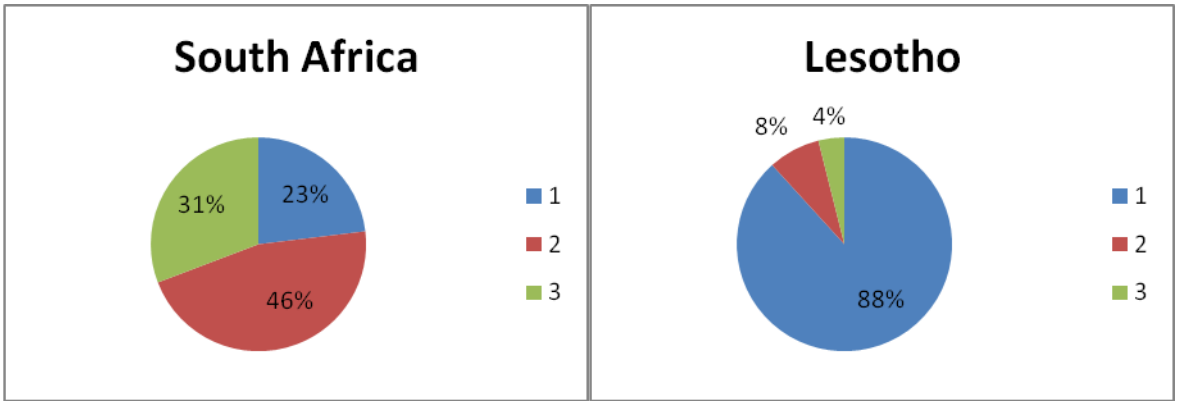

Figure 4.18: South Africa versus Lesotho on queue management.

4.4.3.5 Application processing

Processing of applications is done using both manual and technological procedures in South Africa. That is depicted by the 51% shown in the green area in Figure 4.19 (below). The largest area in Lesotho is 45%; it suggests that application processing is mostly manual. Therefore, the extent to which procedures are manual is dominant in Lesotho relative to South Africa, because only 28% of respondents from South Africa are found in the blue area – indicating manual procedure. Another interesting figure is the 27% in Lesotho using a technological procedure, compared with the 21% for South Africa.

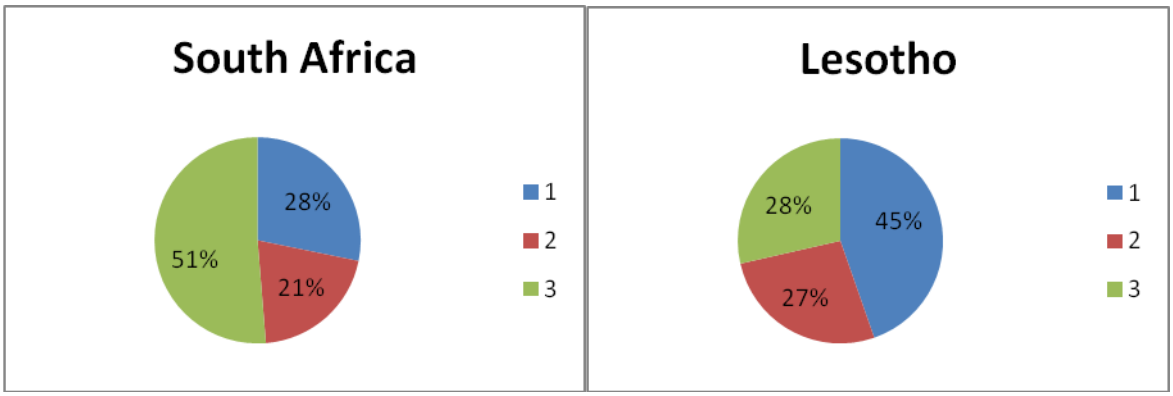

Figure 4.19: South Africa versus Lesotho on application processing.

4.4.4 Research question 4

This part probed the availability of technologies that reduce time delay in Lesotho and South African passport offices. Respondents simply responded "yes" (1) or "no" (2) to this question.

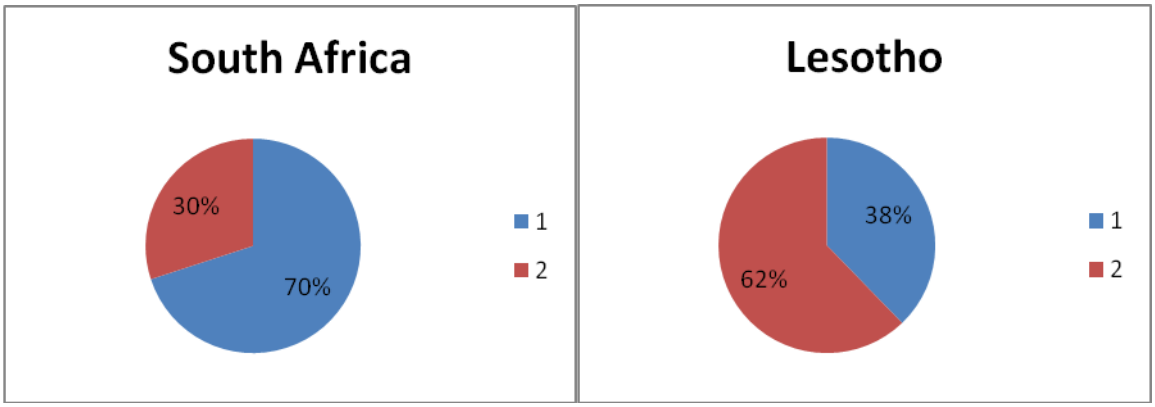

Figure 4.20: South Africa versus Lesotho on the availability of technologies for reducing time delay

Literature (see chapter 2) has shown that modern MIS that are used in passport application, production and issuance – reduce time delay from application to issuance of passports. Most in South Africa (70%) state that they have technologies that reduce time delay for passport processing – while the bigger percentage in Lesotho (62%) falls in the category that considers that such technologies do not exist.

4.4.5 Research question 5

Research question 5 examined the availability of MIS for passport processing in Lesotho and South Africa.

In part (a), respondents were asked to list available systems/technologies that are used for passport production and issuance in both countries.

4.4.5.1 Available systems

Generally speaking, it seems that officials know a lot about the systems used for passport processing in their regional offices. Only 7 officials responded to this question in South Africa, while in Lesotho 35 officials responded. Only 4 respondents in South Africa listed passport Live Capture and 3 officials responded "Do not know". The other respondents did not attempt to answer this question at all. In Lesotho, 26 officials mentioned that "some technology" is used, 2 officials mentioned "computers", while the rest (7) responded "do not know".

4.4.5.2 The need for new systems

Further investigation into whether officials think there is a need for their country to introduce new MIS for passport production and issuance was done, and the comparative results are summarized in Figure 4.21 (below): one (1) represents respondents who said "yes", while "2" represents respondents who said "no".

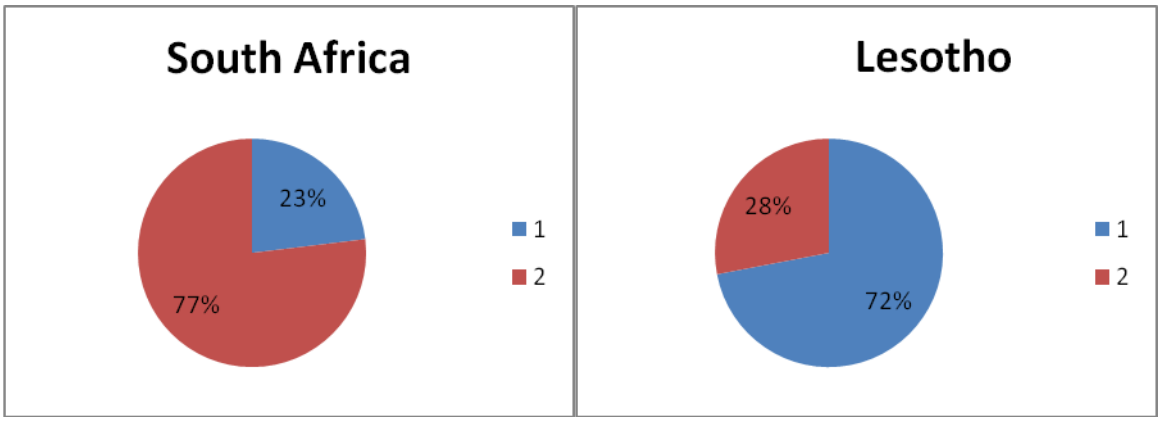

Figure 4.21: Response of officials to the need for new MIS for passport processing.

Figure 4.21 shows that there is more need for new MIS in Lesotho than in South Africa – but it does not mean that South Africa does not need new systems entirely, as evidenced in the previous discussions.

4.4.5.3 Consideration of new systems

Another set of questions investigated whether the introduction of new MIS has been considered at all in Lesotho and South Africa, and whether officials believe the benefits of the new MIS for passport processing would outweigh the risks. Wang, Chang and Heng (2004:88) indicated that when there are high perceived benefits of technology, there is a high possibility and motivation for new technology adoption. Respondents' opinions were investigated by the use of rating scales from "strongly agree" (1) to "strongly disagree" (5).

Figure 4.22 (below) shows that South Africa and Lesotho have considered introducing new MIS for passport production and issuance; at least 37% of officials in South Africa agree to that. It was stated that 77% of South African officials (see figure 4.21 above) do not believe that they need new MIS, but the figure below reveals that their Department is considering introducing new MIS. This fact was also confirmed by the manager (Mr Mlambo 02/07/13) of the Bloemfontein DHA during data collection. On the other hand, another group that warrants consideration is the 47% that are neutral and the 16% that strongly disagree in South Africa. While the literature shows that the intentions to adopt new systems is boosted by the level of stakeholder's readiness to support a system (Wang, Chang & Heng, 2004:88), it appears that most officials in South Africa are not quite up to date about the Department's IT plan. Most officials (76%) in Lesotho are aware that their office is considering the adoption of new MIS – possibly because this goal is not very far from being realized.

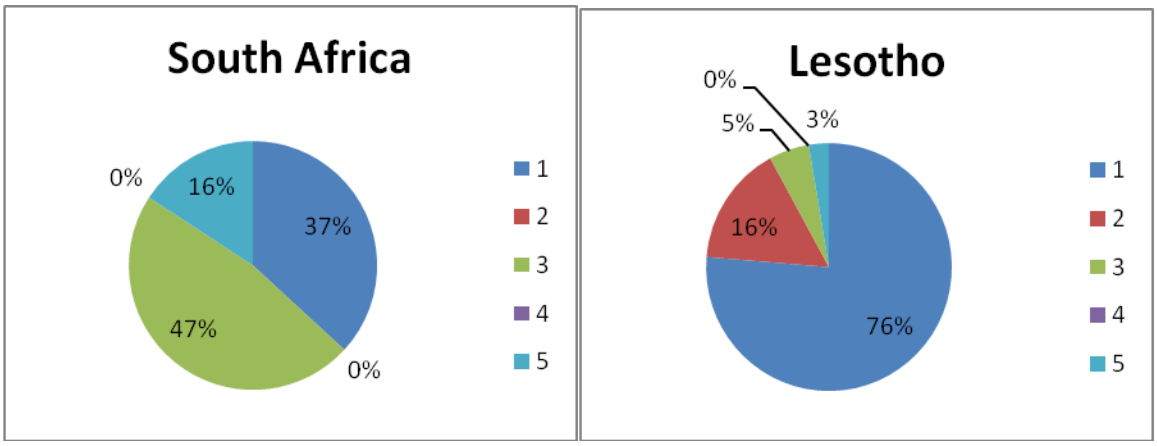

Figure 4.22: South Africa versus Lesotho on consideration of new MIS for passport processing.

4.4.5.4 Perceived benefits

The higher the organization's level of awareness of the benefits of new technologies, the more probable it is that an organization will adopt them (Wang, Chang & Heng, 2004:88). Figure 4.23 (below) shows that, in Lesotho, for the percentage groups 63% and 23% (i.e. 86%), the perception is that the benefits of new MIS will outweigh the risks, while in South Africa only 35% and 4% (i.e. 39%) believe this to be so.

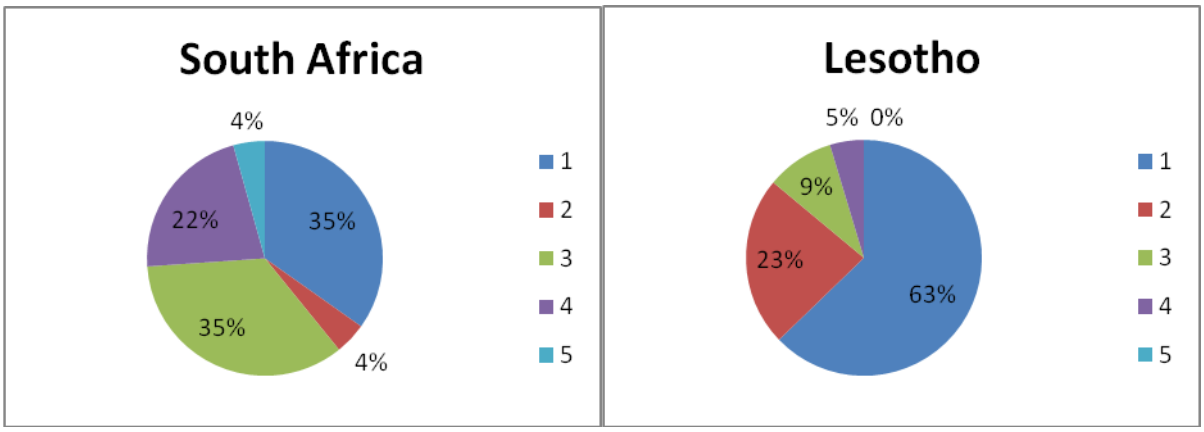

Figure 4.23: South Africa versus Lesotho on the benefits of new MIS.

4.4.5.5 Challenges to MIS Adoption in Lesotho and South Africa

If the need for new MIS has been realized, and the adoption of new MIS has been considered and their benefits are believed to outweigh the risks – what stands in the way of their introduction? The subsequent steps below show averages and their related variance. Afterwards, ranking of averages is done to highlight the main challenges according to how officials see them.

Item	5e	5f	5g	5h	5i	5j	5k	5l	5m	5n	5o	5p	5q	5r
SA														
Average	3.39	3.22	3.08	3.8	2.58	3.39	3.75	3.5	3.33	3.26	3.5	3.25	3.09	2.83
Variance	2.25	1.81	1.99	1.58	1.38	1.79	1.5	1.6	2.06	1.84	1.91	2.02	2.09	1.62
Les														
Average	3.65	2.73	2.95	3.14	1.82	2.98	3.66	2.87	2.47	3.64	3.4	3.41	3.2	2.18
Variance	2.28	2.65	2.73	2.31	1.56	2.7	1.95	1.94	2.3	2.33	2.53	2.48	2.35	1.51

Table 4.20: South Africa versus Lesotho averages and variances.

In South Africa, averages ranged from 2.58 (Item 5i, “Introduction of new passport MIS will drastically change our organization”) to 3.75 (Item 5k, “It is difficult to find passport-production systems that will fit well into our organizational strategies”). Variances ranged from 1.38 (Item 5i, “Introduction of new passport MIS

will drastically change our organization") to 2.25 (Item 5e, "There is a lack of necessary financial resources to introduce such systems").

In Lesotho, averages ranged from 1.82 (Item 5i, "Introduction of new passport MIS will drastically change our organization") to 3.66 (Item 5k, "It is difficult to find passport-production systems that will fit well into our organizational strategies"). Variances ranged from 1.51 (Item 5r, "There are too many layers of authority involved when technological changes for passport processing are considered") to 2.73 (Item 5g, "We do not have computer hardware that supports modern MIS").

Tables 4.21 and 4.22 rank average challenges of Lesotho and South Africa pertaining to MIS adoption. The averages below the value of 3 indicate that officials perceive the issue in question as a problem, while the average above 3 indicates that it is not a problem in South Africa or Lesotho.

South Africa			
Rankings	**Average**	**No.**	**Question**
1	2.58	5i	Resistance to technological change
2	2.83	5r	Too many layers of authority
3	3.08	5g	Lack of supporting hardware
4	3.09	5q	Management style and structure
5	3.22	5f	Lack of required infrastructure
6	3.25	5p	Management's lack of authority to make changes
7	3.26	5n	Low priority in IT
8	3.33	5m	The threat to information security
9	3.39	5e	Lack of necessary financial resources
10	3.39	5j	Threat of job loss
11	3.5	5l	Fear of burdensome changes
12	3.5	5o	Management's lack of knowledge of IT
13	3.75	5k	Difficulty of systems fitting well with strategies
14	3.8	5h	Lack of expertise to operate modern MIS

Table 4.21: Factors that may challenge the adoption of new MIS in South Africa.

4.4.5.6 Rank number 1: Resistance to change

On this factor, the average of 1.82 (rank number 1) reveals that in South Africa the opinion is that the resistance to technological change is the highest barrier to the adoption of new passport systems. In adopting new information systems, reluctance is a factor that has to be dealt with because of the perception

that new information systems will bring unexpected changes that the organization is not ready to face. The same issue is the number one problem in Lesotho – with the average of 1.81.

4.4.5.7 Rank number 2: Too many layers of authority

Another factor that can be linked to the one above is the issue of too many layers of authority. The challenges of implementing new passport systems in South Africa have also been linked to delays caused by bureaucracy (Smith, 2011:1). The average value of 2.83 (rank 2) shows that South African officials feel that there are too many unnecessary layers of authority involved when technological changes are to be considered. The same challenges largely form part of the top two challenges in Lesotho – although they are lower in the average scores of 2.18.

Lesotho			
Rankings	**Average**	**No.**	**Question**
1	1.82	5i	Resistance to technological change
2	2.18	5r	Too many layers of authority
3	2.47	5m	The threat to information security
4	2.73	5f	Lack of required infrastructure
5	2.87	5l	Fear of burdensome changes
6	2.95	5g	Lack of supporting hardware
7	2.98	5j	Threat of job loss
8	3.14	5h	Lack of expertise to operate modern MIS
9	3.2	5q	Management style and structure
10	3.4	5o	Management's lack of knowledge of IT
11	3.41	5p	Management's lack of authority to make changes
12	3.64	5n	Low priority on IT
13	3.65	5e	Lack of necessary financial resources
14	3.66	5k	Difficulty of systems fitting well with strategies

Table 4.22: Factors that may challenge the adoption of new MIS in Lesotho.

4.4.5.8 Rank number 3: Information security

Ezz, Papazafeiropoulou and Serrano (2009:211) aptly state that "The importance of data protection increases when it comes to services involving information-sharing among different agencies". Looking at the issue of information security, Lesotho has the average value of 2.47 and it is the number 3 problem in

rank. In South Africa this issue scored the average value of 3.33. It means that while in Lesotho the means of protecting information during technological change is seen as a threat, in South Africa it is not the case. In contrast with Lesotho, implementing new MIS for passport processing in South Africa will not be threatened by this issue.

4.4.5.9 Rank number 4: Infrastructure problem

The literature shows that investing in IT infrastructure can facilitate business processes and create potential advantages (Wang, Chang & Heng, 2004:90). The infrastructure problem is ranked number 4 – with the average score of 2.73 in Lesotho. It means that when Lesotho has to introduce new systems, it has to consider the issue of infrastructure. It was established during the interview with the Lesotho passport office manager, that the office does not have its own building from which to operate. This issue has also put the security of information and passport systems at risk for a long time – because production has not been at one stable and secure place. Moreover, the space was said to be inadequate to house modern passport systems. South Africa, on the other hand, has the average score of 3.22 on the issue of infrastructure. This suggests that infrastructure will not be among the main challenges – like in Lesotho – when MIS for passport processing are considered.

4.4.5.10 Rank number 5: The burdensome tasks of migration

The burden of migrating to new systems may entail moving information, files and staff to new ways and methods of operation. In Lesotho, this issue is the number 5 problem – with the average value of 2.87. In South Africa it scores the average of 3.50, and is the number 11 problem. It means that Lesotho has a many more other tasks and responsibilities to face than South Africa. Therefore, South Africa will be more ready to introduce new systems, and this factor plays a motivational role in adopting new systems (Wang, Chang & Heng, 2004:88). Among other things, Lesotho will face the challenge of how they can securely and quickly transport information and files. It has just been mentioned that infrastructure improvement is another mammoth task to work on.

4.4.5.11 Rank number 6: Lack of supporting hardware

It is said that all efforts to make passports electronic and secure requires adding hardware, firmware and software at different levels to the existing verification infrastructure (Sinah, 2011:203-204). The number 6 problem in Lesotho is the lack of supporting hardware. This issue has the average of 2.95. This means that

the passport office in Lesotho does not have the computer systems with the capacity and ability to champion modern passport-management systems. South Africa has the average of 3.08 on the same issue. Although it does not fall among the problems in South Africa, the difference is not large – meaning both countries will have the same challenge, but to differing extents.

4.4.5.12 Rank number 7: The fear of job loss

It has been mentioned that in some organizations, IT adoption is perceived as a threat to jobs. The fear of job loss is the number 7 challenge in Lesotho, with the average of 2.98. It was seen during the demographic analysis that Lesotho has few officials over the age of 60. These are the people who are usually not quite familiar with modern technology and the possibility of job losses might arise from this. The fact that an average opinion value on this issue is closer to 3, shows that it does not pose a huge challenge to technological changes.

4.4.5.13 Rank number 8: Lack of enough expertise

The technological incompetence of staff was found to be one of the pressing issues in IT adoption. Countries that adopted IT relatively late – lack proper experience, knowhow and skilful staff, compared with early movers into technology (Chen, Wu & Guo, 2007:202). Lack of expertise in operating new systems is ranked number 8, but it is not a problem in Lesotho. It is also not a problem in South Africa, where it is ranked number 14. It means that most officials in both countries feel that they will be able to operate new systems.

4.4.5.14 Rank number 9: Current management structure and style

This challenge is similar to problem number 2, that was discussed earlier. Officials from Lesotho and South Africa do not feel that their management style and structure could be problematic in relation to technology adoption – yet they both agree that there are too many layers of authority involved, especially when technological decisions have to take place. The passport offices of Lesotho and South Africa are under the Ministries of Home Affairs of their countries. Thus, major decisions have to pass via the cabinet and are handed down through ministers, directors and managers. Decisions of this nature take a long time to be realized, because they may involve inflexible legislatures (Ezz, Papazafeiropoulou & Serrano, 2009:211).

4.4.5.15 Rank number 10: Management's small knowledge of IT

Successful development and implementation of information systems is dependent on middle management's support (Laudon & Laudon, 2006:76-78). Problem number 10 is also similar to problem number 8. Both Lesotho and South Africa share the feeling that lack of knowledge of IT by managers is not a major problem. This issue ranks number 10 in Lesotho with an average value of 3.4, and number 11 with an average value of 3.41 in South Africa. This means that their management, whether quite knowledgeable about IT or not – support new technology innovations. Organizations can easily introduce new technologies when high-level managers are acquainted with and support IT (Chen, Wu & Guo, 2007:202). But it has just been mentioned that major decisions are effected from large statutory bodies like government cabinets, and usually they are not as knowledgeable as they should be.

4.4.5.16 Rank number 11: Management's limited authority on technological changes

Hardcastle (2007:27) points out that IS projects receive necessary support depending on their source of initiation. Systems initiated by senior managers are likely to have the support necessary for successful development – while systems initiated by an IS department as an overall IS strategy, will still need high-level management support for success. Management's lack of authority to make technological changes for passport processing is ranked number 11 in Lesotho with an average value of 3.41, which means that officials do not also see it as a challenge. It is still not a challenge in South Africa, and it ranks number 6, with an average value of 3.45. To a moderate extent, the issue of the lack of authority of management will be more of a challenge in South Africa than in Lesotho.

4.4.5.17 Rank number 12: Low priority for IT

In most organizations, utilizing advanced IT is regarded as an issue that needs to be considered constantly, but is not among the most important ones (Laudon & Laudon, 2006:76-78). Lesotho has an average of 3.64 – for priority relating to IT. This means that according to the Lesotho respondents, IT is a priority in the passport office. The same can be said about South Africa, as they score an average of 3.26. However, it is more of a priority for Lesotho than it is for South Africa – mainly because South Africa has moved ahead of Lesotho in the level of IT adoption for passport processing.

4.4.5.18 Rank number 13: Lack of necessary financial resources

Investing in IT presents special challenges due to high costs coupled with rapid obsolescence (Kumar, 2007:29; Smith 2011:1). Challenges of implementing new passport systems in South Africa have also been

linked to high costs (Smith 2011:1). On the issue of financial resources, respondents do not think that their countries have a problem. Lesotho has an average of 3.65 and South Africa an average of 3.39. But, during an interview with the Lesotho manager, she pointed out that Lesotho is a small economy that operates inside a bigger economy of South Africa, and as such it is difficult for Lesotho to keep up with the versatile and ever-changing trends in economies and technologies.

4.4.5.19 Rank number 14: Difficulty of systems fitting well into strategies

To benefit fully from IT, realize genuine productivity, and to become competitive and effective, many organizations actually need to be redesigned. They will have to make fundamental changes in employee and management behaviour, develop new business models, retire obsolete work rules, and eliminate the inefficiencies of out-of-date business processes and organizational structures. New technology alone will not produce meaningful business benefits (Laudon & Laudon, 2006 76-78). There is no big difference in the feelings of officials on systems and strategies; both in Lesotho and South Africa, there is a similar he mutual feeling that there is no difficulty in finding systems that will fit well with the organizational strategies.

4.4.6 Research Question 6

With the use of checklists, the researcher probed the availability of modern technologies/systems of passport management and border control. The following table (Table 4.23a) compares the findings in Lesotho and South Africa.

4.4.6.1 Part A

	Service/Technology	**South Africa**	**Lesotho**	**Total**
	Number of respondents	**42**	**58**	**100**
1	Online Passport Application	17	6	
2	Electronic Data Capturing	25	29	
3	Electronic Finger-Print Taking	16	19	
4	Electronic Finger-Print Verification	32	16	
5	Electronic Police Verification	3	2	
6	Electronic Face Capturing	16	18	
7	Self-Service Kiosk at Immigration Control Points	2	8	

8	Internet Tracking of Passport Status	10	4	
9	SMS Tracking of Passport Status	21	7	
10	24-hour Call Centre	14	0	
11	24-hour Disaster Recovery	1	1	
12	Queue Management System	23	4	
13	Automated Passenger Clearance at Border Control Points	0	0	
14	Passport Live Capture	31	19	
15	Electronic Passport	9	17	
16	Radio Frequency Identification (RFID) in Passports	1	2	
17	Biometrics in Passports	7	15	
18	Other, Please name:	0	2	

Table 4.23a: Available systems/technologies of passport processing and border control in Lesotho and South Africa.

The truthfulness of the above results was verified by an interview with the managers in Bloemfontein and Maseru. Moreover, the researcher was led throughout the offices to witness the available systems and how they work. The following Table (4.23b) illustrates the results according to the researcher's observations.

	Service/Technology	South Africa	Lesotho
1	Online Passport Application	None	None
2	Electronic Data Capturing	Available	To be in new System
3	Electronic Finger-Print Taking	Available	To be in new System
4	Electronic Finger-Print Verification	Available	To be in new System
5	Electronic Police Verification	None	None
6	Electronic Face Capturing	Available	To be in new System
7	Self-Service Kiosk at Immigration Control Points	None	None
8	Internet Tracking of Passport Status	None	None
9	SMS Tracking of Passport Status	None	None
10	24-hour Call Centre	None	None

11	24-hour disaster recovery	None	None
12	Queue Management System	Available	None
13	Automated Passenger Clearance at Border Control Points	None	None
14	Passport Live Capture	Available	To be in new System
15	Electronic Passport	None	To be in new System
16	Radio Frequency Identification (RFID) in Passports	None	To be in new System
17	Biometrics in Passports	Minimal	Minimal
	Of 17 technologies/systems investigated	6/17	0/17

Table 4.23b: Available systems/technologies of passport processing and border control in Lesotho and South Africa.

When the two tables are compared, it can be realized that most of the items that were said to exist in Lesotho, are only going to be functional in the new system, and this study was investigating the previous system. The new system was being piloted during the time of the study. There are still many passport management technologies that will not be available in the new system. At the same time, there are systems that were said to exist in South Africa – but the researcher's findings were different. In Table 4.23b (above), biometrics (item number 17) is minimal in both Lesotho and South Africa – because in modern passports, biometrics includes more unique features of citizens like the iris and at least 10 finger prints. Yet in South Africa and Lesotho, they only incorporate one finger into a passport. So, when this study was done, according to the second table, South Africa scored 6 – while Lesotho scored zero out of 17 technologies that were investigated.

Lastly, an investigation was done to check the frequency at which both Lesotho and South Africa introduce technologies, or at least make passport-related technological changes. This part was also verified by interviews with managers.

4.4.6.2 Part B

Table 4.24.a (below) shows most averages between 2.82 and 2.17, which means that the last time South Africa made some technological change in the area of passport processing was during the past five years. The literature shows that in 2011, South Africa improved security features on the existing passport.

However, contrary to the average result of 2.54 which suggests that migration to electronic passports was done in the last 10 years, the actual migration to e-passport production is still to be realized.

South Africa	In the Past		
Rankings	**Technological Changes**	**Average**	**Within**
1	6c5. Introduction of new IT strategy	1.82	Past 5 years
2	6c6. Improvement of existing IT strategy	1.89	Past 5 years
3	6c3. Introduction of new IT policy	1.89	Past 5 years
4	6c1. Introduction of new technology	1.93	Past 5 years
5	6c4. Improvement of existing IT policy	2	Past 5 years
6	6c2. Improvement of existing technology	2.17	Past 5 years
7	6c7. Migration to e-passports	2.54	Past 10 years

Table 4.24a: Areas of technological change in recent years (South Africa).

In Lesotho, most technological changes have been realized in the past 5 years. Also, contrary to the information suggested by the average of 1.87 on electronic passports (see Table 4.24b, below), migration to such passports is only now being realized. It can be seen that there were no significant technological changes in Lesotho, because most of the changes ranked below are in the areas of policies and strategies – the results and success of which are mostly realized after years or decades.

Lesotho	In the Past		
Rankings	**Technological Changes**	**Average**	**Within**
1	6c7. Migration to e-passports	1.85	Past 5 years
2	6c4. Improvement of existing IT policy	2.17	Past 5 years
3	6c5. Introduction of new IT strategy	2.2	Past 5 years
4	6c3. Introduction of new IT policy	2.24	Past 5 years
5	6c1. Introduction of new technology	2.27	Past 5 years
6	6c6. Improvement of existing IT strategy	2.32	Past 5 years
7	6c2. Improvement of existing technology	2.34	Past 5 years

Table 4.24b: Areas of technological change in recent years (Lesotho).

4.4.6.3 Part C

The major technological change that is to be realized by South Africa, is the improvement of existing technology and also migration to e-passports. This fact agrees with the argument that was previously made – that South Africa is yet to migrate to electronic passports and the associated technology.

South Africa	In the Future		
Rankings	**Technological Changes**	**Average**	**Within**
1	6d2. Improvement of existing technology	1.5	The next 5 years
2	6d7. Migration to e-passports	1.58	The next 5 years
3	6d4. Improvement of existing IT policy	1.64	The next 5 years
4	6d1. Introduction of new technology	1.71	The next 5 years
5	6d3. Introduction of new IT policy	1.71	The next 5 years
6	6d5. Introduction of new IT strategy	1.79	The next 5 years
6	6d6. Improvement of existing IT strategy	1.79	The next 5 years

Table 4.25a: Areas of technological change in the future (South Africa).

Table 4.25b (below) also shows that Lesotho is in the process of introducing new systems that will generate an electronic passport. Although South Africa is ahead of Lesotho in terms of technologies that speedily produce and issue passports, Lesotho will move ahead of South Africa when they introduce an e-passport – which has still not been issued by South Africa.

Lesotho	In the Future		
Rankings	**Technological Changes**	**Average**	**Within**
1	6d7. Migration to e-Passports	1.37	One year
2	6d1. Introduction of new technology	1.49	One year
3	6d3. Introduction of new IT policy	1.52	The next 5 years
4	6d2. Improvement of existing technology	1.57	The next 5 years
5	6d4. Improvement of existing IT policy	1.65	The next 5 years
5	6d6. Improvement of existing IT strategy	1.65	The next 5 years
7	6d5. Introduction of new IT strategy	1.67	The next 5 years

Table 4.25b: Areas of technological change in the future (Lesotho).

4.5 Discussion of results

In order to discuss the results of this study, the following information that was sourced during an interview with the manager at the Maseru passport office (Mrs Mamookho Phiri: 24/07/13) needs to be presented. The problem with passport processing in Lesotho is beyond what seems to be the case on the surface. There are other interrelated direct and indirect challenges that affect passport processing. First and foremost, passport processing all over the world is guided by an International watchdog – the International Civil Aviation Organization (ICAO) – which from time to time suggests new ways, systems and types of passports and related securities to be implemented. ICAO may instruct countries, at any time, to change passports and related technologies – but also provides timelines. It goes without saying that the financial implications of these suggestions – especially in the ever-changing world of technology – will not be as simple for developing countries as for the developed world.

The first passport in Lesotho was issued in 1963. It was a handwritten paper passport produced and issued at district level. After ICAO declared all paper passports void and susceptible to fraud, Lesotho had to comply and started to issue the first machine-readable international passport in 1998. This passport had improved security features specified by ICAO – and production was centralized to Maseru. This demand by ICAO also meant that Lesotho had to adopt a new system of passport production. However, by 2010, ICAO declared that all countries should migrate to the production of e-passports. This came at a time when Lesotho was already suffering because of backlogs and a very high demand for passports.

When the new system was introduced and new passports were issued, the old local passports had to continue to be in use until their expiry date – but citizens were anxious to have the new passport and therefore began to apply for it. The problematic backlog at the Lesotho passport office started in 2008. By this time, local passports had reached their expiry dates and citizens were applying in huge numbers for new passports. Lesotho responded to the backlog and increasing demand for passports by issuing a Temporary Travel Document (also known as a Permit). In 2010, the government of South Africa revoked all Temporary Travel Documents – and required a more secure document. Lesotho tried to respond to this challenge by issuing a revised Temporary Travel Document – but South African machines could not read this document. This issue, coupled with the problems of high demand that begun in 2008, exerted more pressure on the Lesotho passport office and the backlog increased even more. Lesotho is affected more by South African changes – mainly because it is landlocked within South Africa. This means that there is no way of crossing borders out of Lesotho, except through South Africa.

Other challenges that became prominent in the systems and procedures that were introduced in 2008, were infrastructure problems: the passport office building in Maseru was not able to satisfy production requirements and serve as many applicants as possible – that were using this office. It was not safe enough to secure a highly fragile service like the production of passports. There was also a shortage of staff and equipment. As a result, there was a need for production to be transferred to a new, secure and larger office. Also, the passports themselves needed new security features. Clearly the processes and procedures of passport production needed huge transformation.

It is against the following background that the discussion of the results of the study will be done.

4.5.1 Research question 1

4.5.1.1 Manual versus technological procedures

From the results it seems that the two countries have incorporated technology for passport production and issuance – but the following argument/information should reveal the extent to which technology has been incorporated. During data collection, the researcher observed that Lesotho and South Africa have manual and technological passport application procedures working hand in hand. The application procedure in Lesotho is such that a citizen applies using paper forms. Afterwards, a passport officer types in the applicant's data into the system. The application form, together with supporting documents, will then be delivered to the production unit. However, after application, an applicant does not know when he/she will receive the passport. Therefore, the use of technology cannot be said to have replaced the paper-based procedures used in Lesotho. The researcher was also provided with information from the managers of both Lesotho (Mrs Mamookho Phiri: 24/07/13) and South Africa (Mr Mlambo 02/07/13) – they stated that the paper-based procedures are always available as an alternative, in cases of system failures. So – for both countries, the manual procedures and processes still play a significant role.

The manual (paper) procedure is working parallel with the electronic system at South African DHA. The paper system is said to be mainly useful when an electronic system is down. Thus it serves as a backup plan when the passport Live Capture is not working. When an applicant comes in to apply – and guided by the Queue Management Information System (QUEMATIC) – he presents himself to the officer at counter 9 or 10, where he fills in a form. This step also manually captures the fingerprints, photo and signature into the form. Then an applicant proceeds to make payment at the cashier in the same premises. The third stage is for the applicant to go to the Live Capture system – where fingerprints, photo and signature are

electronically captured. The Live Capture automatically forwards data to the head office, where passports are produced. This process is said to be very quick because of the built-in abilities of the system to do quality and information checks. A client is expected to come and collect a passport after at least a week or two.

From the above information, it does not seem that the passport Live Capture that South African passport office uses, is reliable. The fact that there is still a paper-based procedure operating parallel with the live-capture system poses a question of reliability. In fact, the paper-based system is still the most reliable procedure in the passport office – since all clients are always processed using it, compared with the live-capture system that is seldom used. At the same time, if the paper-based system is still in operation, it does not seem that the benefits of technology are being realized in full. One can argue that DHA is not taking full advantage of the technology. Moreover, in view of the fact that DHA is planning to introduce a new system (Mr Mlambo 02/07/13), the argument is strengthened further. It remains to be seen if the new system will replace all unnecessary manual procedures.

4.5.1.2 Redundant applications

The passport Live Capture, Biometric Authentication System (Lesotho Auditor General, 2011:4) or Mega Matcher (Neurotechnology, 2009:3) are all technologies that can detect redundancy of applications. Although the Biometric Authentication System was recommended in Lesotho in 2011 by the Lesotho Auditor General, the system had not been implemented at the time of this study. For South Africa, it was established during the interview with the manager (Mr Mlambo: 02/07/13) that the Live Capture is not in use in other offices like Ficksburg and Bethlehem. Even for the Bloemfontein office, the researcher established that this system is not always up and running. It was learned that usually the office resorts to the manual way of application when the passport Live Capture system is down.

It has also been said that Lesotho and South Africa have two procedures of passport application and processing. The existence of redundant applications – rated the highest problem for both countries – shows that, indeed, the use of technology in South Africa and Lesotho is of limited practical use. Since systems that detect multiple applications from the same applicant are not in existence in Lesotho, and are not always functional in South Africa, it is difficult for passport offices to detect this problem when it occurs. Another cause of redundancy is that, in Lesotho, applicants apply for a passport in different regions (districts) – with the hope that their passport will be processed more rapidly. The areas concerned are

mostly rural areas that are more technologically disadvantaged. In South Africa, other regions (smaller cities) are also lagging behind compared with big cities, when it comes to modern passport technology. This study has shown that redundant or multiple applications from the same applicant still affect the speedy production and issuance of passports in both Lesotho and South Africa.

4.5.1.3 Speed versus demand for passports

The literature has shown that modern passport technology has been designed with abilities that capture and reveal high demand seasons for passports – so that the public services can be prepared to respond accordingly at these times. Along with the existence of multiple paper procedures and redundant applications which have been said to hamper speedy production, in Lesotho there is also the problem of slow systems of passport production. Although South African systems have been shown to be better in this regard, the systems of both countries are not able to produce in accordance with the prevailing demand for passports, at any point in time.

To say that South Africa is better off than Lesotho when it comes to passport processing, is also subject to the following critical observations. The literature review (chapter 2) revealed that demand for passports is too high in Lesotho because passports are used them for travelling, as a form of identification, and for seeking jobs mainly in South Africa – not to mention that Lesotho is also land locked by South Africa. Travelling through borders from Lesotho is affected directly by the laws and regulations of one country (South Africa). In South Africa, the demand for passports is not as high as for Lesotho, because they have another identity document besides the passport for the uses listed above. Again, leaving South Africa is not as popular and frequent as crossing the borders out of Lesotho – because the South African economy supplies, to some extent, most of the needs of its citizens. Although slow systems cause slow passport production and issuance in Lesotho, it is not necessarily true that South African systems are fast; it is also the case that the demand for passports is not as high.

4.5.1.4 Age of passport production systems

This study also shows that systems of passport production and issuance in Lesotho are not only slow, but are also old – while the South African systems are not seen to be old by the officials. The issue of age of systems is a problem – especially when passports are susceptible to fraud. The literature has shown that there are modern systems that can capture an applicant's data and process passports within the time limits

of a week to two. Modern passport management systems like those of India and Indonesia are also able to display seasons of high demand fort passports.

4.5.1.5 Frequency of breakages

Systems that process transactions on a daily basis are so central to a business that their failure for a few hours can lead to a firm's demise – and perhaps other associated firms as well (Laudon & Laudon, 2006:87). In agreement with the report by the Lesotho Auditor General (2011:2), this study also established that the production unit is still experiencing frequent breakages of printing and laminating machines. This issue is also related to system speed and age, and its inability to detect fraudulent applications. Also, when systems break down frequently, this leads to reliance on paper or manual procedures – which has also been a safety alternative in South Africa. The issue of maintenance also becomes an important issue in this respect. Lesotho and South Africa are suffering from poor maintenance of passport technology. It is not enough to consider new technological implementations; proper management and good functionality have been other problems.

4.5.1.6 Rapid response to broken systems

Contrary to previous findings, Lesotho does not seem to have the same problem that it had two years ago. This study has shown that response to, and the fixing of, broken systems is currently said to be satisfactory. In South Africa as well, the same issue is not seen as one that is contributing to delays in passport production and issuance. However, it will be shown in the following discussion that there are other contradictory facts.

4.5.1.7 Proximity and responsibility of service provider

With regard to speed in responding to broken systems, most respondents state that issues are responded to quickly in both Lesotho and South Africa. However, the same respondents see the issue of proximity of the IT service provider as being a hindrance to speedy passport production and issuance in Lesotho. During an interview with managers in both Lesotho (Mrs Mamookho Phiri: 24/07/13) and South Africa (Mr Mbambo 02/07/13), it was established that both countries have an internal IT Department. However, these departments cannot remedy all the problems that arise as far as passport-production system breakages are concerned. The problems that cannot be attended to by the internal IT Department are resolved by an external IT service provider. During the period of waiting for the service provider, however, services are on

hold – sometimes for weeks in Lesotho – while in South Africa they resort to paper applications when the passport Live Capture system is down. Thus the issue of proximity of a service provider is a problem only if the IT problem is beyond the capabilities of the IT Department concerned. This factor relates to problems of passport delays, in that, during the period of waiting for the service provider, services are on hold – thereby contributing to delays and backlogs. In South Africa, the slow paper or manual procedures become an alternative.

4.5.1.8 Country of residence of service provider

To add to the problem just discussed, is the issue of the country of residence of the IT service provider. Countries like India have enlarged their offices to accommodate their service provider under the same roof as the passport office – so that technology-related problems are resolved quickly. An issue that affects the speed of passport production in Lesotho, is that the service provider resides oversees, and, as such, the response to broken systems is very slow. When systems are responded to after a long time, slow and bulky paper procedures are the alternative used. Combining this issue with the problem of the proximity of the service provider, it can be concluded that the country of residence of an IT service provider is an issue that affects speedy production and issuance of passports in Lesotho, while in South Africa the problem is less pronounced because the service provider is said to be local.

4.5.1.9 Responsibility of internal IT Department

On this issue, for both countries, responses were balanced – because of some equally differing views on the responsibilities of the internal IT Department in their organizations. Another reason for such data distribution is what has already been emphasized – that the existing IT Department has responsibilities that are limited. This issue does affect responses to major passport system breakages that have to wait for the external, overseas service provider. The inability of the Internal IT Department to fix all technology-related problems means they are not well trained by the external service provider on how systems function, and how they can be repaired when problems arise. In the end, this issue does indeed affect production and issuance of passports, because when systems are not functioning production stops – or faulty manual processes of application are used. When production stops, backlogs build up in the production unit.

4.5.1.10 Existence of IT personnel

It is obvious to most respondents that an IT Department does exist in their organization, but it has just been emphasised that these Departments are not fully functional. To have IT personnel that do not respond to all technological problems increases staff and office costs – on which there is no pay back. It means that there are times when these staff will be idle, even when there are technological problems. Moreover, time is wasted while waiting for help to come from elsewhere – while there are IT personnel that could have been trained to solve the problems.

4.5.1.11 Staff competency on passport systems

This issue speaks of employees that use passport application and production systems daily, to serve citizens. According to the respondents, the problems of delay are not caused by the inability of staff to use systems to their best ability; the systems themselves are problematic. Lesotho's systems are old, slow and unable to efficiently perform all the functions of applications and processing. South African systems are not always functioning as expected – and manual procedures are still used.

4.5.1.12 Shortage of staff

For both countries, the issue of staff shortages is seen as a problem. The possibility is that staff feels the overload when procedures that are best and speedily performed by technology are still on their shoulders. Most of the work in Lesotho and South Africa is still tiring and inaccurate manual work. At the same time, the literature has shown that the production unit in Lesotho was undersized.

4.5.1.13 Working hours

Most public-sector administration workers operate within certain standard hours. The systems of production are also designed to produce a certain output within certain hours of work. In Lesotho, the required output per hour was not achieved, because of limited working hours – but the problem was also linked to the undersized production unit and the poor functionality of systems and machines. It was also established that in South Africa, working hours are not necessarily an issue that have to be addressed in order to speedily increase output.

4.5.2 Research question 2

The causes of delay in Lesotho and South Africa have been dealt with above. This section discusses further the issue of the time it takes to produce and issue a passport. To say that passports are produced and issued after a long time in Lesotho, is an understatement. However, sometimes, especially when citizens apply for emergency passports to facilitate job seeking and study outside Lesotho, the Lesotho passport office does produce emergency passports within a week or two. The Auditor General's report (2011:4) stated that the rise in the rate of emergency passport production was due to applicants' mistrust of the passport office. Clients wanted to know the expected time it would take for their passports to be released, and the passport office could not give reliable information. Consequently, applicants resorted to applying for emergency passports. The scramble to put in emergency applications was exacerbated when South Africa revoked temporary passports in 2010 (Mrs Mamookho Phiri: 24/07/13). The passport office was forced to shift its focus from the main applications to emergency applications – and hence the main application processing suffered even more.

4.5.3 Research question 3

With regard to research question 3, the results reveal that most of the main procedures in passport processing are performed using technological and manual procedures. The results of this question are related to research questions 1 and 2. In research question 1, it was shown that the reasons for passport delay are, *inter alia*, are the manual procedures that are still in use in both countries. The use of manual procedures has contributed to the inability to detect redundant applications in Lesotho and some of the South African regions. Also in South Africa, a contributing factor to redundant applications has been that the passport Live Capture is not always functional. Research question 2 further illustrated that – as a result of problems highlighted by research question 1 – the Lesotho passport office is unable to produce passports speedily, and South Africa, although to a small extent, is also suffering from delays. Research question 3 further shows how specific procedures of passport processing are done. On this part, the responses that fall in the category of "both technology and manual" agree with the findings of research question one.

As an example, with regard to data capturing, a large number of respondents stated that this procedure is done manually and with the use of technology – both in South Africa and Lesotho. This is a contributing factor to the delay during application and the inability to pick up redundancy. Manual finger-print taking also

contributes to the delay. It causes applicants to spend a long time in the passport office premises unnecessarily – especially when systems that manage queues are not present in Lesotho and are not always functional in South Africa. Needless to say, there is a need for new reliable systems, procedures and maintenance processes. The existing resistance to fully integrate and trust new systems that will manage passport processing, reveals also that the management and utilization of passport systems for ensuring their total and everyday functionality and reliability, is another problem.

4.5.4 Research question 4

The results confirm what has already been shown above – that for Lesotho, there is no passport Live Capture, queue management control system, and also fingerprints are manually captured. Furthermore, the extent to which application processing is done, was stated to be mostly manual. For South Africa, some of these systems are available and yet their full functionality and effectiveness is questionable. For example, it has already been seen that some of the most important procedures like data capturing and finger-print taking are still managed manually. The previous parts of this section will address the question of how modern these technologies are and if there is a need for the replacement of South African passport production and issuance systems. It is also important to mention that research questions 3 and 4 dealt with passport systems that are used during application at passport regional offices. The systems that are used at the production areas will be the focus of the next research question.

4.5.5 Research question 5

There is a lack of modern and integrated MIS for passport processing in Lesotho. That is why they are in the process of piloting new systems for passport processing. The system that has been in use for a long time is not only outdated – it also has many other flaws that negatively affect the production of passports. Lesotho has seen a need for new MIS, and is in the process of migrating to such. South Africa has moved ahead of Lesotho with regard to passport-management systems. However, their systems are not the latest passport-management systems that produce an electronic passport according to the requirements of ICAO. This is confirmed by the existing plan to introduce a new system in South Africa.

It is still debatable whether the systems being implemented in Lesotho will respond to the needs of the people by reducing or combating time delays. Before adopting new MIS for passport processing, the top challenges below have been identified in Lesotho and South Africa. Given inadequate literature on passport processing, this study has related the general problems of technology adoption to the adoption of passport-

processing technology; the assumption is that there is no substantial difference between passport technology and general IT adoption problems.

4.5.5.1 Resistance to technological change

One of the organizational internal difficulties that the IT age has to face is resistance to change. Many employees do not see e-governance as an opportunity; instead they see it as a threat to their future (Ezz, Papazafeiropoulou & Serrano, 2009:214). The results of this study also reveal that passport technology implementations are affected by a certain level of resistance to technological changes in Lesotho and South Africa. The problem of resistance to change can be linked to some of the demographic results.

Considering the issue of work experience, it was found that the two countries have a considerable number of employees – 23% and 18% (Lesotho), 25% and 10% (South Africa) – with 10 to more than 20 years of work experience. Employees of this calibre are normally very influential in organizations, but also only comfortable and familiar with how work has always been done using inflexible and incompatible legacy systems. This challenge can also be linked to the age factor. Those aged above 50 years in Lesotho and South Africa – make up 13% of the respondents. It is normal for older users to perceive the adoption of new technology as being challenging (Harjumaa & Isomursu, 2012:53). The implications of this statement are that younger people perceive the adoption of new technology differently and also more positively than older people. The problem of resistance to technological change may also be linked to the fact that most employees in South Africa (54%) do not have a diploma or degree qualifications. The modern generation is technologically literate because of modern ways of teaching which have integrated technology – and as such will be more willing to make work simpler through the use of modern technology.

4.5.5.2 Too many layers of authority

A study on key issues in information systems' management found that in economies that adopt highly centralized decision-making strategies, it is not easy for innovations to penetrate organizations. Such problems have also been seen to exist more in state-owned organizations, because top executives there are not sufficiently acquainted with IT. For that reason, they are unable to provide the necessary support for IT applications (Chen, Wu & Guo, 2007:202-203). Ezz, Papazafeiropoulou and Serrano (2009:214) declare that public administrations have to consider changing their organizational structure in order for them to fully exploit the benefits of IT. Management style plays a very important role when innovations are effected in organizations.

It seems that Lesotho and South Africa are not an exception when it comes to the problems of bureaucracy. Passport processing in Lesotho and South Africa are directly managed by the government. Therefore, for changes to be effected, decisions have to be passed down from the legislature and cabinet to ministries and then management. According to officials in the Lesotho and South African passport offices, the issue of too many layers of authority negatively affects the rapid and flexible implementation of technology for passport processing.

4.5.5.3 Information security

The problem of information security prevails only in Lesotho; only in Lesotho is the issue seen as a serious one to be considered before introducing new systems for passport processing. It means that when systems are implemented in Lesotho, the future needs for migration to other, more efficient ways of passport processing are not anticipated or considered – otherwise it would be easier and quicker to migrate to new systems or simply to integrate other systems with existing ones. On the same note, Ezz, Papazafeiropoulou and Serrano (2009:213) argue that old systems are inflexible, incompatible and make it hard to develop even new integrations. The fact that IT applications change rapidly should always be a hind to managers that there will always be a need to improve. Not only that, with passport processing, the fact that ICAO is always looking for new ways to improve security and efficiency should always put nations on the alert. Thus, in Lesotho passport processing, the problem of finding secure ways to migrate to new systems is another issue of concern.

4.5.5.4 Infrastructure problem

The infrastructure issue is one that has always affected IT adoption in Africa. In passport processing it also affects security of information and systems. In Lesotho, passport office preparedness to improve systems and processes has always been restricted by the poor quality of buildings and the security of those buildings. To ensure the security of buildings and processes, South Africa has its own procedures, and employees and buildings are permanently scanned with cameras – by management and security. Thus, in Lesotho, migration to new systems is a difficult task. It is seen by officials as being burdensome work that will involve much adjustment. Therefore, officials perceive that they do not have the state-of-the-art infrastructure suitable for modern passport-management systems. The issue of infrastructure is also related to information security; the researcher perceives that it would be easier to implement new systems if secure infrastructure was already in place.

4.5.5.5 Hardware problem

Any effort to make passports electronic and secure requires adding hardware, firmware, and software – at different levels – to the existing verification infrastructure (Sinah, 2011:203-204). The results of the study have confirmed this to be true in Lesotho. It can also be related to the infrastructure and security problem. Another issue associated with preparedness, is the lack of supporting hardware that power modern passport-processing systems. To consider new hardware and infrastructure means more costs that are normally not anticipated nor planned for. This issue undoubtedly postpones new IT innovations. This study shows that respondents in Lesotho feel that the lack of proper hardware is another problem that hinders the adoption of new passport technology.

4.5.5.6 The threat of losing jobs

The elimination of jobs falls among the ethical and social issues related to the adoption of information systems (Laudon & Laudon, 2006:76-78). Even though government departments do not normally retrench employees during public-sector reform, in Lesotho the passport office's migration to new systems is still seen by employees as being a threat leading to job losses. It means that such employees, especially older ones who have been in the passport offices for a long time, will not easily welcome or initiate migration to new processes and systems. This is because, as has been already shown, there are categories of older and highly experienced employees in Lesotho and South Africa that are possibly comfortable with how things have been done before and do not relish the thought of change.

4.5.6 Research Question 6

New and modern passport management and issuance systems which use biometrics and Radio Frequency Identifications technologies have been found to be the latest solutions to speedy and secure passport processing, production and issuance. These systems, when best used, are integrated with other services like police services, for more security. They have contributed to and are integrated with modern, automated border-control technologies. Moreover, apart from their speed at customer service points, these systems have also reduced queues during passport applications – through new features that enable online applications and the tracking of passports.

The results of research question 6 show that most of these systems are lacking in South Africa, while in Lesotho all of them are unavailable. The issue of effective communication with passport applicants is

important – before and after they apply. Before citizens apply, some countries make information available through websites; citizens are also able to apply for passports using the internet. After applications have been made, many countries allow citizens to make enquiries and sometimes update citizens about their applications using the internet and phone messages. These functions have been confirmed as being unavailable in the Lesotho and South African application processes.

When considering time intervals, when technological changes have been considered in both countries, it was realized that mostly technological changes are reviewed at least every 5 years. In today's ever-changing technological environment, it means that these countries will always be lagging behind in developing efficient technology and processes. Technology is still seen to be an important factor – but is not necessarily a factor that needs to be prioritized.

4.6 Method of inference

The final part of this chapter responds to the research questions of the study, in order to determine whether all the research objectives have been addressed. After careful consideration of the nature of the results, a decision to follow informal inferential reasoning was taken. This was because the data were found to be far from normally distributed, and therefore the best-known types of formal inferential reasoning (like T-Tests) were found to be irrelevant. The following working definitions describe how informal inference is used to draw conclusions in this chapter.

Pfannkuch (2007:149) used informal inference to describe the drawing of conclusions from data, and is based mainly on looking at, comparing, and reasoning from distributions of data. Zieffler, Garfield, Delmas and Reading (2008:44-45) define inferential reasoning as "reasoning about possible characteristics of a population (e.g., shape, centre) based on a sample of data; reasoning about possible differences between two populations based on observed differences between two samples of data (i.e., are differences due to an effect as opposed to just due to chance?); and reasoning about whether or not a particular sample of data (and summary statistic) is likely (or surprising) given a particular expectation or claim".

Blanche, Durrheim and Painter (2006:208-209) state that if members of the sample were randomly selected – and as such are representative of the population from which they were selected – the averages can be used as informal inferential statistics to estimate the features of the population. In this study, as the sample was relatively large and the members of the sample were randomly selected, it is assumed that the sample

is a good representation of the population. *Informal inference will thus be done by assuming that the results of the sample (the descriptive statistics in terms of percentages or ranks) hold approximately for the entire population.*

4.6.1 Research question 1: What are the possible causes for delay in the production and issuance of passports in South Africa and Lesotho?

The results of the study show that – according to the officials in our sample – only three challenges can be linked to passport delay in South Africa, whereas eight problems have been identified in Lesotho. In the following tables, the challenges have been listed according to their rank.

South Africa			
Rankings	**Averages**	**No.**	**Question**
1	2.79	1b	Redundant applications
2	2.88	1l	Shortage of staff
3	2.90	1i	Internal IT Department

Table 4.26a: South African officials' top-ranking challenges on the causes of passport processing delay.

4.6.1.1 Redundant applications

Regarding the redundancy of applications, the average value of South Africa is 2.79≈3, as compared with the average value of 1.93≈2 for Lesotho; thus the average opinion value of South Africa is 0.83≈1 greater than that of Lesotho. The difference seems large enough to conclude that the problem is more prominent in Lesotho, where applicants apply in different locations – hoping that one regional passport office might process the passport faster. Since manual procedures are still part of the main processes, errors such as redundancy are in fact difficult to detect.

RQ (1a): Redundancy of applications is regarded by officials as being the biggest cause of delay in passport processing – but to a greater degree in Lesotho in South Africa

In addition, the redundancy factor is related to the fact that the Lesotho and South African passport offices are still relying on manual procedures. The literature has shown that modern MIS have been designed to replace manual procedures, in order to speed up the processes of passport application and to improve accuracy and security. The researcher also observed that reliance on manual processes shows that

technology has not yet been fully incorporated, utilized and well managed in order to produce maximum output. In fact, there is generally a skeptical reliance on technology for passport processing, and that is why manual procedures during application and passport processing cannot be completely replaced. Therefore, they are still a contributing factor to the delay in passport production and issuance in Lesotho and South Africa; however, the extent to which procedures are manual is more marked in Lesotho than in South Africa.

RQ (1a) i: To some extent, manual procedures are a contributing factor to the delay in passport production and issuance in Lesotho and South Africa

4.6.1.2 Shortage of staff

Shortage of staff is the number two problem in South Africa (2.88≈3), while in Lesotho (2.37≈2) it is ranked as number five. The fact that this challenge is greater in Lesotho than in South Africa is demonstrated by the considerable difference of 0.51≈1, in favor of South Africa.

RQ (1b): According to officials, the problems of delay in South Africa and Lesotho can be related to the fact that the passport offices are under-staffed

4.6.1.3 Internal IT Department

The issue of internal information technology is ranked number three and is the least lowly ranked problem in South Africa (2.90≈3). In Lesotho (2.75≈3) it is ranked number six. While the problem is greater in Lesotho than in South Africa, the difference (0.15≈0) of opinions is, however, not a large one. This issue is a problem in this way; when technological problems arise in the passport offices of Lesotho and South Africa, the existing IT departments cannot fix some of the problems. Sometimes production has to temporarily cease while waiting for an external IT service provider. The opinions are, however, closer to 3 (neutral) – meaning that the issue in question is not the main source of delays in both countries.

RQ (1c): Officials link the problems of passport delay to the fact that when systems are malfunctioning, the response by the internal IT department is not immediate

Lesotho			
Rankings	**Average**	**No.**	**Question**
1	1.93	1b	Redundant applications
2	1.97	1h	Proximity of IT service provider

3	2.17	1g	External IT provider
4	2.34	1c	Speed of passport production systems vs. demand
5	2.37	1l	Shortage of staff
6	2.75	1i	Internal IT department
7	2.79	1e	Systems often broken
8	2.86	1d	Status of production systems ('newness')

Table 4.26b: Lesotho officials' top-ranking challenges relating to the causes of passport-processing delay.

4.6.1.4 Proximity of IT service provider

In Lesotho, the problem is not only that the IT Department is unable to fix most of the technology-related problems, but that the service provider resides in overseas. Therefore, while waiting for systems to be fixed, production has to stop longer for a longer period than in South Africa. The issue of the proximity of the IT service provider is the number two problem in Lesotho – with an average value of 1.97≈2.

RQ (1d): According to officials at the passport office, the passport production delay is related to the issue of the proximity of the IT service provider

4.6.1.5 External It service provider

As already mentioned, major system-related problems are attended to by external service providers. This factor contributes directly to the passport production delay in Lesotho. The problem of an external IT service provider is problem number three in Lesotho – with the average value of 2.17≈2.

RQ (1c): The problems of passport delay are related to the fact that when systems are malfunctioning, the response by the internal IT Department is not immediate

RQ (1d): According to officials at the passport office, the passport production delay is related to the issue of the proximity of an IT service provider

RQ (1e): According to officials in Lesotho, reliance upon the services of the far-removed external IT service provider affects the speed of passport production

4.6.1.6 Speed of passport-production systems versus demand

The problem of speed of passport production systems in Lesotho is number 4 – with the average value of 2.34≈2 – which is 2.04≈2 less than South African opinions (average of 4.38≈4).

RQ (1f): According to officials, passport-production systems in Lesotho are very slow to meet the current demand for passports.

4.6.1.7 Frequent breakage of systems

The issue of frequent breakages is related to 1f above. According to officials in Lesotho, it does affect the speed of passport production and issuance negatively. Opinions in Lesotho are on the average of 2.79≈3, compared with those of South Africa which are 3.29≈3 (a difference of 0.50≈3).

RQ (1f): according to officials, passport-production systems in Lesotho are very slow to meet the current demand for passports.

RQ (1g): Not only are the systems slow, another contributor to the delay in passport processing is said to be frequent breakages of passport systems.

4.6.1.8 Status of production systems ('newness')

The average value of 2.86≈3 in Lesotho is lower than that of 4.02≈4 in South Africa, by a value of 1.16≈1 showing that Lesotho officials feel that their passport-production systems are older and cannot cope with the current demand, as compared to those of South Africa. This factor can be related to RQ (1f) and (1g).

RQ (1f): According to officials, passport-production systems in Lesotho are very slow to meet the current demand for passports.

RQ (1g): Another contributor to delay in passport processing is said to be frequent breakages of systems.

RQ (1h): The systems that are used for production and issuance of passports in Lesotho are also old.

4.6.2 Research Question 2: How long does it take on average to produce and issue a passport in Lesotho and South Africa?

The literature has shown that the reasonable timeframe of waiting for a passport is nowadays reduced to a week. Under such situations, the need for emergency passport applications is very limited. The results of the study show that 56% of South African sample respondents say that their passport is processed and issued within two weeks, while 57% of those of Lesotho say that their passport office issues a passport after a year or more. There is a considerable difference of at least a year between the Lesotho and South African average time of passport production and issuance.

RQ (2a): Most of the time, in South Africa a passport is received within two weeks after application.

RQ (2b): In Lesotho, while there is no set standard against which a passport is received after application, it is normally after a year.

4.6.3 Research Question 3: Are the current systems and procedures used to process an application, and to produce and issue a passport still manually done or is technology used?

Most of the procedures in South Africa are done using technology, while most procedures in Lesotho are done manually. But, the use of manual procedures and processes still exist in Lesotho and South Africa – especially with applications. It does not seem that the application processing is quicker in South Africa than Lesotho; however, it is clear that South Africa's production and issuance of passports is faster. Put another way, while Lesotho and South African applicants may spend more or less the same time at immigration offices during application, South African applicants will receive their passports considerably faster after application. So, South Africa's production unit has systems and procedures that are faster than those of Lesotho.

RQ (3a): South Africa and Lesotho use manual and technological procedures for application and processing of passports.

RQ (3b): The use of manual procedures is more in Lesotho than in South Africa.

4.6.4 Research Question 4: Are there technologies that are used to reduce the time delay in the production and issuance of passports?

There is a need for new technologies that can be used for the reduction of time delays for Lesotho and South Africa. It is important to mention though, that South Africa is ahead of Lesotho as far as embracing these technologies is concerned. Through the use of a queue management system and the passport Live Capture, South Africa has managed to reduce time delay during applications. But the simultaneous use of manual processes negatively impacts on the ability to reduce delay.

RQ (4a): Some technologies that can reduce time delay do exist in South Africa – but they are not always functional and useful.

RQ (4b): There are no technologies that reduce time delay for passport processing and production in Lesotho.

4.6.5 Research Question 5: Is there an integrated MIS in the processing of passports in both Lesotho and South Africa?

4.6.5.1 Availability of Modern Integrated MIS

There is lack of modern and integrated MIS for passport processing in Lesotho. Even though 77% of officials in South Africa have indicated that they have the necessary passport management systems, the need for new ones has been identified – the evidence being the existing plan in South Africa to implement new MIS for passport processing. Depending on the success of the new systems being piloted in Lesotho, Lesotho will move ahead or come to the South African level of implementation of passport-management systems. The system that has been in use for a long time is outdated and has frequent breakages. The need is not only to implement new systems, but also to develop good strategies of implementation, maintenance and management of passport technology. Both countries have identified this need to migrate to new systems of passport processing.

Moreover, if the need for new systems is only to improve speed at which services are offered to citizens, South Africa would not be very far from reaching it. But it is also imperative to improve the security of services to reduce fraudulent activities at DHA – the existence of which has led to the South African passport being vulnerable to crime syndicates. For that reason, South Africa has also realized that there is a need for new MIS for passport processing.

RQ (5a): There is a need for new Integrated MIS for passport processing in both countries?

The following challenges to new MIS adoption have been identified by officials:

South Africa			
Rankings	**Average**	**No.**	**Question**
1	2.58	5i	Resistance to technological changes
2	2.83	5r	Too many layers of authority

Table 4.27a: South African officials' top-ranking challenges to new MIS adoption

Although with less differing average values, Lesotho and South Africa have the same challenges as the major impediments to the technological adoption of passports.

Lesotho			
Rankings	**Average**	**No.**	**Question**
1	1.82	5i	Resistance to technological changes

2	2.18	5r	Too many layers of authority
3	2.47	5m	The threat to information security
4	2.73	5f	Lack of required infrastructure
5	2.87	5l	Fear of burdensome changes
6	2.95	5g	Lack of supporting hardware
7	2.98	5j	Threat of job loss

Table 4.27b: Lesotho officials' top-ranking challenges to new MIS adoption

4.6.5.2 Resistance to technological changes

The opinions differ by 0.76≈1 in average in the favor of South Africa. That means the problem is perceived as greater by officials in Lesotho, than in South Africa.

RQ (5b): Resistance to technological changes is the main impediment to the adoption of new MIS for passport processing.

4.6.5.3 Too many layers of authority

Again the problem is greater in Lesotho than in South Africa – by the average value of 0.65≈1.

RQ (5c): With too many levels of authority, adoption of MIS for passport processing in Lesotho and South Africa is hindered.

The following challenges have been identified by respondents in Lesotho only:

4.6.5.4 The information security problem

RQ (5d): Officials feel that the difficulty of migrating to new MIS for passport processing is related to an information security problem.

RQ (5e): There is lack of relevant infrastructure to accommodate modern MIS for passport processing.

RQ (5f): There is lack of relevant hardware to run modern MIS for passport processing.

RQ (5g): The fear of losing jobs still has a negative effect on the move towards the adoption of new technology.

4.6.6 Research Question 6: What are the possible and available MIS technologies that could be applicable in addressing the delays in the processing, production and delivery of passports?

RQ (6a) New and modern passport management and issuance systems which use biometrics and Radio Frequency Identification technologies have been found to be latest existing solutions to ensure speedy and secure passport processing, production and issuance. In their best strategic use, they are integrated with other government systems like border control and police services. Such systems and their strategic integrations are not present in Lesotho and South Africa.

4.7 Conclusions

This chapter reported on the research results of a survey questionnaire that was structured and self-developed. Descriptive and informal inferential statistics were used to analyze the data. Where it was necessary, additional interviews and observation results were also reported – to shed more light on the interpretation of the statistical findings. The analysis started by looking at the demographic data, where percentage tables were used to interpret results. Thereafter, statistical measures of central tendency along with pie charts and tables were used to report the results on perception and attitudinal variables on MIS adoption in Lesotho and South African passport offices. In addition, the extent to which Lesotho and South Africa have incorporated modern technology in passport processing was explored and compared.

South Africa has incorporated more technology for passport processing than Lesotho. This factor has helped South Africa to issue a passport faster than Lesotho. However, South Africa's passport-production systems have breakage inconveniences and other flaws. For that reason, both countries have seen a need to introduce new systems for passport processing. Lesotho is already in the process of introducing new systems. There are slow passport production processes in Lesotho and no set standards against which production and issuance time limits are measured.

Out of 13 identified contributors to slow processes of passport production and issuance, respondents feel that South Africa will be affected by only three, while Lesotho will be affected by eight. Respondents in Lesotho perceive the following challenges as being the main contributors to slow production services: redundant applications is ranked number one (1), proximity of the IT service provider is number two (2) and another factor related to it is not so much a challenge on its own – namely that the external IT service provider is responsible for fixing broken systems (3). It has been explained that this factor becomes a challenge at times when the service provider responds after a long period. Respondents in Lesotho also state that their passport systems are slow to meet the current demand for passports (4). They also feel that the workload is too much for them (5). While the systems of passport processing are very old (6) and break

very often (7), the immediate internal IT Department is not responsible for fixing main system-related problems (8).

In South Africa, only three challenges are pressing according to the respondents. These are: redundant applications (1), shortage of staff and the internal IT Department (2). Lastly, there is the responsibility to main system-related problems vested on the external IT service provider. Although to differing averages, it is realized that South Africa and Lesotho have these same 3 challenges perceived by officials as main contributors to slow services.

It is perceived that the economic factors of Lesotho and its geographic position make the country very vulnerable to technology deficiencies. As much as South Africa is ahead of Lesotho, it has not introduced the latest or modern MIS systems for passport processing. In this regard, respondents in South Africa feel that their country is resistant to change (1). They also think that too many layers of authority are involved in technological decisions, and are an obstacle to changes (2). While the same challenges exist in Lesotho, there are additional challenges. Respondents have the sense that it will be difficult to secure information during transition (3). They understand that the lack of good infrastructure is another problem (4). Migrations to new technology are perceived as being a burdensome task in the Lesotho passport office (5). Respondents have also showed that the Lesotho passport office does not have supporting hardware for new systems (6). Lastly, some employees see the adoption of new systems as a threat that might lead to job loss (7).

This chapter explored all the research questions, in order to systematically and logically respond to all their related objectives. All the findings of this chapter and the related literature (chapter 2) will lead to conclusions of the study – and recommendations that will be dealt with in the next and final chapter.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This last phase of the study first reviews the findings and conclusions of a comparative study conducted between Lesotho and South Africa with regard to challenges affecting MIS adoption for passport processing. The main objective of the study – which was to explore the challenges and opportunities of adopting MIS for passport management in both countries – has been achieved, and recommendations have been made. However, the recommendations of the study may not be implemented without a careful outlook on the environment in which they are to function. For that reason, concepts like customization of passport systems have been employed in order to meaningfully act in response to on-hand challenges of passport processing. Additionally, the solutions that may combat the problems have been identified and recommended.

The analysis of data on all the research questions was done by a qualified statistician through the use of Microsoft Excel computer software. Since the data of the study were found to be unevenly spread, mostly informal inferential statistics was used to draw conclusions of the study.

The first focus of the chapter is to review the conclusions from the previous chapter. Thereafter, it recommends the system and strategies. The limitations of the study are then reviewed - which is followed, in conclusion, with the identified requirements for further research.

5.2 Finding of the study

Previous studies such as the Auditors General's report (2011:1-9), and the general public, have mostly linked the challenges of passport processing in Lesotho to internal problems in the passport office itself. However, there are other multiple and diverse internal and external challenges that have been found to hinder passport processing, and, consequently, border control between Lesotho and South Africa. The fact that Lesotho is land-locked within South Africa results in Lesotho's economic and social life being vulnerable and dependent on that of South Africa. That is because, in order for Lesotho citizens to cross borders, the only option or route is through South Africa. There is also an ever-increasing outflow of Lesotho citizens into South Africa – for job seeking and studying purposes. Thus, the high demand for passports cannot only be attributed to Lesotho's passport office inefficiencies. It should also be linked to the inability of Lesotho's economy to supply the necessary resources and means of life- support for its citizens.

Moreover, in Lesotho, the manifold use of the passport as a means of identification – in job seeking and studying and as a travelling document – makes it a highly sought after document.

Apart from the fact that South Africa is typically able to supply the shopping and other needs of its citizens, the South African passport is almost exclusively used for travelling purposes. Moreover, studying and working abroad is not as popular and as compelling in South Africa as it is in Lesotho. Even for going on holiday, it is highly likely that South Africans will be able to satisfy those needs within the country's borders, while Lesotho citizens are more likely to find what they need abroad – and mostly in South Africa. Apart from these challenges, the data collected in chapter three and analyzed in chapter four provided other important insights into the study. The following section is an overview of the conclusions that can be derived from the literature review and the research results.

5.2.1 Causes for the delay in the production and issuance of passports in South Africa and Lesotho

Three challenges have been attributed to causing delays in passport processing and issuance in South Africa:

a) Redundant applications

It was established that, in South Africa, incidents of multiple passport applications by the same applicant do occur (see Table 4.10, page 72). This problem is associated with lack of the passport Live Capture systems in some regions – while on the other hand, in regions where the passport Live Capture exists, like in Bloemfontein, its proper and regular function cannot be ascertained. The literature review has revealed that the Mega Matcher, the Biometric Authentication, and the passport Live Capture (pages 18 and 32 respectively) are modern systems that eliminate the problems of redundancy of applications. Manual procedures in passport applications are inherently incapable of capturing incidents of citizens applying repeatedly at different sites; therefore it is identified as another loop-hole that allows redundancy.

b) Shortage of staff

Most staff members in the passport-processing sections feel that their departments are under-staffed (see Figure 4.12, page 81). More employees are needed in order to meet the daily needs of processing passport applications. Staff mostly feels this way in places where technology has not yet been utilized or where it is

under-utilized. For both countries, technological procedures have not completely replaced the manual approach.

c) The internal IT Department

The internal IT Department is not well trained to fix all technological problems that arise (Table 4.17, page 82). This issue contributes to time delay, in that, when systems are malfunctioning, the Department of Home Affairs usually has to seek the help of the external service provider.

Eight challenges have been attributed to delaying passport processing in Lesotho:

a) Redundant applications

Similarly, but to a greater extent, the problem of redundancy of applications in Lesotho is the main cause of the delay in passport production and issuance (Table 4.10, page 72). The reasons have been attributed to the lack of systems that can highlight the passport office where an applicant applies for the second or third time for the same passport. Moreover, the cause of multiple applications in Lesotho is a result of citizens trying their luck at different districts – with the hope that one regional passport office might issue a passport faster. But, because all passports are centrally produced, and given that there is no technology that identifies multiple applications at the application office and at the production unit – the workload is ever increasing.

b) Proximity of IT service provider

The IT service provider of Lesotho resides overseas. Therefore, when systems are broken or malfunctioning, the passport office has to wait for a long time for the systems to be fixed – especially because, like South Africa, the Lesotho internal IT Department does not have the required skills to fix most passport technological problems (see Table 4.18, page 83).

c) External IT service provider

This issue is closely related to the one above. It has been mentioned that the external IT service provider who resides overseas is responsible for fixing broken systems in Lesotho. This fact has contributed to delays in passport processing, because systems of passport processing break down regularly and the existing IT Department does not have the necessary expertise to fix them. Moreover, respondents stated

that it takes too long for the external IT service provider to respond to technological problems. The literature has also revealed that there is no agreement between the Lesotho passport office and the service provider on the reasonable timeframe allowed after reporting a technological problem and when the problem is attended to by the service provider. It was said that the service provider seems to be more committed to other countries, than it is to Lesotho.

d) Speed of passport-production systems versus demand

Passport systems are designed with components that supply management with information on different levels of seasonal demand for passports throughout the year (see Korea, page 21). Such systems are not only lacking in Lesotho, but the country's existing procedures and systems are too slow to respond to and serve the current demand for passports at any point in time.

e) Shortage of staff

The challenge of the shortage of staff also exists in South Africa. In both countries, it is linked to the fact that technological procedures have not really replaced manual ones. At the same time, the problems of inadequate staff members does not have to be ignored. A previous study by the Auditor General also established that the production department of Lesotho was undersized. This problem – coupled with slow and old systems – undoubtedly affects production and the speedy issuance of passports.

f) Internal IT Department

This issue also exists in South Africa. It is also linked to the fact that the existing IT Department does not have the skills to respond to most of the technological problems that arise in the passport office. This means that during the time there are passport system breakages, production will stop – depending on the magnitude of the problem.

g) Regular breakage of systems

It has been revealed that systems that process transactions on a daily basis are so central to an organization, that their failure for a few hours can lead to a firm's demise and perhaps other firms linked to it (Laudon & Laudon, 2006:87). This factor was found to be true in Lesotho where passport-production systems are said to be breaking on a regular basis – thereby negatively affecting the turnaround time for the release of passports after applications have been made (Figure 4.5, page 76). To counter the problem

of delay, citizens choose to apply in different districts – but the result is more, and redundant, work for the passport office, which culminates in more delay for passport issuance.

h) Status of production systems ('newness')

Not only do systems break often, but the results of the study have also shown that the passport-production systems are also very old (Figure 4.4, page 75). The passport office of Lesotho has shown a desire to migrate to new and modern ways of passport production – for over a decade.

5.2.2 Reasonable waiting period between the processing and delivery of passports to applicants, especially in Lesotho.

With modern passport technologies, the reasonable time to wait for a passport can at least be minimized to a few days – or a maximum of a week. In most cases a South African passport is issued after two weeks. Sometimes, however, they do take longer to produce and issue a passport. On the other hand, in Lesotho, while there is no standard time of issuing a passport after an application has been received, it takes mostly a year or more to issue a citizen with a passport (Figure 4.14, page 85).

5.2.3 The extent to which both South Africa and Lesotho have embraced technology in the processing of passport applications, monitoring, and delivery

Generally, both countries have been found to use similar approaches for applications and the processing of passports – even though South African procedures have been infused more with technology than those of Lesotho. The similar approach is that of using manual and technological procedures simultaneously. In spite of the similarities, the reasons for these approaches differ; in South Africa, there is skepticism about completely replacing manual procedures – in anticipation of times when technology might fail. On the other hand, Lesotho does not have most of the latest technologies that are used for passport processing. For example, as in Lesotho, a South African citizen expects to go through manual fingerprint taking, manual signature, photo taking and filling of forms – after which (only in South Africa) the technological procedures for the same tasks are done. Other technologies that help to improve service delivery in South Africa are the Queue Management Systems for the management and control of queues, and the use of surveillance

cameras which management uses to monitor – from the office – everyday proceedings and how customer service is proceeding.

5.2.4 Technological measures implemented to track the progress of the applicant's passport application, for the purpose of reducing the waiting period

In South Africa and Lesotho, the only efficient procedure for tracking a passport is clients physically presenting themselves at the office to ask an officer – who will in turn check on a computer what the status of a passport application is. An applicant cannot himself make a phone call and/or receive phone massages – let alone use internet tracking. At least in South Africa the office can also make a phone call to applicants, but only when a passport is ready to be collected by an applicant. For both countries, the only time an applicant will have contact or can view of his application – is during application and during collection. Alternatively, modern MIS for passport processing allows for passport tracking through phone messages, phone calls and internet applications.

5.2.5 Have both countries adopted an integrated MIS for the processing, production and delivery of passports?

The results of this study suggest that modern MIS for passport processing are being considered in both countries (see Figure 4.22, page 92). Even though the passport Live Capture plays an important role for passport application in South Africa, its reliability and consistency are not regularly trusted and depended upon. This factor is evidenced by the coexistence of the passport Live Capture and the manual procedures. The two countries have seen a need for new systems and this study established few impediments faced by management. The challenges of adoption of new MIS for passport processing have been identified – and there are more of them in Lesotho than in South Africa;

Possible challenges for South Africa (Figure 4.21, page 91) are:

- Management and staff's resistance to technological change
- There are too many layers of authority involved in technological changes and decisions.

Possible challenges for Lesotho (Figure 4.22, page 92) are:

- A fear that technological changes needed for passport processing might threaten information security
- Lack of required infrastructure for new and modern passport-management systems
- A fear of burdensome changes thought to be needed for migration to new systems
- Lack of supporting hardware for modern MIS
- Some respondents think that introduction of new systems and procedures might lead to their replacement or job loss(s).

5.2.6 MIS model that can help reduce the delay in the processing, production and delivery of passports

This final objective of the study will be the direct focus of the following section, which also discusses the identified solutions – as recommendations of the study.

5.3 Recommendations of the study

To respond to the problems identified in Lesotho and South Africa, this study considers that there is no single system that can independently solve the problems of passport processing in Lesotho. A system has to be adopted, and that system must incorporate features or strategies of other countries. Careful consideration of the environment in which both countries operate will prompt and suggest the adoption of systems that are customized to suit that country's needs. Without compromising the issues of security and accuracy, a passport system that is affordable has to be implemented.

5.3.1 Recommended e-government model

Passport processing in every country is also a component of e-government initiatives. Although e-government is not an e-passport, it can succinctly be stated that an e-passport is e-government. In adopting e-government systems, various studies have assessed and developed different models that address intended users' drives to embrace technologies as a compulsory element. Kumar *et al.* (2007:72) state that unique features of the citizens – and the factors that create satisfaction – need to be clearly understood before generating any e-government model. That is because the success of e-government implementation depends greatly on the extent to which intended users make use of it. In this study, the researcher recommends the conceptual model as an approach to implementing customer-centric public-service delivery.

In adoption of the conceptual model, Bwalya (2009:6) suggests that it must be custom-made for specific environments – especially in the SADC countries. Such a model must be able to weigh the pros and cons of other models – with the aim of achieving the best approach for a specific context. With the conceptual model, Kumar *et al.* (2007:68-71) recommend that the following elements be adhered to:

a) *User characteristics* (perceived risk, perceived control, and internet); it means that governments must consider implementing systems that suggest minimal risks to intended users. The citizens will also use a system if they perceive that they have maximum control of information they submit and that the services are available on the internet.
b) *Website design* (perceived usefulness, perceived ease of use); in making public services available on the web, governments must consider that customers will use a service when they see it as both useful and user-friendly.
c) *Service quality*; the services must be of better and improved quality.
d) *Client satisfaction*; the service must be designed not only to meet needs – but should also provide customer satisfaction.

To this concept, Kumar *et al.* (2007:68-71) add the cultural awareness and the need to improve on the ICT infrastructure – in order to ease accessibility of contents. With cultural awareness, the emphasis is on local language and cultural incorporation – while less costly IT infrastructure is considered with regard to the latter. When the culture content is included in the conceptual model, implementation of e-government will also enable the participation of citizens as a feedback instrument in decision and policy making, instead of a 'give-and-take' approach that is mostly prominent in government services (Bwalya, 2009:6).

Along with "culture" and "the need to improve ICT infrastructure," this study further recommends a remote oversight on processes. A system or application must be designed to remotely and electronically monitor passport processes from application to issuance in Lesotho and South Africa. Such an application must be able to identify each application and raise flags or hazards on any backlog, delay or irregularity in the application. It means that the standards on things like turnaround time and maximum time limit for an application – at any stage of processing – must be defined clearly, so that there may be hints of any abnormal delay. The application must be monitored exclusively by the Auditor General and passport-office management, from their offices. There is a possibility that when passport officers know that their

procedures and each passport application are being watched regularly – many problems of delay and possible corrupt activities will be eliminated.

5.3.2 Recommended system: Indonesian Biometric Passport System Neurotechnology (2009:1-5)

Among the systems that have been discussed in the literature review, Indonesia's system and strategies have been found to have shortened the turnaround time of passport issuance to at least three days. While still considering the issue of costs, it is advisable to incorporate into a system as many components or features of need, as possible. These features may be activated or suspended at any time at the discretion of passport-office management and the IT department. Figure 5.1 (below) is a model of the Indonesian system at work.

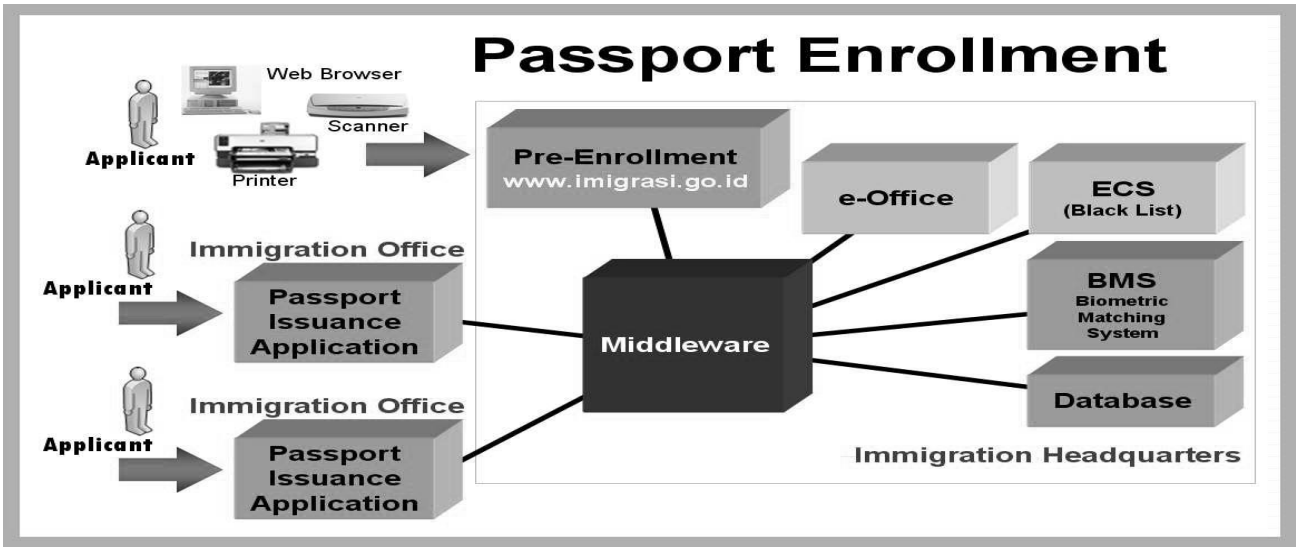

Figure 5.1: Recommended Passport Enrollment: Source: Neurotechnology (2009:3).

The Indonesian passport-issuance system has distributed, fast, accurate and reliable verification technology. The apparent reason that Indonesia adopted this kind of system and procedures is that the country has distributed geography, with over 100 passport offices across the country. As mentioned earlier, the country comprises many islands that make daily travelling and distribution of passports close to impossible. There was a need for a system and procedures that required less human intervention and physical distribution of documents and passports. Therefore, the distributed issuance system is not only less costly, but it is also faster and more convenient. The system is a custom-made and web-based application.

5.3.2.1 How the system functions (Neurotechnology, 2009:1-5)

At respective immigration offices, personnel input the demographic information of an applicant and scan other supporting documents. Then an application captures a photo of a citizen directly from an integrated digital camera, and automatically checks and adjusts the quality of the image and crops the photo according to the ICAO standard – and then saves it according to the required standard format. Then software is used to capture 10 live-scan fingerprints directly from the fingerprint scanner, and automatically checks the quality of the fingerprint image before saving it in a required format. The face and fingerprint images are stored, along with other demographic information, in a MySQL database on the local server at the immigration office.

Data stored at each immigration office is automatically forwarded to the Biometric Matching System at immigration headquarters for identification – the results of which are returned to the immigration office. After receiving the results authorized by the headquarters, the respective immigration office can proceed to issue passports to citizens through decentralized processes and issuance systems. The whole process is without human intervention and it guarantees accurate delivery of the data.

The following merits have let to the recommendation of this system:

- The total costs of ownership of this system are said to be low.
- The system has high degree of accuracy and speed – because it is paperless.
- Security features include the ability to capture 10 figure prints.
- Like modern passport-management systems, it is also web based, to allow internet applications and online tracking of passport status.
- The Mega Matcher of this system is well able to accurately identify duplicate face and fingerprint records in Indonesia's large database. It is automatic, robust and fault tolerant software, that efficiently manages the large workload. It is enabled to function with interoperability and flexibility, so that it can easily work with other software and hardware. Mega Matcher is also said to be a cost-effective solution, because it operates at low cost, per unit, and has low hardware system requirements. It also helps monitor and reconcile related revenue.

- The Indonesia Passport Issuance System can be customized to suit every home affairs or immigration office and performs procedures according to ICAO standards.

5.3.3 Recommended Strategies

Lesotho and South Africa are not divided by many Islands like Indonesia. But there are a number of factors – although different to those of Indonesia – which can be a motivation for adopting Indonesia's procedures. The costs of distributing passports and securing them are significantly reduced by the decentralization of the issuance system, while the security measures are well taken care of by centralizing identity checks and authorizations. Lesotho has 10 districts with mostly one passport office each. In the mountainous kingdom of Lesotho, also known as the "Roof of Africa", it is not always simple to transport passports daily from a central production unit to application office. Security measures must be up to the maximum – and this is costly as well. South Africa has 9 provinces with many passport offices in each. The level of crime and the large geographic area make it costly and risky to distribute passports daily.

The following strategies, along with those of other countries, are recommended:

- Like Indonesia, Lesotho and South Africa are advised to centralize the biometric matching component, authorization and consolidation of information – while decentralizing the passport production and issuance. This method looks expensive from the start, but in the long run the savings are substantial, because it eliminates everyday costs and the delays relating to the distribution of passports to all regional offices – by making passport procedures completely paperless. As already mentioned, valuables like passports in transit demand a high level of costly security, but the decentralization of production and issuance will eliminate such problems. Also, less human intervention and paperless procedures will guarantee security and the speediness of services.

- Like that of Korea, the system must be customized with components that display different demand seasons for passports (Hidglobal.com, 2010:1). MIS for passport processing must be able to generate information for management regularly – so that they are well informed about the performance of the office at any given point in time (Nayak & Sharma, 2011:7).

- Apart from passport MIS, the researcher recommends the production of resultant e-passports by the passport office and automated passenger clearance and self-service kiosks at immigration control points. Under such situations, a passenger presents the travel document to an automated reader

device, which then reads the passenger's biographical information and biometrics from the contactless chip or a central database. Then, when the passenger's facial, fingerprint or iris image is captured in the reading system, the stored biometric image is compared to the one presented. If the images match, then the traveler passes through immigration without interacting with an immigration officer. This process takes place quickly, and it has vastly reduced queues at immigration control points in countries where automated passenger clearance with biometrics has already been implemented. The Hong Kong Special Administrative Region of China (HKSAR) is a key example of this (ACI Worldwide, 2006:1-2).

- The researcher therefore recommends that more biometric features like the iris and 10 finger prints with the use of RFID technology of the passport holder – be incorporated into a passport to increase the security level of a passport. Such features will enable the use of automated immigration control systems and interoperability during international travelling.

- The passport offices of Lesotho and South Africa must incorporate and coordinate to some extent, the services of the IT service provider under the same roof – to allow speedy and readily available technical support, while also allowing for the transfer of skills to local IT personnel and the other staff members.

- Design the system and strategies with a continuity frame of mind, or in such a way that future expansions, changes and integrations will be easy and quicker. Short-sightedness of government institutions hinders them from identifying problems and opportunities from afar, and that is why they mostly act too late. When change is implemented, governments must know that it is not the ultimate. The need for improvement and more change will always arise, and organizations that have that mindset will be at an advantage. With such a mindset, Neurotechnology (2009:2) reports that when Indonesia was implementing a passport-issuance system, the service provider developed a tool that enabled the transportation of data to the new system without errors, over the course of two months.

- A passport system like any other public-sector systems must be designed such that it will be easy to integrate the system with other public-sector systems – as and when that need arises. For security purposes, such a component must be controlled by a passport office. In Korea, a passport system is said to have been enabled to interconnect with immigration control systems and police services systems (Hidglobal.com, 2010:1), while in India, it is reported that the passport office coordinates an online exchange of information with the police systems for information verifications.

- The Lesotho and South African governments are recommended to introduce or refine research departments that will enable them – not only to be ready for change – but also to act faster and accordingly, in order to create a safe and efficient public-service delivery environment. The research departments will be tasked with discovering the latest issues that might affect passport processing negatively or positively, and the necessary prompt actions to be taken.
- A 24-hour call centre and disaster recovery unit must also be established. A good example exists in India (Nayak & Sharma, 2011:7).
- The one -top shops around the country will achieve the application process, that is less congested.
- SMS or internet tracking of passports can be well incorporated into the system for customer feedback, when they need it.
- As in India, it is important to establish accountability of employees through a complete digital signature trail for each passport issuance process.
- Additional technologies like queue management systems that exist in South Africa are recommended for Lesotho.
- Installation of surveillance cameras at service points are recommended to enable management to identify problems like bottle-necks during working hours – so that they can act or make decisions accordingly. Decisions may include moving staff around or instructing those that are free – to help reduce the workload. Such a process was witnessed by the researcher in South Africa, where DHA also has zoom-in-and-out capabilities for managers to view every procedure, and from every angle. Moreover, managers' phone numbers are pasted over the floor at South African DHA – so that citizens may call with complaints when dissatisfied.
- Technologies like televisions are recommended to offer applicants comfort and entertainment while waiting to be served.

5.4 Limitations of the study

During data collection, some of the difficulties encountered were the reluctance of staff members to respond to the questionnaire; therefore, the intended sample from which conclusions were made was not as satisfactory as might have been expected. Another aspect that affected the sample was the fact that it

was selected from four Free State and Lesotho regional offices – while there are nine provinces in South Africa and ten districts in Lesotho. Therefore, the results and conclusions of the study – though generalized to parts of South Africa and Lesotho – are not a complete reflection of South African and Lesotho passport offices' opinions. The main tool used to solicit responses was a questionnaire. For that reason, this research instrument lacks some of the practical information which might otherwise have been captured by other tools like interviews and observations – if they were thoroughly used.

5.5 Recommendations for future research

Although the study suggests MIS that might remedy the problems of delays in Lesotho and South Africa, it is not aimed at designing those systems. Also, by the time this study was undertaken, the Lesotho passport office was in the process of piloting new systems of passport processing – while in South Africa, the idea of new systems was still a concept. Further research will therefore be necessary in the near future to investigate the affects that Lesotho's new system might have had on existing problems, and if South Africa has implemented new systems, the same investigations will be necessary. The study may also be extended to other Home Affairs' services like identity documents, birth certificates and permits of different kinds – or to the public sector at large. A similar study can also be conducted specifically on immigration systems. Another important study for the future could be around the integration of public-sector systems and the challenges associated with that.

This study was about challenges and the opportunities of adopting MIS – with more emphasis on the issue of speed in performing procedures and issuing passports. The issue of new passports and their technologies is another important aspect of security; the study has not dealt comprehensively and exclusively with that area, and, as such, it might be necessary to investigate this in further studies.

5.6 Conclusions

To conclude, both countries under investigation have been found to lack paperless passport production procedures. That has led to seemingly similar problems – but with different magnitudes. The problems are also not different from those impediments that affect the adoption of technology in Africa at large. Mainly, the problems of adequate infrastructure and other economic disadvantages are at the forefront. Therefore, the adoption of passport-management systems and their challenges cannot be looked at in isolation from other, more general, technological problems.

Perceptibly, there is a need for new systems, but it is also equally important to look at the maintenance and continuity of systems and procedures. Therefore, the systems and procedures that have been recommended from this study should enable interoperability, ease of integration and the possibility of the transfer of data in cases of inevitable migration to new methods/operations. The suggested strategies enable immediate technical support by the service provider and the transfer of technological expertise to local IT staff. In implementing new systems, organizations should always consider that the technological world is dynamic and the related crimes are ever increasing, therefore, IT departments and systems should always be improved and up to date. It is necessary to capacitate the public sector with research tools and aptitudes – especially in the IT environment – so that government departments are always up-to-date when worldwide technological changes and related security needs present.

Passport processing is also affected by the overall level of technology of the country in which the passport office operates. Moreover, since it is a public-sector office, it is not immune to problems related to bureaucracy, the legislature, and political dynamics. Most times, these factors contribute to rigid and snail-pace changes. Even though the recommendations of the study are aimed at combating challenges like costs, resistance to change, negativity of staff, and slow processing of passports through old and inefficient systems – the problems deriving from government or political impediments will lamentably still affect IT adoption in the public sector. Nevertheless, if the suggestions and strategies are taken into consideration by governments, there are substantial benefits to be enjoyed. Such benefits include, but are not limited to, a short turnaround time, secure passport processing, a low cost of production, and stable and competent public-service delivery.

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APPENDIXES

Appendix A: Letters requesting permission to conduct the study

[cid:SCRXZZLPNRKA.IMAGE_2.jpg]

>>>Seakge Rosy <rseakge@cut.ac.za<mailto:rseakge@cut.ac.za>> 6/27/2013 3:29 PM >>>

Good day

Please find attached a letter requesting permission for Ratakane Baptista Maime to conduct his study at the Department of Home Affairs, Free State. He is a student at the Central University of Technology (CUT).

Your response regarding this matter will be greatly appreciated.

Regards

Me Rosy Seakge
SAA : Department of Business Management
Business Management Science Building Room 005

Tel: +27 51 507 3964 | Fax: +27 51 507 4026 | E-mail:

rseakge@cut.ac.za<mailto:rseakge@cut.ac.za>

i) To South Africa (Free State)

Faculty of Management Sciences

24 June 2013

ATT: PROVINCIAL MANAGER
DEPARTMENT OF HOME AFFAIRS
FREE STATE PROVINCE

RE: PERMISSION TO UNDERTAKE A RESEARCH STUDY

This letter serves to confirm that Mr Rakatane Baptista Maine, with a student number 207010617 is a CUT M.Tech: Business Administration student.

Topic: Challenges and opportunities of adopting Management Information System (MIS) for passport processing: comparative study between Lesotho and South Africa.

We humbly request that you give him permission to undertake his research at your company/institution. The purpose of the study is to explore the level integration of management information system (MIS) for the entire process of passport production/issuance.

The data will be collected at the following regional offices, namely: Bloemfontein, Bethlehem, Ficksburg and Welkom.

For more clarity, please do not hesitate to contact the student directly at this number (072 762 2930) or the supervisor/promoter at the numbers below.

Thanking you in anticipation.

Prof MN Naong
HOD: Business Management and Supervisor
051 507 3219
082 9578343

ii) Permission by Free State provincial manager

From: Bonakele Mayekiso [mailto: Bonakele.Mayekiso@dha.gov.za]
Sent: Friday, June 28, 2013 8:48 AM
To: Seakge Rosy
Subject: Re: Request for permission

Good Morning

You may go to these offices I have already communicated this with the managers there, kindly ask for the manager when at these offices

Thanks and Regards

Bonakele Mayekiso
Provincial Manager Free State
MOBILE: 0828001755
OFFICE: 051 4103900
EMAIL: bonakele.mayekiso@dha.gov.za<mailto: bonakele.mayekiso@dha.gov.za>
"Courage is not Action in the absence of fear, Courage is action in spite of your fear"

iii) To Lesotho

Central University of Technology, Free State

Faculty of Management Sciences

24 June 2013

ATT: DIRECTOR OF IMMIGRATION SERVICES
OR PASSPORT OFFICE
P O BOX 363
MASERU
100
LESOTHO

RE: PERMISSION TO UNDERTAKE A RESEARCH STUDY

This letter serves to confirm that Mr Rakatane Baptista Maine, with a student number 207010617 is a CUT M.Tech: Business Administration student.

Topic: Challenges and opportunities of adopting Management Information System (MIS) for passport processing: comparative study between Lesotho and South Africa.

We humbly request that you give him permission to undertake his research at your company/institution. The purpose of the study is to explore the level integration of management information system (MIS) for the entire process of passport production/issuance.

The data will be collected at the following regional offices, namely: Maseru, Mafeteng, Mohale's Hoek and Berea.

For more clarity, please do not hesitate to contact the student directly at this number (+27 72 762 2930) or the supervisor/promoter at the numbers below.

Thanking you in anticipation.

Prof MN Naong
HOD: Business Management and Supervisor
+27 51 507 3219
+27 82 9578343

Central University of Technology, Free State
2 [illegible] 2013
FACULTY OF MANAGEMENT SCIENCES
Private Bag X20539 • Bloemfontein

Appendix B: The questionnaire

1st July 2013

Dear Respondent

RE: REQUEST TO COMPLETE A QUESTIONNAIRE

I would very much appreciate if you could participate in my research project for Masters in Business Administration (MBA) - Central University of Technology.

The purpose of this questionnaire is to gather information about challenges and opportunities of adopting Management Information System (MIS) for passport processing. It tries to establish the level at which the Department of Home Affairs (passport office) has embraced MIS in passport production. It also addresses the attitudes and perceptions at Home affairs on MIS regarding migration to and adoption of these systems to tackle queues and delays in passport production and issuance.

Topic: Challenges and opportunities of adopting Management Information System (MIS) for passport processing: Comparative study between Lesotho and South Africa.

The questionnaire is completely anonymous, and data gathered in this survey will be treated with strictest confidentiality, and presented only in a summary form without the name of the respondent. You are mainly asked to mark with "X" the appropriate boxes that best describe your answers and opinions. Should you have any questions, comments, etc., regarding the questionnaire and my research, please do not hesitate to contact me on the numbers below.

Thanking you in anticipation.

Mr RB Maime

+2772 762 2930

+266 580 36861

Email: ratakane.maime4@gmail.com

Section A: Demographic Data

1. Mark with ***X over a number in the row*** that indicates your answers. e.g. over "1" if male, or over "2" if female

a)	Gender	Male	1	Female	2

Please do not use the right hand column throughout the questionnaire.

b)	Age				
	21-25	1	46-50	6	
	26-30	2	51-55	7	
	31-35	3	56-60	8	
	36-40	4	61-65	9	
	41-45	5	66 and above	10	

c)	Regional Office			
	Bloemfontein	1	Maseru	5
	Welkom	2	Mafeteng	6
	Bethlehem	3	Mohale's Hoek	7
	Ficksburg	4	Berea	8

d)	Work Experience at Home Affairs	
	2 years or less	1
	Between 2 and 5 years	2
	Between 5 and 10 years	3
	Between 10 and 20 years	4
	More than 20 years	5

e)	Highest Qualification	
	No Matric/Form 5/ COSC	1
	Matric/Form 5/ COSC	2
	Diploma/Degree	3
	Post Graduate	4

f)	Job Title	
	Director	1
	Senior Manager	2
	Manager	3
	Supervisor	4
	Senior personnel	5
	Junior personnel	6
	Other: please name:	7

Section B: Attitudinal and perceptional variables on Management Information Systems.

1. Possible causes of delay in the production and issuance of passports. ***Mark with X to indicate your answer.***

Statements	SA=1	A=2	N=3	D=4	SD=5	
a) Our passport production procedures are done manually	1	2	3	4	5	
b) Some applicants tend to apply more than once for a passport	1	2	3	4	5	
c) Our passport production systems are very slow to meet current demand for passports	1	2	3	4	5	
d) Our passport production systems are very old	1	2	3	4	5	
e) Machinery and passport production systems break very often	1	2	3	4	5	
f) Broken systems or machinery are fixed after a long time	1	2	3	4	5	
g) An external Information Technology service provider (another company) is responsible for fixing broken systems	1	2	3	4	5	
h) Our Information Technology service provider (another company) is situated in the foreign country	1	2	3	4	5	
i) Our Information Technology personnel is responsible for fixing broken passport production systems	1	2	3	4	5	
j) We do not have Information Technology personnel at our regional office	1	2	3	4	5	
k) Staff that uses passport production systems daily at our regional office does not always know how systems work	1	2	3	4	5	
l) We have shortage of staff in our passport regional office	1	2	3	4	5	
m) Working hours are not enough to meet current demand for passports	1	2	3	4	5	

Note: *SA = Strongly Agree= 1. A = Agree = 2. N = Neutral = 3. D = Disagree = 4. SD = Strongly Disagree = 5*

2. How long does your department take to produce/issue passport after application has been received?

Time Frame				
1 Week	1	2 Months	5	
2 Weeks	2	3 Months	6	
3 Weeks	3	More than 3 months	7	
1 Month	4	A year or more	8	

3. How are the following procedures done at your regional office?

System/ Procedure	Manual	Technology	Both	
Data Capturing	1	2	3	
Data Verification	1	2	3	
Finger Print Taking	1	2	3	
Queue Management	1	2	3	
Application Processing	1	2	3	

4. Are there technologies that reduce time delay in the production/issuance of passports at your region?

Statements	YES=1	NO=2	
a) We have technologies that can reduce time delay for passport production	1	2	

b) If the answer in "a" above is yes, Please name them.

1.	3	
2.	4	

5. Integrated MIS in the processing of passports at your organization

In other countries, passport production and issuance is through Integrated Passport Management and Issuance Systems. The use of technologies like Radio Frequency Identification (RFID) (a chip that securely contains information of passport holder inside a passport), and Biometrics (identification of human identity through measurement of biological characteristics) has facilitated the migration from paper to electronic passports.

a) Name below the system that the Department of Home Affairs uses to produce passports in your country	

Please respond to the following statements	YES=1	NO=2	
b) In my opinion, our organization needs new integrated Management Information Systems for passport processing	1	2	

If your answer to "b" above is **YES,** please respond to the following statements, but if it was **"NO"** skip to question 6

Statements	SA=1	A=2	N=3	D=4	SD=5	
c) Introduction of new Management Information Systems for passport processing has been considered	1	2	3	4	5	

d)	The benefits of new Management Information Systems for passport processing will outweigh the risks	1	2	3	4	5	
e)	There is lack of necessary financial resources to introduce such systems	1	2	3	4	5	
f)	We do not have required infrastructure to run modern Management Information Systems for passport processing	1	2	3	4	5	
g)	We will have to upgrade to new computer hardware that supports modern passport Management Information Systems	1	2	3	4	5	
h)	We do not have expertise that will operate passport Management Information Systems	1	2	3	4	5	
i)	Introduction of new passport Management Information Systems will drastically change our organization	1	2	3	4	5	
j)	Introduction of such systems may result in job loss for some employees	1	2	3	4	5	
k)	It is difficult to find passport production systems that will fit well into our organizational strategies	1	2	3	4	5	
l)	Movement to new Management Information Systems for passport processing will be a burdensome task	1	2	3	4	5	
m)	Movement to new Information Technology for passport processing raises another challenge of information security	1	2	3	4	5	
n)	Bringing in new technology is not among the top priorities in our organization	1	2	3	4	5	
o)	Management at Home Affairs is not knowledgeable/familiar with Information Technology or Information Systems	1	2	3	4	5	
p)	Management at Home Affairs does not have authority to make Technological changes	1	2	3	4	5	
q)	It is difficult to make changes, especially technological through the current management structure and style at Home Affairs	1	2	3	4	5	
r)	There are too many layers of authority involved when technological changes for passport processing are considered	1	2	3	4	5	

Note: *SA = Strongly Agree= 1. A = Agree = 2. N = Neutral = 3. D = Disagree = 4. SD = Strongly Disagree = 5*

6. **a**) Which of the following passport and border control technologies are available in your country? ***Mark with "X" only if available.***

Service/ Technology		
Online Passport Application	1	
Electronic Data Capturing	2	
Electronic Finger Print Taking	3	
Electronic Finger Print Verification	4	
Electronic Police Verification	5	
Electronic Face Capturing	6	
Self-Service Kiosk at Immigration Control Points	7	
Internet Tracking of Passport Status	8	
SMS Tracking of Passport Status	9	
24 hour Call Center	10	
24 hour disaster recovery	11	
Queue Management System	12	
Automated Passenger Clearance at Border Control Points	13	
Passport Live Capture	14	
Electronic Passport	15	
Radio Frequency Identification (RFID) in passports	16	
Biometrics in passports	17	
Other, Please name:	18	

b) When was the last time your department introduced the following changes in relation to passport processing? ***Please mark only one answer per row.***

		Within the past					
No	Change	year	5 years	10 years	15 years	20 years	
1	Introduction of new technology	1	2	3	4	5	
2	Improvement of existing technology	1	2	3	4	5	
3	Introduction of new IT policy	1	2	3	4	5	
4	Improvement of existing IT policy	1	2	3	4	5	
5	Introduction of new IT strategy	1	2	3	4	5	
6	Improvement of existing IT strategy	1	2	3	4	5	
7	Migration to E-Passports	1	2	3	4	5	
8	None of the above	1					

c) Which of the following changes is your department considering in the future? **Please mark only one answer per row.**

		Within the next					
No	Change	year	5 years	10 years	15 years	20 years	
1	Introduction of new technology	1	2	3	4	5	
2	Improvement of existing technology	1	2	3	4	5	
3	Introduction of new IT policy	1	2	3	4	5	
4	Improvement of existing IT policy	1	2	3	4	5	
5	Introduction of new IT strategy	1	2	3	4	5	
6	Improvement of existing IT strategy	1	2	3	4	5	
7	Migration to E-Passports	1	2	3	4	5	
8	None of the above	1					

End of Questionnaire **Thank you!**