AN INVESTIGATION INTO THE FACTORS INFLUENCING THE ADOPTION OF OPEN SOURCE SOFTWARE IN ZIMBABWE PUBLIC ORGANISATIONS

BRIGHT MARTIN TARUVINGA

R124574N

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SUPERVISED BY: PROFESSOR C.P BHUNU
DEDICATION

This study is dedicated to the Open Source Software movement and all IT practitioners that work hard for the development and support of open source software. I hope this study will assist in the sustainable development of open source software.
DECLARATION

**Student's Declaration** - I, BRIGHT MARTIN TARUVINGA, do hereby declare that this dissertation is the result of my own investigation and research, except to the extent indicated in the acknowledgements, references, and by comments included in the body of the report, and that this dissertation is therefore my original work and has not been presented in part or in full for any other degree in any other University.

Signature …………………………………..  Date ………………………

**NAME:** BRIGHT MARTIN TARUVINGA

**STUDENT NUMBER:** R128574N

**Supervisor Declaration** – I, Claver P. Bhunu, confirm that the work reported in this dissertation was carried out by the candidate under my supervision as the University supervisor. This dissertation has been submitted for review with my approval as University Supervisor.

Signature …………………………………..  Date ………………………

**NAME:** PROF. C.P BHUNU

Graduate School of Management
University of Zimbabwe
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Lastly I would like to thank all the people who took part in this research for their valuable contributions that made this study possible.
ABSTRACT

This study investigated the factors that influence the adoption of open source software in public organisations that are in Zimbabwe. Open source software is software that gives access to the underlying source code that make up that software for free to manipulate, copy and distribute. This is a working characterisation of OSS and a more strict definition of OSS will be discussed in the study. OSS is an interesting phenomenon in that although it is provided free of cost and has negligible licensing costs, its adoption has been minimal. Hence this study seeks to find out the factors that influence its adoption in an attempt to influence its adoption.

The main proposition of the study was that OSS is an economically viable innovation for public organisations to adopt in order to enhance employee productivity and improve the organisational efficiency. This is in spite of criticisms that OSS lacks accountability and as such there is no guarantee of its existence in the future.

A qualitative methodology was adopted for this study in order to gain deep understanding of the factors that influence the adoption of OSS. The research strategy used was a case study of three public organisations in different economic sectors. The respondents were drawn from IT and non-IT managers that are involved in the decision making and implementation of IT innovations. Data was collected through face-to-face semi-structured interviews.

The key findings of the study were that the critical factors that influence OSS adoption in public organisations are security and stability, understanding technical functionality, ability to meet basic requirements, cost, and organisational culture. The implications of these findings is that it will assist organisations to make OSS adoption decisions as it gives the clear guidelines on which factors to consider as they adopt open source solutions. Having this knowledge may motivate the adoption of OSS.
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Chapter 1

1.0 Introduction

The history of Open Source Software (OSS) can be traced to 1998 when the Open Source Initiative was founded. OSS has therefore been in existence for about 16 years in the information system domain. In spite of nearly one and a half decades of existence, the adoption of open source software for use in organisations has lagged behind. This is surprising considering the benefits that are touted by practitioner writers and literature on OSS. Although there has been some significant effort by different proprietary software vendors to open up their software and provide resources for the OSS movement its share in the market has remained surprisingly depressed. The Open Source Initiative (2010) lists IBM, Adobe, HP, and Twitter as some of its sponsors. In addition, Google, Oracle, Apple has been noted by Hedgebeth (2007) as having embraced OSS to conduct business and providing services to their customers. This support and adoption of OSS by reputable IT enterprises endorses OSS as a practical business innovation.

Nagy et al. (2010) highlight some of the advantages of OSS as cost savings, vendor independence, and open standards. Open source software is significantly cheaper to purchase and license than proprietary software. In addition, because of the availability of the source code, open source software can be customized to fit an organisation’s particular needs and uses. Unlike proprietary software, open source software reduces the legal liability of an organization that results as a consequence of using unlicensed software. In spite of these advantages the adoption of open source has been minimal in most organisations.

1.1 Background

The Zimbabwe business operating environment has been plagued by foreign currency shortages which became chronic from 2003. In that year, the Reserve Bank of Zimbabwe instituted Foreign Exchange Auction on 12 January 2004, as a system of efficiently allocating scarce foreign currency and determining the exchange rate in a bid to balance the supply and demand of foreign exchange (Reserve Bank of Zimbabwe, 2004). Even as Zimbabwe ushered in an era of the use of multiple
currencies in 2009, the shortages in foreign currency still persist and manifest in the form of a liquidity crunch (Dhliwayo, 2014).

One of the resources pushing demand of foreign currency is IT products that include software purchases and licensing. IT software has become a critical resource for organisations not only to remain competitive but to survive. The majority of organisations in Zimbabwe use software that is developed in other countries which is subject to annual license fees. For example, according to POP Technologies a local authorised Microsoft dealer, the annual license for Windows Server 2008 is US$40 000 per Server. If we consider the number of Microsoft servers which are running then one would approximate that millions of dollars are spent on single proprietary software. This is compared to US$870 per Server for Red Hat Enterprise Linux which is an open source solution.

With so much money going towards the purchase and licensing of proprietary software it is important to investigate the possible adoption of open source software which offers similar products at much lower costs.

This study aims to find out some of the factors that influence the adoption of open source software in public organisations. Most of these organisations are reported to be undercapitalized and most of them report perennial financial losses. Due to these constrained budgets the use of open source software may ease the budgetary constraints and also allow some parastatals to adopt IT based business solutions which may improve their efficiency and productivity of employees.

This study investigated the factors that influence the adoption of open source software in organisations with a particular interest to public organisations in Zimbabwe.
1.3 Definition of Terms

1.3.1 Open Source Software

This is software licensed to users with the freedoms to run the program for any purpose, to study and modify the program, and to freely redistribute copies of either the original or modified program without royalties (Wheeler, 2009).

1.3.2 Public Organisation

This is an entity that is owned by the government, not by a private company and is usually supported by taxes (Macmillan Dictionary, 2014).

1.4 Statement of the Problem

Reducing IT costs has become an important objective in most companies today. The total annual IT expenditures for organisations range from 2 to 6 percent of annual revenues (Setty, 2014). With the strict constraints and relentless demands on executives and boards to cut costs, reducing the cost of ownership of IT assets is a critical area of concern to investigate and address.

Open source software appears to provide a remedy to this challenge especially as it impacts directly on IT financial costs. This is also mentioned in a study by Hedgebeth (2007) which contends that a knowledge enterprise's total cost of ownership (TCO) can be significantly reduced through the use of open source software, as a consequence the enterprise will enjoy an improvement in the overall performance associated with the collaborative and innovative nature of the open source model.

However, the adoption of open source has been criticized since open source software has no “owner” hence there is no accountability of the development process and also there is no guarantee it will be available in the future. There appears to be no guaranteed continuity in open source software. Hence, even though the software is cheap to acquire and license they may be some “hidden costs “(Nagy et al., 2010).
It is the object of this study to establish the important factors that influence the adoption of open source software in public organisations in an effort to provide business executives with a practical guide that is founded on empirical study when deciding on adopting OSS.

1.5 Research Objectives

I. To identify and categorise priority levels of the factors that influence the adoption of open source software in public organisations.
II. To establish the cause and effect relationship, if any, among the factors.
III. To find out the state of adoption of OSS in public organisations.
IV. To find out the challenges associated with the adoption of open source software.
V. To come up with recommendation on adoption, or non-adoption, of open source software.

1.6 Major Research Questions

I. What are the major factors that affect the adoption of the open source software at different phases of adoption?
II. To what extent do the identified factors influence the adoption of OSS?
III. What is the extent of OSS adoption in public organisations?
IV. What are the causality relationships, if any, among the factors?
V. What are the possible pitfalls of adopting open source software?
VI. What measures can be considered to successfully adopt open source software?

1.7 Proposition

This study postulates that OSS adoption is an economical, sustainable and viable innovation for public organisations to adopt.
1.8 Justification

Current literature on OSS adoption remains inconclusive regarding the major factors that influence the adoption of OSS. There are also variations in the weighting on the factors that affect OSS adoption. Most of the studies do not propose any prioritisation as to which factors are more important. A study done by Rossi et al. (2012) allocated some level of priority to the factors investigated. However, they acknowledged that their study fell short in that it did not investigate the cause and effect relationships among the factors themselves (Rossi et al., 2012).

The study contributed to knowledge by providing a framework that shows the factors that affect adoption of OSS. The framework also provides a simple priority allocation classification that makes it easy for decision makers to distinguish the importance of each factor. This study also investigated the causality among the factors and also increased the analysis of the impact of the factors that affect adoption of OSS to three case studies.

This study looked not only on Open Source Server Software (OSSS) but also OSS for desktop applications. The study contributed to knowledge in that it assessed whether the factors affecting OSS adoption as found in this study agree with current literature. It also highlights the extent to which each factor is important to public organisations in Zimbabwe. This is imperative so that we understand how to influence adoption.

1.9 Scope

The study looked at desktop applications and server applications since it would be difficult to consider all the OSS licenses e.g. ERP, developer tools. All of which may have differing influences. The study also considered phases of adoption (initiation, implementation) and the levels of adoption (technological, organizational, environmental, and individual).

Eisenhardt (1989) indicates that researchers should not add new cases when theoretical saturation is reached. She further states that, there is no ideal number of
cases (Eisenhardt, 1989). The study will therefore, investigate three public organisations in Zimbabwe.

Respondents will be selected from IT managers, IT System Administrators and non-IT executives who are willing to participate in the study. The IT Managers are familiar and also involved in adoption decisions hence their knowledge will be crucial. Non-IT executives will provide insights into the applicable elements from a business perspective. The System Administrators input is crucial since they eventually implement the decisions and will therefore provide insights on some of the influencing factors from an operational point of view. By working with willing and knowledgeable respondents we satisfy the criteria recommended by (Campbell & Stanley, 1966; Rossi et al., 2012) to avoid selection bias.

1.10 Organisation of the Study

Chapter Two critically reviews literature related to the study and concludes with an theoretical model. Chapter Three is the Methodology chapter, which describes how sampling was performed and how the analysis was carried out. Chapter Four presents and discusses the research findings. Chapter Five is the final chapter, it offers a conclusion and some recommendations based on research findings.

1.11 Chapter Summary

This chapter introduced the study by defining key concepts that will guide this study. The objectives of the study and the specific research questions were highlighted. This chapter argued that the use of OSS in public organisations has the potential to improve the performance, innovativeness and productivity of these entities. In order for the adoption to take place, the factors that influence OSS adoption should be identified and prioritised in order to influence adoption. The scope of the study will be limited to OSS on that are used on desktop and server computers. The chapter points out that the factors influencing OSS adoption can be determined through interviewing IT and non-IT managers that are involved in decision making.
Chapter 2
Literature Review

2.0 Introduction

This chapter is dedicated to the critical review of related literature on the factors influencing the adoption of Open Source Software (OSS). OSS are those software programs whose licenses allow the users the freedom to run the program for any purpose, to study and to modify the program and to redistribute copies of either the original or modifies program without having to pay royalties to previous developers (Nepelski & Swaminathan, 2007; Wheeler, 2014). This is in contrast to proprietary software users rely on the supplier for all development and improvements since the consumers do not have access to the source code (Nepelski & Swaminathan 2007). The well-known examples of OSS include Linux, Apache and Mozilla.

In addition, it is also argued that open source software is not only software where one has access to source code but it should also comply with the following characteristics; Free Redistribution, Source Code, Derived works, Integrity of The Author's SourceCode, No Discrimination Against Persons or Groups, No Discrimination Against Fields of Endeavour, Distribution of License, License Must Not Be Specific to a Product, License Must Not Restrict Other Software and License Must Be Technology-Neutral (Open Source Initiative, 2010).

The definitions discussed above are the ones that informed this study. This study starts off by briefly discussing literature on the adoption process in innovations and technology. The discussion in this section focuses on specific research questions and objectives. It highlights how previous studies have answered these questions and subsequently reveal the gaps in existing knowledge that the study seeks to answer. In this chapter the major themes and findings from previous studies are highlighted and how these relate to the current study. Finally, the key aspects on which the current study will offer new understandings are discussed and a conceptual framework to guide this study developed.
2.1 Adoption Process

The crux of this study is on adoption and as such an understanding of the adoption process is important. Literature shows that there are eight dominant theories that have been used to analyse adoption of technology and innovations (Michael et al., 2011). Different studies have used different models of adoption in their analysis and hereinunder is a discussion of the theories that were considered in this study and the ones that were eventually adopted.

In their study on adoption of OSS Rossi et al. (2012) adopted the Innovation Diffusion Theory (IDT) which they argue provides a basic context for the investigation of the adoption of new technologies that comprises several aspects, from the types of adopters to the adoption phases. More important to their study was that this model allowed for the factors of adoption to be discussed at different levels or perspectives. However, (Ven & Verelst, 2012) contend that there is no universal theory on organisational adoption and as such they used the Technology Organisation Environment (TOE) framework that describes the context in which adoption takes place rather than the adoption process itself. The same argument was used by (Johnston et al., 2013). Other authors such as (Hedgebeth, 2007) and (Rafiq & Ameen, 2009) did not consider the adoption process in their study. Since they appear to be no consensus on the importance of discussing the adoption process, this may be a contributing factor into the variations in identifying the factors that impact OSS adoption.

As was argued by (Rossi et al., 2012) there are endogenous aspects of innovation hence even technologies that are of benefit to a community can take several years before they are widely adopted, deployed, and used. They cited the innovations such as Dvorak keyboard (Margolis & Liebowitz, 1999), the AC vs. DC current (David & Bunn, 1988), laptop computers (Rogers, 1995).

As alluded to earlier there are eight models that have been used in IS adoption studies and according to (Michael et al., 2011) the widely cited model is the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT model is a
consolidation of the eight dominant models and the original model had been cited 450 times at the time (Michael et al., 2011) did their study. The originators of the UTAUT model argue that the model has “distilled the critical factors and contingencies related to the prediction of behavioral intention to use a technology and technology use primarily in organizational contexts. In longitudinal field studies of employee technology acceptance, UTAUT explained about 70 percent of the variance in behavioral intention to use a technology and about 50 percent of the variance in technology use” (Venkatesh, 2012). Due to its consolidated nature the UTAUT model provides a comprehensive method to analyse the adoption of innovations and technology. However, the objective of the UTAUT model is to explain employee technology acceptance and use (Venkatesh, 2012). It therefore focuses on the individual rather than the organisational level. Although the UTAUT model has been cited 450 times, findings by (Michael et al., 2011) show that most of the citing was to support a theory or critising it rather than using the theory.

The adoption process provides the necessary background to understand how adoption occurs regardless of the specific subject matter under review hence its inclusion is important. From the reviewed literature the Innovation Diffusion Theory appears to provide a sound theoretical framework to investigate adoption in an organisation. The Innovation Diffusion Theory provides for adoption at a unit level which can be an individual or institution (Sahin & Rogers, 2006). This makes it ideal to use in the current study as the current study looks at adoption at an organisational level. Sahin & Rogers (2006) also cite (Dooley,1999; Stuart,2000) who observe that the Innovation Diffusion Theory is a widely used theoretical framework for technology adoption and diffusion.

### 2.2 OSS in Public Organisations

Rossi et al. (2012) argue that the adoption of OSS in public organisation can promote local economies, minimise the technological divide, prevent vendor-dependence and subsequently reduce their monopolistic dominance on the market. The same arguments are made by (Camara & Fonseca, 2007) who also add that OSS promotes indigenous technology development and help to establish an
information economy. Similar sentiments are echoed by (Kovács et al., 2004) who observe that public entities spend a substantial amount of money on commercial off-the-shelf-software licenses and hence by adopting appropriate OSS technologies these expenses can be reduced significantly and the savings re-routed for development in other areas. The adoption of OSS in public organisation leads to flexibility, development of the people, improved security, eliminate vendor lock-in and is cost effective (Johnston et al., 2013). The benefits of OSS adoption are summarised in Figure 2.1.

Benefits of OSS Adoption by Public Organisation

![Diagram showing benefits of OSS Adoption](image)

Figure 2.1 Summary of benefits of OSS Adoption by Public Organisations:(Camara & Fonseca 2007; Johnston et al. 2013; Kovács et al. 2004; Rossi et al. 2012)

There is therefore consensus among stakeholders on the benefits of adopting OSS in public organisation. Countries that include South Africa have enacted a policy that mandates the use of OSS in the Western Cape schools (Johnston et al., 2013). The United Kingdom government and the UN have both, although separately, commissioned reports that acknowledge the importance of OSS in public entities and the reports are meant to provide a basis for policies on OSS use in public entities and governments (Camara & Fonseca, 2007).
In spite of the consensus and policies in place, adoption of OSS remains low and public organisations are reluctant to adopt OSS (Johnston et al., 2013) and (Rossi et al., 2012). Hence this study will seek to investigate the factors that inhibit or facilitate adoption of OSS at the initiation and implementation phase (Rogers & Everett, 1983) or alternatively the primary and secondary phase (Fitzgerald et al., 2009). This is important since previously only a study by Rossi et al. (2012) and the other by Fitzgerald et al. (2009) made this distinction. The primary and secondary adoption are quite different scenarios (Gallivan, 2001; Zaltman et al., 1973) as cited by (Fitzgerald et al., 2009). The different factors will now be discussed in the context of Technological, Organisational, Environmental and Individual (TOEI) framework. The TOE framework was developed by Tornatzky & Fleischer (1990) as a framework for organisational adoption based on Contigency Theory of Organisation by (Lawrence & Lorsch, 1967) and the theory postulates that the structure of an organisation should match the environmental needs (Arpaci, 2012). Subsequent studies on organisational adoption then included the individual aspect to the original TOE framework, these included studies by (Johnston et al., 2013; Rossi et al., 2012).

2.3 Technological Factors

The technological context considers the available technologies important to the firm, both internal and external, that might be useful in improving organizational productivity (Lippert, 2006). Its main focus is on how technology characteristics themselves can influence the adoption process (Arpaci, 2012).

The technological factors that literature highlights as influencing OSS adoption include findings by (Dedrick & West, 2004) and (Johnston et al., 2013) who observe that the relative advantage in terms of cost and reliability of OSS platforms influenced positively their adoption by organisation. In addition (Rossi et al., 2012) cite compatibility with existing standards in the organisation, trialability of the new system, and complementary skills in the management of the organization act as facilitators of OSS adoption. In relation to trialability, (Dedrick & West, 2004) note that because one can “freely” download and use OSS, this facilitates its adoption.
since after trial use there is increased knowledge and understanding of perceived risks of OSS hence this might steer the organisation towards adoption.

Dedrick & West (2004) emphasised the importance of compatibility by stating that for OSS to be adopted it should be compatible with existing application, current skills of the IT staff and the tasks to be performed. They note that in cases were OSS platform was not compatible with existing application, this acted as a barrier to adoption. The same is true when requisite skills for OSS use are not available or are limited in the organisation then adoption is inhibited. Dedrick & West (2004) also observed that organisations in which the tasks to be performed are simple such as the case with Internet Service Providers (ISP), who only handle a simple set of application that provide mail and store web pages, then adoption is facilitated.

Furthermore (Glynn et al., 2005) argue that the advantages of access to source code, dissatisfaction with existing systems, the ability of OSS to run on older hardware makes the adoption of OSS desirable by organisations. However, reservations have been made on the importance of access to code as a facilitator for OSS adoption. Participants in various studies did not view this as a factor that influenced adoption (Dedrick & West, 2004; Glynn et al., 2005). VanBeulen et al. (2009) found out that even though most organisation do not tamper or access the source code the idea that they have access to the code makes them feel more self-reliant.

An interesting factor that inhibits adoption is the existence of a coherent stable IT infrastructure this is so because the presence of a coherent technical architecture makes deployment of OSS difficult since doing so may be contrary to existing policy (Glynn et al., 2005). They further argue that the existence of mandatory standards may inhibit OSS adoption. They cite an example of a case which they studied and they observed that because the organisation had a low budget assigned to IT costs this resulted in the firm having a mixture of application packages reducing the resistance to OSS adoption since the firm already had a heterogeneous system of platforms and packages. This they argue would have been different had the organisation had a more coherent system (Glynn et al., 2005).
Most literature showed that the technological factors are not crucial at the initiation phase but are important at the implementation phase particularly the aspects of technical compatibility, technical complexity and relative advantage (Rossi et al., 2012). They also note that increased technological compatibility encourage adoption at the implementation level while increased task and technological complexity inhibits adoption of innovation (Rossi et al., 2012).

Rogers & Everett (1983) characteristics of innovation that are relative advantage, compatibility, trialability, complexity and observability are all brought out and discussed by literature on OSS adoption. However, not much discussion is made on observability which is the degree to which the results of an innovation are visible to others (Rogers & Everett, 1983). Rogers & Everett (1983) makes the argument that the more when results of an innovation are easy to observe then this will facilitate adoption. It would be of interest to this study to investigate this aspect on OSS innovation.

Although literature argues that the presents of renowned and observable adopters of OSS will improveits adoption. The following are the propositions of this study that arise from the discussion of the technological factors influencing adoption.

Proposition 1: The presence of observable users of OSS will not facilitate the adoption of OSS due to the lack of skill in public organisation.

Proposition 2: In spite of availability of skills the tasks to be performed are complex the organisations will not adopt OSS.

2.4 Organisational Factors

The organizational context is defined in terms of resources available to support the acceptance of the innovation. These criteria include firm size and scope; the centralization, formalization, interconnectedness, and complexity of the managerial structure; and the quality and availability of the firm’s human resources (Lippert, 2006). Glynn et al. (2005) argue that in addition to organisational size, availability of resources the organisational factors also entail top management support. However,
(Rossi et al., 2012) suggest that the organisational factors comprise of facilitating drivers that include top management support, organisational objectives consensus, and training. In their paper (Dedrick & West, 2004) argue that the organisational factors that influence adoption are the organisation’s general view of IT innovation, the strategic importance of IT to the business and the nature of slack resources available. The different authors have proposed different organisational factors that influence OSS adoption. Even though there is little consensus on the factors there is no contradictions as well. The authors are therefore appearing to be extending the list of the factors involved in the adoption of OSS.

The size of the organisation is relevant since usually large organisations will have more Desktop computers and Servers which when converted to OSS will greatly reduce the per seat and per server software licensing cost (Glynn et al., 2005). Furthermore, (Glynn et al., 2005) argue that large organisations will have enough IT specialist to handle technical OSS implementation challenges.

The deployment of OSS is a radical and high-risk initiative and hence the support of top management is of great importance especially when implementing on high-profile desktop systems (Glynn et al., 2005). Top management support is therefore a facilitating factor in OSS adoption (Rossi et al., 2012).

Limited financial resources in organisations is a facilitating factor of OSS adoption due to the negligible costs of OSS purchase and the need to continually provide service at the expected service levels in spite of shrinking IT budget (Glynn et al., 2005). In organisations with redundant human resources and limited financial resources OSS is welcome especially if the relevant skills to install and operate the system are present (Dedrick & West, 2004).

Glynn et al. (2005) have observed that although there is a controversial argument made by some authors that the cost of finding an OSS-literate personnel is higher than finding proprietary literate one, they argue that the increase in popularity of OSS among students in universities will increase the supply of OSS-literate personnel and reverse this trend if we assume that the argument holds.
Literature has different views on the overall cost of OSS adoption and the Figure 2.2 shows the findings on the different pillars of OSS cost.

<table>
<thead>
<tr>
<th>Type</th>
<th>Literature on Open Source</th>
<th>Literature on Commercial</th>
<th>Findings</th>
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<tr>
<td>Evaluation Costs</td>
<td>• More time consumed than commercial • Chucking a company to evaluate • To really understand what an open source project can do, an IT department must install it and play with it which requires time and different resources • Developers and architects take the lead • cost of creating a trial installation • cost of learning the software to play around with it and understand its functionality to determine if it can meet the company's requirements • It does remove a significant amount of risk from the process • result in a deeper understanding of both the software and the requirements</td>
<td>• Pushed by vendors who produce white papers, marketing materials, case studies, proof of concept • Commercial software evaluation might take place with the sales staff or with IT managers who screen the products, bringing in the architects or developers later on if the product passes providing • Cost includes: o Negotiation of a trial license that might have an activation fee o Payment of service fees to support the trial installation o Training o Trial licenses for additional related software</td>
<td>• The cost of downloading and playing in terms of resources and money is generally not though of • &quot;I don’t know as it has never been measured&quot; • &quot;Lucky (vendors) will show me - I prefer to buy than to be sold because anybody that is coming to sell me something, as got a vested interest in me taking the product, it’s a commercial thing to them. They want me to take the product, whether the product fits into our needs, or not. But at the end of the day, they can show me 50 million demo’s, I still need to evaluate the product on my own&quot; • &quot;I spent a grand while looking at the tool and when using my salary to measure justification it is still the paper street licensing and having a consultant&quot; • &quot;Chasing after OSS solutions are more cost effective&quot; • &quot;Time spent to understand / evaluate / how to use and training on both OSS and proprietary may be quicker with propriety&quot; • &quot;Evaluation costs the same - must do due diligence on both. For this OSS is quicker because you get answers faster than having to contact vendor or having to tech investigate&quot; • &quot;OSS more expensive that proprietary... no, I don’t think there is a difference. I don’t think it is true&quot; • &quot;Softening costs the utilization of OSS has been gradual and as such we saved costs because the licensing costs attached to the proprietary software that we have decommissioned have fallen considerably&quot; • &quot;Licensing costs we hire external consultants, but we have to do that if we use proprietary because we build software therefore we put in smaller pieces of USB&quot; • &quot;High maintenance system. We bought the OSS one and the cost was similar to proprietary solution. You still need support because you end up having to deal support yourself internally&quot; • &quot;Can I correct some of the statements. For example: Open Source apps is more time consuming than commercial. I find this to be a general conclusion with people creating 10 years working on MS Windows and then complain that OSS it is too difficult after one week of using it. They are not the same and you cannot compare experience in one to experience in the other&quot; • &quot;Configuring the software takes longer in OSS... ask that question to a user with a consultant at 1100 am and 3 years later they still have the consultant on site&quot; • &quot;Configuring the software generally takes longer for Open Source because the configuration is usually in a text file which must be edited by hand&quot; • &quot;TCO...I’ve heard that argument death already&quot;. The defensiveness stems from what they perceive to be &quot;numbers are being thrown about OSS&quot; and that they are tired of these constantly being perpetuated as a fact. • &quot;Depending on the administratos skills. Cannot throw a Windows administrator in front of a Unix box and expect him to be able to use evaluation like a skilled unix administrator&quot; • &quot;Installation of software in our standard software repo (currently 18738 packages) takes under 20 seconds on average. Open Documentation and HowTo’s in the form of Wiki, mean that anyone that solved a problem, shares it with the community. Documentation grows faster when</td>
</tr>
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| License and Maintenance Costs | • No maintenance fees for open source upgrades • Subscription fees for Linux distributions • Licensing fees for implementation | License and maintenance fees for commercial products can range from as low as a few percentage points to as much as 20% or more of the total solution | • "Softening costs the utilization of OSS has been gradual and as such we saved costs because the licensing costs attached to the proprietary software that we have decommissioned have fallen considerably" • "Licensing costs we hire external consultants, but we have to do that if we use proprietary because we build software therefore we put in smaller pieces of USB" |

| Installation and Configuration Costs | • Time consuming (cost inherent in the resources and opportunity cost) • Configuring the software generally takes longer for Open Source | The cost of customization to extend the software to meet requirements | • "Softening costs the utilization of OSS has been gradual and as such we saved costs because the licensing costs attached to the proprietary software that we have decommissioned have fallen considerably" • "Licensing costs we hire external consultants, but we have to do that if we use proprietary because we build software therefore we put in smaller pieces of USB" |

| Integration and Customisation Costs | | The need and degree of customization is less | • "Softening costs the utilization of OSS has been gradual and as such we saved costs because the licensing costs attached to the proprietary software that we have decommissioned have fallen considerably" • "Licensing costs we hire external consultants, but we have to do that if we use proprietary because we build software therefore we put in smaller pieces of USB" |

| Operations and Support Costs | | Licensing fees required for • Creating a development environment on each developer's workstation • Creating a test environment or a staging environment • Adding servers for scalability • Adding servers for disaster recovery or for a hot source | • "Softening costs the utilization of OSS has been gradual and as such we saved costs because the licensing costs attached to the proprietary software that we have decommissioned have fallen considerably" • "Licensing costs we hire external consultants, but we have to do that if we use proprietary because we build software therefore we put in smaller pieces of USB" |

9

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Figure 2.2 is a summary of the costs that are associated with OSS adoption as promoted (Van Beulen et al., 2009). This study will evaluate these costs in the context of public organisation and if they have any influence on OSS adoption by these entities. The cost break down provided above is an important framework since its analysis in this study will assist decision makers to make factual decisions on the related costs involved given the conflicting views on cost (Nagy et al., 2010).

**Proposition 3:** There are other salient costs that are inherent in adopting OSS that make OSS adoption expensive besides acquisition and licensing costs.

Previous research in public sector reveal that public organisations are less likely to take on risky initiatives due to their tendency towards a conservative organisational culture (Glynn et al., 2005). This agrees with the organisational IT innovativeness noted by (Dedrick & West, 2004). They observed that some organisations closely monitor technology trends and move in quickly to adopt the technology once it begins to gain widespread use and these organisations view themselves as fast followers. The innovation positioning of an organisation appears to be an important factor in relation to the timing of adoption and the kinds of hints that are essential to the adoption decision (Dedrick & West, 2004).

The strategic importance of IT to the organisation is another relevant factor related to the keenness to adopt IT innovation. Dedrick & West (2004) observe that those organisations which depend on technology for competitive advantage are willing to...
embrace new technology and absorb its capabilities than those organisations where IT does not give them a competitive advantage.

Following are the propositions that this study postulate as a result of the discussion on the organisational factors affecting OSS adoption.

**Proposition 4**: The absence of an innovative culture in public organisations negatively affects the deployment of OSS.

**Proposition 5**: Lack of understanding and knowledge on OSS by top management inhibits the adoption of OSS in public organisations.

### 2.5 Environmental Factors

OSS adoption represents a radical paradigm shift in the overall software and business environment, hence the focus on environmental factors is necessary (Glynn et al., 2005).

The environmental context represents the setting in which the firm conducts business, and influenced by the industry itself, its competitors, the firm's ability to access resources supplied by others, and interactions with the government (Lippert, 2006). In addition it also includes factors such as general attitude to risk in the industry sector; existence of renowned successful OSS adoptions; government or institutional support; the need for transparency, value for public money, security; and the existence of industry-wide purchasing agreements with proprietary vendors, or sectorial standards in relation to IT architecture (Glynn et al., 2005). Dedrick & West (2004) noted availability of technology skills and services, and legitimacy as the important environmental factors that organisations consider on OSS adoption.

Risk-averse industrial sectors are generally reluctant in engaging risky implementation such as OSS adoption which does not offer the legal securities of vendor-guaranteed support and written maintenance contracts (Glynn et al., 2005). They further argue that although governments and public sector organisations are
generally viewed as risk-averse those in Europe are very proactive in adopting OSS they attribute this to the government and institutional support which tends to mitigate the risks of OSS implementation. Contradicting Government and institutional support in Western Cape schools negatively affected the adoption of OSS after the Government initially enacted a policy mandating all schools to adopt OSS and then the Western Cape Education Department (WCED) signed a Microsoft Schools Agreement later on which negated the earlier governments efforts resulting in the minimal adoption of OSS in the schools (Johnston et al., 2013). Microsoft is a company that produces and distributes proprietary.

For public organisations where public access, transparency and value for public money is important OSS adoption is encouraged since closed source do not reveal for instance any Trojan Horses (or simply Trojan) that may be present and may subsequently compromise security or citizen privacy (Glynn et al., 2005). A Trojan Horse is this study refers to a malicious computer program that does something unwanted yet they offer top provide a wanted service(Thimbleby et al., 1999). For example you can have a logon prompt at the site of a bank which one uses to access their account, the Trojan can intercept that prompt and issue that screen itself such that as one provides their username and password the information is captured by the Trojan Horse and to avoid detection the Trojan Horse can transfer control to the legitimate program. The login process will therefore proceed normally but the Trojan Horses has already captured the user’s credentials without their consent and knowledge.

Certain sectors are tightly regulated and interoperability may be vital to an extent where policies will exist in relation to IT infrastructure and oddly a particular proprietary software may appear as the de facto standard for interoperability (Glynn et al., 2005). Also some sectors may be bulk-purchasing agreements with proprietary software vendors (Glynn et al., 2005) for example the Microsoft Schools Agreement for Western Cape schools (Johnston et al., 2013). Furthermore, software packages in a particular industry may have to comply with certain standard architectures for instance the HL7 standard for textual data and DICOM standard for images in the health sector (Glynn et al., 2005).
Dedrick & West (2004) have observed that large firms who can afford to pay for support from large vendors such as HP and IBM are concerned with the limited availability of vendors for OSS and this is an important factor for them. However, they note that smaller firms are not concerned with nature of vendor support from OSS vendors since they depend mainly on their own skills and online support available from open source communities.

Earlier studies have revealed that regular availability of patches from OSS community is an important factor to consider since with proprietary software patches have to go through huge efforts to ensure patch compatibility (Dedrick & West, 2004). This availability of patches is related to legitimacy which according to (Johnston et al., 2013) refers to the risk of a new technology being abandoned. (Glynn et al., 2005) noted that most IT practitioners welcomed the development that firms such as HP have expressed long commitment to Linux. A study by (Van Beulen et al., 2009) shows that legitimacy is a facilitator and inhibitor of OSS adoption. However, (Johnston et al., 2013) noted that this factor was not important in their study.

The discussed environmental factors impact more on the implementation phase of the adoption process (Rossi et al., 2012).

**2.6 Individual Factors**

The original TOE framework does not include the Individual factor but recent studies have progressively included the individual aspect. A number of studies (Glynn et al., 2005; Johnston et al., 2013; Rossi et al., 2012) all included the individual factor in addition to the initial TOE framework.

Glynn et al. (2005) argue that since classical innovation adoption theory underscores the relevance of the individual factor for innovation adoption the individual should be included for OSS adoption. Furthermore, they argue that OSS has a strong underpinning arising from ideological motivation which usually occurs at the individual level; the charisma and drive of those that advocate for OSS may also significantly influence OSS adoption.
Individual factors can have a positive or negative influence on OSS adoption decision and can affect the technological, organisational and environmental factors (Johnston et al., 2013). Individuals may resist OSS as they feel it is de-skilling them if they do not have the popular proprietary software skills (Glynn et al., 2005). Public sector organisations also find it costly to up skill staff members (Johnston et al., 2013). In addition resistance to OSS adoption of OSS by individuals is also linked to familiarity with proprietary software especially Microsoft as most of them are using these at household level (Johnston et al., 2013).

Johnston et al. (2013) note that a facilitator of OSS adoption at the individual level is the influence of OSS champions. They, however, note that once the OSS champion is absent use of OSS may decline, for example in one case an OSS laboratory was abandoned after the OSS champion moved to a different organisation.

Rossi et al. (2012) concluded that individual factors are important at both the initiation and implementation stage of the OSS adoption process.

2.7 OSS Adoption Framework

The literature discussed so far assisted in building the theoretical framework that this study used for data collection and analysis. The framework puts together relevant factors from the TOEI framework and the initiation and implementation phases of the Innovation Diffusion Theory to come up with a comprehensive model that will assist executives in making decisions on OSS adoption. This model, as will be discussed later, will contribute to existing models by including prioritisation of the factors and establishing whether the factor identified inhibit or facilitate OSS adoption.
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The OSS adoption framework in Figure 2.3 is an integration of the TOEI framework and the Innovation Diffusion theory. It contains the two major phases of IDT (Rossi et al., 2012) and four levels. An additional layer that attaches a priority level of each factor is included to enrich the framework such that decision makers are aware of the influencing factors in order of priority. Previous studies on OSS adoption only focused on identifying the factors without allocating any priority level (Rossi et al., 2012). Even though (Rossi et al., 2012) assigned priorities to their factors their study only included two cases which makes generalisation difficult to make. For a case
study to be generalised it should have reached a point of saturation (Eisenhardt, 2014). The framework will also indicate whether an adoption variable is a facilitating or inhibiting factor.

The framework will be used to guide data collection, analysis and presentation process and also to compare the results of this study to what is already known in this area of interest.

2.8 Chapter Summary

This chapter highlighted the major factors that previous studies have observed in relation to OSS adoption. Although this study considered adoption of OSS in public organisation, it did not restrict itself to literature on OSS adoption in public organisation but rather gleaned from other studies in order to exhaust all possible sources of information available on OSS adoption. Literature was reviewed in the context of the TOEI framework and guided by the initiation and implementation phases of the Innovation Diffusion Theory. Finally an adoption framework by Rossi et al. (2012) was adapted and modified to include factor prioritisation which will enhance literature in the field of OSS adoption in public organisation. And as mentioned earlier in chapter, most studies involved cases of up to two organisations. However, this study will enrich available knowledge to an extent of generalisation of the findings by using three case studies as recommended by (Eisenhardt, 1989).

The next chapter will be on the Methodology which discusses the philosophy, data collection and sampling techniques that this study will use.
Chapter 3
Research Methodology

3.0 Introduction

This chapter details the important steps that were taken in conducting this study. It outlines the research philosophy that forms the basis of this study. This chapter also discussed the reasons for using the case study research strategy. It looks at the research methodology and the instruments that was used to collect data. Furthermore, the population and sampling frame for this study was discussed including how data validity and reliability will be ensured. The chapter concludes by discussing the ethical issues and how the study conformed to sound ethical and value considerations.

3.1 Methodological Framework

3.1.1 Major Research Question

The major research question for this study is to identify the major factors that affect the adoption of the open source software (OSS) at different phases of adoption and the relative level of importance of these factors among themselves.

The minor research questions alluded to in chapter 1 will also guide this study.

3.1.2 Major Research Propositions

This study postulates that OSS adoption is an economical, sustainable and viable innovation for public organisations in Zimbabwe to embrace.

3.1.3 Minor Research Propositions

The minor research propositions that this study makes and that will subsequently guide data collection and analysis for this study include the following:

**Proposition 1:** The presents of observable users of OSS will not facilitate the adoption of OSS due to the lack of skill in public organisation.

**Proposition 2:** In spite of availability of skills the tasks to be performed are complex the organisations will not adopt OSS.
Proposition 3: There are other salient costs that are inherent in adopting OSS that make OSS adoption expensive besides acquisition and licensing costs.

Proposition 4: The absence of an innovative culture in public organisations negatively affects the deployment of OSS.

Proposition 5: Lack of understanding and knowledge on OSS by top management inhibits the adoption of OSS in public organisations.

3.2 The Research ‘Onion’

The research onion in Figure 3.1 summaries the important considerations when conducting research.

The research ‘onion’ in Figure 3.1 will guide the discussion on how this study was conducted. The choices to be adopted for this study have been encircles in the Figure 3.1.

3.3 Research Philosophy

The research philosophy is an important term in relation to the growth of knowledge and the nature of that knowledge (Saunders et al., 2009). As shown in Figure 3., the
research philosophy chosen underpins the research strategy and methods used as part of that strategy (Saunders et al., 2009). An important observation noted by (Saunders et al., 2009) is that the major influence on the philosophy chosen is likely to be the view of the researcher on the relationship between knowledge and the process by which it is developed. In light of this observation, this study was underpinned by the interpretivism philosophy. The researcher believes this is the appropriate philosophy for the study since according to (Saunders et al., 2009), the interpretivism philosophy is ideal for complex business and management situations. The adoption of innovations is a complex matter as shown by the literature discussed in the previous chapter.

3.4 Research Design

3.4.1 Research Approach

The study used the inductive approach, this approach entails developing a theory based on data collected even though the theory may be similar to the one already known (Saunders et al., 2009). An inductive approach is ideal for this study since it provides a flexible methodology that offers an alternative explanation for what is going on (Saunders et al., 2009). Selecting the appropriate research approach is important because it allows for the informed selection of an appropriate research design, it assists in selecting the most suitable research strategies to use and finally it enables one to adapt their research design to cater for constraints (Easterby-Smith et al., 2008).

3.4.2 Research Strategy

Morris & Wood (1991) suggest that when confronted with the need to have a deep understanding of the context of the research and the processes being enacted a case study strategy is most appropriate. A case study approach is preferred since its used when investigating a particular contemporary phenomenon within its real life context and when “how” or “why” questions are being posed to discover a current phenomenon and when the researcher has little or no control over the events (Yin, 2003). This applies to this study as it seeks to investigate the reasons behind the low adoption of OSS in Zimbabwe public organisation even though there are good
candidates for its use if one considers the financial constraints the organisations have.

A number of studies (Dedrick & West, 2004; Glynn et al., 2005; Rossi et al., 2012; Ven & Verelst, 2012) have contributed to literature and knowledge on OSS adoption have used the case study strategy. Therefore this study used a multiple case study approach investigating three public organisations in Zimbabwe.

Using multiple case studies will allow for the generalisations of the findings from this study (Saunders et al., 2009). Furthermore, (Eisenhardt, 1989) argue that although there is no set number of cases to include in a case study one should consider including more cases until a point of saturation. The use of three cases is therefore within these recommendations since the cases representative of the key sectors in which public organisations operate.

3.4.3 Methodology

Since this research is underpinned by the interpretivism philosophy, the qualitative methodology was adopted in this study. This methodology provides a deep understanding of the factors that affect OSS adoption in public organisations. Previous studies on OSS adoption also used the qualitative methodology in order to get a rich understanding of the influencing factors.

The study will be exploratory in nature since it seeks to establish the factors that identify OSS adoption in public organisations in Zimbabwe. Literature reviewed has not revealed that such studies have been conducted in Zimbabwe. Similar studies conducted in other countries have been exploratory in nature hence the decision to conduct an exploratory study so that comparisons can be made.

3.4.4 Time horizon

Due to the constrained time period that this study was conducted, a cross-sectional study was conducted as recommended by (Saunders et al., 2009). A cross-sectional study studies a particular phenomenon at a particular point in time (Saunders et al., 2009). Threedifferent organisations were investigated at a particular point in time.
Although cross-sectional studies are common in surveys, they can also be used in case study qualitative research (Saunders et al., 2009).

3.4.5 Research Methods

In a case study research it is recommended to have more than one research method so that one can triangulate results (Saunders et al., 2009). Triangulation assists in reducing personal and methodological biases and in the process increase the probability of generalising the findings of a study since data is gathered from different perspectives and through different methods (Decrop, 1999).

This study collected data through semi-structured interviews, document analysis and observations in three different organisations. This eliminated the limitations of using a single research method.

3.4.5.1 Semi-Structure Interview

The method of data collection was through face-to-face interviews of key personnel that are familiar with the adoption decision process and those who implement the decisions. All interviews were recorded with the informed consent of the interviewee.

In this study, interviews of key personnel are important in order to gain in-depth understating of the underlying factors that inhibit or facilitate adoption of OSS in organisations.

3.4.5.2 Document Analysis

Data was also collected through analysis of IT policies of the organisations. Internal email communications and websites were also examined as part of document analysis. According to (Yin, 2003) a document is any element that gives information about the investigated phenomenon and exists independently of the researcher’s actions. It is normally produced for specific purposes other than those of the research but it can be used by the researcher for perceptive purposes, e.g. letters, newspapers, diaries and websites (Corbetta, 2003).
3.4.5.3 Direct Observation

Visiting the organisations to conduct interviews created an opportunity to collect data through direct observation as suggested by (Yin, 2003). This method enables the investigator to understand and capture the setting within which people interact; get things that people will be reluctant to talk about in an interview and hence allow the observer to get more experience about the subject matter under investigation (Patton & Cochran, 2002).

3.4.6 Research instrument

The main research instrument for this study is the interview guide schedule. The interview guide was developed in line with the research questions and the OSS adoption framework discussed in Chapter 2. A pilot test was done using the interview guide schedule to ensure reliability. Two interview guide schedules were developed; one to cater for IT respondents and the other for non-IT respondents as shown in appendix I.

The interview guide was administered by the researcher through semi-structure interviews. Dawson (2009) contends that the semi-structured interview is likely the most widely used type of interview used in qualitative research. In this kind of interview, the researcher has an interview guide which is list of pre-written questions used to gather information about specific issues and sometimes identify new topics that were not originally part of the interview. A semi-structure interview is flexible and allows the researcher to add or remove questions from the set questions based on the results of each interview. Furthermore, Saunders et al. (2009) indicated that the investigator is not requested to follow a specific order of questions but can vary the order depending on the flow of the conversation.

Semi-structured interviews allow the investigator, where necessary, to ask follow-up questions that are not on the guide which will assist in gaining deeper understanding and clarity on answers given by the respondent.

Although, due to its nature, the interview is influenced by the state of the interviewee especially in terms of the emotional state of the interviewee so that a likely distortion
to data may result because the interviewee is anxious or annoyed at the time of the interview, and also they might provide responses that they think the interviewer wants to hear (Patton & Cochran, 2002; Saunders et al., 2009). To avoid having biased data, it is important that interviewers dissociate themselves as much as possible from any particular design or solution, that is, if participants are aware of the interviewer’s personal stake in the outcome of the study, the results are more likely to be affected by demand characteristics (Dell & Cutrell, 2012). In order to conform to these recommendations the investigator allowed the interviewees to freely give out their views with minimal interrupts and did not guide their responses by finishing their statements or giving the interviewers opinion.

3.4.7 Population and Sample

3.4.7.1 Population

The first level of the target population is public organisations that are owned and controlled by the government of Zimbabwe.

The second level of the target population for this study are workers who are involved in the decision making process of information technology purchases in Zimbabwe’s public organisations.

3.4.7.2 Sample

The sample was determined using a purposive sampling technique by deliberately selecting contrasting organisations that are informative to this study. Three organisations which are in different economic sectors were selected. These were selected based on the convenience and ease of access that the researcher has into the organisations.

The investigator interviewed IT administrators who implement adoption decisions and the IT and business executives that make the adoption decisions. In total, the researcher interviewed 13 respondents with a bias towards respondents in the IT departments since they recommend decisions for adoption and eventually implement those decisions. Due to this dual role the IT department has on OSS adoption, their input greatly informed this study on factors influencing OSS adoption at the two phases of adoption which are of interest to this study namely the initiation and implementation phases.
Adler & Adler (1987) contend that the number of interviews to conduct in a qualitative study depends on a number of factors that include the research objectives, resource availability, and available time. They also argue that if one is using multiple research methods in their study then the argument of number of interviews falls away since data is collected through different methods that cancel out each other’s weaknesses. In this study 13 interviews were conducted and data was also collected through document analysis and direct observation.

3.5 Data Analysis

Data collected from the interviews was transcribed using a free tool known as Express scribe. The transcribed data was then coded based on themes that emanated from the data collected. Thematic analysis was therefore used to present and analyse the data. Thematic analysis involves identifying key themes in text which are then transformed into codes and aggregated (Attride-Stirling, 2001). A thematic analysis is ideal for this study since interpretations are supported by data. During analysis data was examined initially within the case and then a cross case analysis was also be done. This was done to ensure all data was analysed.

3.6 Reliability and Validity

3.6.1 Reliability

Reliability refers to the extent to which your data collection techniques or analysis procedures will yield consistent findings (Easterby-Smith et al., 2008). However, (Marshall & Rossman, 1999; Seale, 1999) contend that qualitative data, like experiments, are difficult to reproduce since they reflect the situation at the time of data collection and this situation is likely to change.

Reliability was ensured by assuring respondents that their identities will remain anonymous as recommended by (Saunders et al., 2009). Respondents were identified using codes rather than their actual names. In this study, reliability was also ensured by recording the interviewees so that the researcher will not try to remember conversations which may introduce bias as suggested by (Gray, 2004) who argues that recordings ensure more reliability than field notes. In addition, all
questions were worded clearly and asked with a natural tone of voice. In order to minimise participant bias, the interviewer did not comment verbally or non-verbally to the responses given by respondents. However, questions were repeated in instances where the interviewee did not understand the question asked.

In an effort to assist in reproducing the study, the research objectives, the research purpose, the justification of the study as well as the research methodology have been provided in detail.

3.6.2 Validity

Validity is concerned with whether the findings are really about what they appear to be about (Saunders et al., 2009). In this study validity was ensured by asking questions in the interviews that were directly related to the research objectives and research questions and incorporated all the facets of the research topic. Due care was taken while transcribing data in order to ensure that the process produced accurate data.

3.7 Ethics and Values

This study conformed to the ethics policy of the University of Zimbabwe. Written permission and consent was sort from relevant authorities within each organisation to conduct the study in the respective organisations.

Respondents were informed of their voluntary participation in the study. No names of respondents were mentioned during the study, that is, the identity of respondents will remain anonymous throughout the study.

All information obtained was treated as private and confidential and used for academic purposes only.

3.8 Chapter Summary

In this section a review of the major research question and underlying proposition of this study was made. Thereafter, the researcher discussed the research philosophy
that will underpin this study and subsequently an interpretivism philosophy was adopted. This philosophy is recommended for complex business and management situation (Saunders et al., 2009) such as the one currently under investigation.

This section also recommended the use of the explanatory case study qualitative approach focusing on three public organisations which are in different economic sectors and are selected purposively. Data will be collected through interviews and transcribed for analysis using qualitative analysis software package called ATLAS ti. Finally this study will conform to UZ ethics policy and research and will ensure anonymity and privacy of the respondents.

The next chapter will be Data Collection, Analysis and Presentation. It will, among other issues, discuss how data collected will be analysed and presented.
Chapter 4  
Data Framing and Analysis

4.0 Introduction

In this chapter findings of the study will be presented and analysed in line with the research questions, propositions and theoretical framework discussed in Chapter 2. It will highlight the factors that influence adoption of OSS in Zimbabwe public organisation as found through interviews of 3 public organisations.

In conducting this study, data was collected by way of face-to-face semi-structured interviews. The total number of interviews conducted was 13. Three of the interviews were pilot studies which were done in order to check the reliability of the interview guide schedule. The results of the pilot study were not included in the data analysis but were used to modify the interview guide. The respondents comprised of 7 managers in the IT departments, 3 managers in the business departments and 3 non-managerial employees in the IT departments of the organisations investigated.

Each interview was conducted over 20 to 30 minutes duration. Consent was sort and granted by both the organisations and participants prior to conducting any interviews. The identity of the interviewee was concealed through use of codes for both the organisations name and the name of the individual participant.

4.1 Case Overview

A total of 3 organisations took part in this study. These organisations were drawn from banking, tertiary education institution, and telecommunications. Each organisation was coded as Case A, Case B, and Case C and each respondent denoted by their job title. Case A is a mobile telecommunications provider, Case B is a financial institution and Case C is a University.

4.2 Data Framing and Analysis

According to (Miles et al., 2013) there is no standard way to do data analysis. However, in this study data was analysed in accordance to recommendations made by (Miles et al. 2013). Since the study is comprised of multiple cases, an in case analysis was done first. This involved analysing the
responses of respondents within a single organisation. A cross case analysis was then done which now evaluated and analysed data collected across the different organisations.

4.2.1 In-Case Analysis

4.2.1.1 Case A Data

<table>
<thead>
<tr>
<th>Respondents</th>
<th>State of Adoption</th>
<th>Factors affecting adoption and reasons</th>
<th>Priority Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Auditor</td>
<td>Generally the adoption you can say its limited. Billing system server operating system, BI server operating system.</td>
<td>Decisionmakers are not knowledgeable about how OSS works. Risk and maintenance is done internally than from the service providers. OSS saves money. There is need to understand the technical aspects of it Skills should be there to take it up Compatibility with other systems Cultures embedded in their operations also affect.</td>
<td>Understanding the technical functionality is most important, followed by skills</td>
</tr>
<tr>
<td>Management Accountant</td>
<td>I do not know the technical IT people will know.</td>
<td>Cost implications. Quality of the software. Is it a well-known software, the brand. Does it meet our requirements? Can we try before we commit ourselves?</td>
<td>Highest priority will be on meeting the basic requirements, then the associated costs and then the brand.</td>
</tr>
<tr>
<td>Computer Network Specialist</td>
<td>We do have Open source installed we have a machine that is running in our data centre with Fedora 14, it’s a file server. We also have another Linux Red Hat for our applications that is running Mobile money service.Our website is also running on Linux</td>
<td>The main reason was it is free. It’s fairly secure. Something we know and already trust and we have worked with. There is no one to report to when there is a problem. We need someone who can support us internally. The amount of control you have when working with OSS.</td>
<td>Security is obviously more important considering the nature of traffic that we deal with and then the costs.</td>
</tr>
<tr>
<td>Roaming Controller</td>
<td>We have got Linux that we use in some servers for communication with the data clearing house.</td>
<td>Secure as far as public key encryption concept is concerned. Prior use of OSS. Power of knowledge of OSS. We saved some funds for the organisation. Given out by the GCMA association to people, so most of the people adopted. Ease of installation. Need to develop a technical interest in OSS.</td>
<td>I think security was more important in this aspect. I would put as natural progression as the second prioritisation but for the training, training was worthwhile and we were going to save also some funds for the organisation.</td>
</tr>
</tbody>
</table>

Table 4.1 Case AFactors of Adoption
In relation to state of adoption of OSS in public organisations, there was agreement that OSS adoption is limited. In Case AOSS is used to provide a platform for hosting applications that perform complex tasks. The applications executing on the platform are mobile money services, billing of mobile subscribers, web hosting and file transfer. The applications themselves are closed systems. It also shows that the OSS is mainly used at the server end where it is administered by experienced IT personnel.

The factors that influenced adoption varied among the respondents. However, there was consensus among the respondents that low cost of acquisition, skills availability facilitated adoption of OSS while non-availability of service providers was an inhibiting factor. The cost of acquiring OSS and skill availability were considered to facilitate adoption while the absence of OSS service providers was an inhibiting factor to adoption. The IS Auditor cited compatibility with other systems as a facilitating factor and organisational culture as an inhibiting factor that influence adoption. Similar factors were also noted by the Computer Network Specialist were compatibility with other systems is a facilitating factor since OSS is an open standard and cultural issues tended to hold back adoption of OSS. The Roaming controller and Computer Network Specialist included security and prior use of the OSS platform they adopted as a motivating factor to its adoption.

Other factors that came out from this organisation are the ability to understand the technical aspects of OSS as a facilitating factor, whether the software is a recognised brand and who else is using the software, the ability to manipulate the software, and recommendation by a business partner. These factors facilitated the adoption of OSS.

The most prioritised factor of security was cited as the most important by 2 of the respondents while the IS Auditor listed understanding the technical functionality as most important while from the business side, the Management Accountant considered the ability to meet the basic requirements as most important. Cost was highlighted as the second most important by all respondents save for the IS Auditor who placed skills availability as second most important. The recognisability of the brand and prior use of open source software where prioritised thirdly important. The IT policy for the organisation did not give guidelines on factors to consider when
buying software. It however noted the need to consider software providers with low cost as guided by the state procurement board. It was also observed that most acquisitions of new software were based on the least cost provider concept.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Influence by other entities</th>
<th>Top Management Knowledge</th>
<th>Bridging Knowledge Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Auditor</td>
<td>The whole decision is strictly independent, when it comes to systems, the biggest problem that we have as well is the major controller, which is the government itself is not well equipped or well advised when it comes to systems, itself as the government.</td>
<td>The decision makers are not knowledgeable about how these OSS work, so when they make decisions of purchasing software, they want to look at something where people who are not internal and are somewhere can control.</td>
<td>Enforce change management that would help as we could have a different eye a different view to look at the organisation and explore the opportunities that OSS has. As long as it’s internal, it will not bring the change that you want. It can be initiated from the ministry level, or sector level, it would help to push for such changes to be made.</td>
</tr>
<tr>
<td>Management Accountant</td>
<td>The government in a way does although it does not have a policy that restricts, it offers guidelines. For example now we are being recommended to use SAP as financial software.</td>
<td>We rely mainly on IT for procurement and although IT people are not part of purchasing committee there are called in, in instances that require their expertise.</td>
<td>We do no mind if IT keeps informing us on these developments because there are the experts.</td>
</tr>
<tr>
<td>Computer Network Specialist</td>
<td>In most cases, we look at best practices and sometimes we learn from experience. At times we follow what other organisations are doing.</td>
<td>The real information on OSS is at the operational level this is where they understand the consequences of adopting new innovations. In most cases when we want to do a major project we usually consult and most of the times we usually get OSS already included with the application we buy.</td>
<td>I think everything goes around culture. Government can intervene through policy. And also if people start at learning using OSS in schools, then people become informed.</td>
</tr>
<tr>
<td>Roaming Controller</td>
<td>We have the guidelines from the GCNA association and the Data clearing House guys so we adopted the public key encryption standard using Linux that was open source through their guideline.</td>
<td>No.</td>
<td>Lobby HR so that once in a while you can identify conferences that has executive-like, that touches only the issues at that level.</td>
</tr>
</tbody>
</table>

Table 4.2 Case A OSS Adoption Process

The decision to adopt any new software is largely at the sole discretion of Case A management. However, they sometimes get guidelines in some instances of which software to use. These guidelines are recommendations and not prescriptive and it is up to the organisation to adopt or not. If the recommendations are coming from government they have to give reasons behind the non-adoption, should they decide
not adopt as recommended. If the guidelines are coming from business partners they adopt any software that meet the required specification and not necessarily the ones recommended.

It was noted that management was not adequately informed about IT innovations that include OSS to be able to make independent decision concerning adoption. They depend on recommendation from IT department which are from employees at an operational level.

In light of this deficiency in top management, it was found out that a change management strategy meant to instil a new organisational culture concerning adoption of OSS should be adopted. This strategy has to be driven by private external consultants or the parent ministry. It was also noted that the top management should attend IT related executive conferences in order to enhance their understanding of OSS innovations. Introducing OSS use and training in schools was suggested as a way to enhance adoption knowledge on OSS.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Advantages of Open Source Software</th>
<th>Reservation for OSS adoption</th>
<th>Cost of OSS</th>
<th>Recommendations on OSS Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Auditor</td>
<td>OSS they keep you abreast with latest developments, they keep you knowledgeable, even you line of skills.</td>
<td>Most people do not know how it functions and people have not even pushed for it. You need to have programmers that really like it and push for it.</td>
<td>With OSS you can be able to save money. We are employing programmers who are not being utilised that a cost unless we adopt OSS then they will use their skills. Closed systems are very costly especially if you are in a business where things change very fast.</td>
<td>If an organisation wants to take up OSS they have to look at the technical side of that software so much more than the functionality. And assess if they have the skills to take it up, what other languages are compatible with it, what other systems or whatever are compatible with that OSS, the databases.</td>
</tr>
<tr>
<td>Management Accountant</td>
<td></td>
<td></td>
<td></td>
<td>Should be easily upgradable and should provide forward guidance on the life cycle of the software.</td>
</tr>
<tr>
<td>Computer Network Specialist</td>
<td>There is more amount control when working with OSS you can change it if you have the skills. In terms of costs you do not have to incur extra costs.</td>
<td>There is no one to go to and make a proper complaint.</td>
<td>It’s cheap because this stuff is free. But there are training costs.</td>
<td>If they have skills that can maintain or sustain the OSS activities maybe they can better do it that way. It’s always a cost benefit approach.</td>
</tr>
</tbody>
</table>
The research found out the following advantages for OSS adoption; skills development, low acquisition costs, flexibility to enforce high security, ability to handle big file with variable file formats, ease of installation, ability to manipulate to suit your environment.

The reservations for OSS that came out from the study are; there is limited knowledge on OSS even from IT practitioners, absence of vendor support, limited availability of skills within the organisation and in the market, need to be in continuous knowledge of the development in the OSS community and track the stable versions.

The cost of adoption of OSS gave differing opinions. There was consensus that OSS is cheap to acquire and the license fees are low. However, the were differences in terms of maintenance costs were the adoption of OSS will result in skills of IT employees being fully utilised hence matching costs of employment with the productivity of the employees. This is cost effective in terms of skills productivity than employing skilled programmers to maintain closed systems which results in those employees being gradually deskilled.

However, other respondents said that the cost of training the technical stuff and the cost of regular updates increase the maintenance costs of OSS.

<table>
<thead>
<tr>
<th>Roaming Controller</th>
<th>Ease of installation. The encryption itself is a cipher encryption that is quite powerful. It looks like it’s also faster as far as response wise and how to format stuff and it takes actually very big files to format and the old ones.</th>
<th>There is a danger that if you nap so much on the platform it might be compromised. You need to be upgrading your software regularly. Some of the software is not stable. There is a possibility that if you make it a policy, and just pick any open source, you could actually run into security dangers.</th>
<th>One needs to upgrade it now and again which costs in terms of maintenance down time.</th>
<th>You need to have a department of research. Or maybe to be linked with a college e.g. the UZ, NUST whatever to assist in maintenance and support.</th>
</tr>
</thead>
</table>

Table 4.3 Case A Adoptability of OSS
4.2.1.2 Case B Data

<table>
<thead>
<tr>
<th>Respondents</th>
<th>State of Adoption</th>
<th>Factors affecting adoption and reasons</th>
<th>Priority Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Senior Systems Auditor</strong></td>
<td>Linux systems are used to support all Network devices.</td>
<td>Linux is more secure, it’s cheap, skills availability where available.</td>
<td>The major underlining factor of an organisation choosing OSS is basically the cost, it’s cheaper to license and acquire. Security is the second major concern.</td>
</tr>
<tr>
<td><strong>Financial Manager</strong></td>
<td>Reliability of the software. Cost of the software. Consider the reputation of the provider. Local support availability. Consider availability of upgrades. There is security for that software. skills are available.</td>
<td></td>
<td>The most important one would be reliability, goodness-of-fit. The second most important is cost. Thirdly, is the supplier of the software reliable, his/her reputation. Number 4 security levels, number 5 support and maintenance and lastly the availability of upgrades.</td>
</tr>
<tr>
<td><strong>Manager I.T Systems Security, Networks and Hardware</strong></td>
<td>On Some servers, mail and internet servers.</td>
<td>Stability, Affordability (No annual licenses), Trained and experienced engineers who can administer the OSS, Safe (few to no attacks, viruses etc.)</td>
<td>Stability, Safe, Affordability, Trained and experienced engineers to administer</td>
</tr>
</tbody>
</table>

Table 4.4 Case B Factors of Adoption

Results from Case B reveal that the organisation has adopted OSS to a minimum extent and this is mainly restricted to servers which are manned by experienced IT personnel. The factors that lead to the adoption of OSS in Case B are; low cost of acquisition, security, availability of skills, stability of the OSS platform adopted, traceable reference of the software. These were the facilitating factors that influenced adoption. The non-availability of local support for the software was a potential inhibiting factor. However, because of skills were available within the organisation, it did not prevent adoption.

The perceived priority levels allocated to the factors varied among the respondents. The IS Auditor viewed cost as most important and security the second most important. The order varied with that of the Finance Manager who placed suitability of the software to perform the tasks as most important, followed by cost, supplier reputation, security, support and maintenance and availability of upgrades in descending order. The IT Manager prioritised stability of the software, security, affordability and skills availability in descending order of importance. Prioritisation
therefore varied across functional lines depending on whether one was in technical or business background. It was also observed in Case B there is a feeling among the IT technical team that OSS is a preserve of the experienced IT technical staff and as such its use should be limited to these individuals. Another observations made was that the experience in using OSS for Case B IT employees seem to be limited to Linux. And as such there are reluctant to try other OSS besides Linux which they are familiar with.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Influence by other entities</th>
<th>Top Management Knowledge</th>
<th>Bridging Knowledge Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior System Auditor</td>
<td>The decision to buy software is an independent decision. We only need to meet some security benchmarks that are set by the Reserve Bank of Zimbabwe.</td>
<td>I remember this one time when we wanted to implement a certain OSS for a particular business unit we had some challenges from the top management, they didn’t understand what it was.</td>
<td>There is need for technocrats in the area to educate people maybe in the form of newspaper blogs, newspaper articles. Through the ministry they can highlight all those issues to organisations and train people, hold some seminars, educate people about the existence of that software.</td>
</tr>
<tr>
<td>Financial Manager</td>
<td>As a bank we report to the RBZ, so sometimes they influence the software we are supposed to use for example we have RTGS which we process with other banks and RBZ is involved in that as well because they need to monitor all those transactions so because of that you find that there is a system called Perago which we are supposed to use. The government has influence on the software that we purchase for example with the issue of the ZIMASSET, there is software that we are supposed to purchase which we are supposed to use which is SAP software. When we purchased our core banking software, it was influenced by ZIMRA because it had to be compatible with their system as well.</td>
<td>Yes, why I am saying that is because at that level they go into meetings whereby the IT executive is required to provide such information.</td>
<td></td>
</tr>
<tr>
<td>Manager I.T Systems Security, Networks and Hardware</td>
<td>No we are not influenced by anyone.</td>
<td>Business makes decisions as guided by the information they get from IT management.</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.5 Case B OSS Adoption Process
The decision to adopt software is solely at the discretion of the organisation. However, adopted software for the core banking system has to meet guidelines provided for by the regulator. Also, business partners in some instances recommend software that is compatible to their platform hence influencing adoption.

Although the IS Auditor is of the view that top management is not knowledgeable on OSS issues, the presence of an IT executive who is also part of the top management supports the claims by the other respondents that top management is well versed with OSS to an extent of making independent decision on its use.

Newspaper articles, IT blogs, seminars and interventions by Ministry of ICT in the way of policy pronunciations, are the suggested ways of improving knowledge on OSS among business or acquisition teams.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Advantages of Open Source Software</th>
<th>Reservation for OSS adoption</th>
<th>Cost of OSS</th>
<th>Recommendations on OSS Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Systems Auditor</td>
<td>It has been efficient, it has been up to scratch, and it has met my set standards.</td>
<td>The risks which will limit an institution to have open source is that you would not know for sure what will happen to you data on the system. You would not know the continuity of that system for the future. You have no one to hold responsible for anything that happens to the system.</td>
<td>Most companies are forking out a lot of revenue and lots of money licensing, in purchasing and managing those proprietary software. But in this way it can save money and add value in their day to day business running.</td>
<td>We should not restrict ourselves to the culture we had of getting some proprietary software. It's a culture we need to let go.</td>
</tr>
<tr>
<td>Finance Manager</td>
<td>OSS its free for all to try and also the fact that it's cheap because you do not pay any licenses for it in most cases.</td>
<td>I feel that it's not very secure.</td>
<td>It's not only the initial cost that you look at, you also look at the cost to maintain and support the software and upgrading cost so you.</td>
<td></td>
</tr>
<tr>
<td>Manager I.T Systems Security, Networks and Hardware</td>
<td>It is secure.</td>
<td>It gives IT people more work than usual. Brings confusion and ineffectiveness to novice users.</td>
<td>Invest more money on training.OSS does minimise costs to a greater extent. However, unfamiliar OSS increase maintenance costs.</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.6 Case B Adoptability of OSS
The advantages of using OSS that the study revealed include the low cost of acquisition, efficiency, security especially on the server software. Reservations from the study were the risk that the adopted software may not be supported into the future, the unavailability of support, not very secure in some instances, requires a lot of attention from IT staff, and is misunderstood by inexperienced users.

OSS has low to acquire and licensing costs. However, there is need to invest in training especially at the initial stages. Also if you adopt unfamiliar OSS, it will be costly to maintain.

4.2.1.3 Case C Data

<table>
<thead>
<tr>
<th>Respondents</th>
<th>State of Adoption</th>
<th>Priority Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems Manager</td>
<td>To a large extent especially in terms of the core network systems. And also email, library system, learning management system.</td>
<td>Cost will be the most important, the other three are inter-related.</td>
</tr>
<tr>
<td>ICT Projects Manager</td>
<td>We have quite a number of software that we are using that are open source. Library information systems. Institutional repository (IR) it is running on OSS called DSpace. Servers are running on Linux. Web servers running on Apache, Internet server running on Squid which are all OSS.</td>
<td>Service availability Technical skills availability Support from the top management Economic factor</td>
</tr>
<tr>
<td>Senior Administrative Assistant</td>
<td>We have quite a number of software that we are using that are open source. Library information systems. Institutional repository (IR) it is running on OSS called DSpace. Servers are running on Linux. Web servers running on Apache, Internet server running on Squid which are all OSS.</td>
<td>Cost is the overriding factor here; other aspects can also be viewed from a cost perspective like reliability, support service.</td>
</tr>
<tr>
<td></td>
<td>Lower cost. Working with some foreign partners with knowledge of OSS. Skills availability. Provided skills development and research and development platform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of skills, in the form of computer science students. Knowledge to go ahead and adopt most of the OSS. We got a ten year project with the Belgians so as part of that partnership. We received a lot of training on Linux based systems. We have a strong Linux background. Low Cost to maintain. The number of users that are using the OSS we want to adopt.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cost Reliability Support Service Flexibility to software upgrades and versions Compatibility with existing systems Authenticity of Software (Genuine and Registered) User capacity (no. of users who can share the same software). Its suitability and capacity to meet our minimum specific requirement.</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.7 Case C Factors of Adoption

On CASE C the study found out that the organisation had implemented OSS to a large extent and that OSS was used to handle tasks that are at the core of the organisation these include Library Management system, Learning Management
The agreed factors that influenced adoption in this organisation are: low cost of OSS acquisition, partnership with a knowledgeable entity, availability of skills, platform for learning and development in line with the organisation’s core objectives, access to training on OSS usage, stability of the OSS platform, number of users using the OSS which guarantees support into the future, ability to meet basic requirements. These were found to be the facilitating factors that influenced adoption. The senior administrative assistant also included compatibility with existing systems as a factor that facilitated adoption, and availability of vendors and upgrades as a factor which inhibited adoption.

The systems manager and senior administrative assistant indicated that cost is the most important and all the other factors are interrelated and eventually can be viewed in monetary terms. The ICT projects manager view the prioritisation of factors as service availability, seconded by technical skills availability, and then support from the top management and the economic factor coming out at the least. It was observed that the IT employees in Case C were enthusiastic about the use of OSS. They were comfortable and ready to discuss how the different OSS systems they have adopted worked.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Influence by other entities</strong></td>
<td><strong>Top Management Knowledge</strong></td>
</tr>
<tr>
<td><strong>Systems Manager</strong></td>
<td>No, it is independent although we worked with partners who provided guidelines.</td>
</tr>
<tr>
<td><strong>ICT Projects Manager</strong></td>
<td>Yes, from a library point of view there are some virtual organisations. University library consortium also influences.</td>
</tr>
<tr>
<td><strong>Senior Administrative Assistant</strong></td>
<td>We first identify what other like Institutions are using</td>
</tr>
</tbody>
</table>

Table 4.8 Case C OSS Adoption Process

The ICT projects manager and the administrative assistant revealed that the organisation is influenced by other entities that they have relationships with when
deciding on the kind of software to use. However, the influence comes as guidelines rather than being prescriptive. The Systems manager although denying that there are influenced by other entities admits that their reason to adopt initially adopt OSS came from discussion with a project partner who went on to arrange training on use of OSS.

It was found out that top management are aware of OSS and this was attributed to the presence of a Director who has in-depth knowledge of OSS. However, the senior administrative assistant believes that the top management are concerned of costs hence although they do not know about OSS they appreciate that it reduced the IT costs.

The study in this case found that in order to bridge the knowledge gap, seminars and participation of the organisation in government activities would help in the understanding of OSS.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advantages of Open Source Software</strong></td>
<td><strong>Reservation for OSS adoption</strong></td>
</tr>
<tr>
<td>Systems Manager</td>
<td>Cost saving, access to source code.</td>
</tr>
<tr>
<td>ICT Projects Manager</td>
<td>The beauty of OSS is that is comes with the source code which you can customise</td>
</tr>
<tr>
<td>Senior Administrative Assistant</td>
<td>They provide a sound foundation for future system development, for small and new firms.</td>
</tr>
</tbody>
</table>

Table 4.9 Case C Adoptability of OSS
The advantages of OSS emanating from the study of Case C are; access to source code, bridging digital divide, cost savings, and foundation for system development especially for small or new firms.

The reservation on OSS adoption are; availability of capable human resources especially at initiation, maturity of open source software, absence of ready assistance which leads one to depend on themselves and online community for support. It is a novel and hence risky decision to take.

OSS minimises operational cost since the cost of purchase and licensing are negligible when compared to proprietary software.

As one decides on OSS adoption, they should take into consideration the number of users using that OSS and they should have access to the relevant skills to administer the OSS environment.

### 4.2.2 Cross Case Analysis

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State of Adoption</strong></td>
<td><strong>Factors affecting adoption and reasons</strong></td>
</tr>
<tr>
<td><strong>CASE A</strong></td>
<td>Limited Use. It used on Web server, File transfer Severs, Billing System platform, BI server platform, Mobile Money application.</td>
</tr>
<tr>
<td><strong>CASE B</strong></td>
<td>minimum extent and this is mainly restricted to servers</td>
</tr>
</tbody>
</table>
To a large extent

**Facilitating:** low cost of OSS acquisition, partnership with a knowledgeable entity, availability of skills, platform for learning and development in line with the organisations core objectives, access to training on OSS usage, stability of the OSS platform, number of users using the OSS which guarantees support into the future, ability to meet basic requirements compatibility with existing systems as factor that facilitated adoption.

**Inhibiting:** availability of vendors and upgrades as a factor which inhibited adoption.

<table>
<thead>
<tr>
<th>Priority 1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost is the most important</td>
</tr>
<tr>
<td>Service availability</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priority 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>technical skills availability</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priority 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td>support from the top management</td>
</tr>
</tbody>
</table>

**Table 4.10 Cross-Case Factors of Adoption**

In two of the cases studied, the use of OSS is minimal and is restricted mainly to servers which are administered by experienced IT personnel. In one of the cases, OSS use was high and used extensively to cater for core operations of the organisation.

The facilitating factors that influenced adoption of OSS are:

- Low cost of acquisition and licensing
- Availability of skills in the organisation
- Security and stability of the software
- Traceable references of users of the software
- Brand name familiarity

These factors were agreed among the cases. Other factors that were considered by at least two of the firms are:

- Recommendation by a business partner
- Prior use and experience with the software
- Compatibility with other systems
- Access to source code
- Ability to meet basic requirements

One organisation also cited number of users using the OSS, access to training on OSS administration as facilitating factors that led it to adopt OSS.

The inhibiting factors that retarded adoption of OSS are:
• Availability of vendor support locally
This was the main factor that was cited by all organisations. Two of the organisations also named organisational culture as an inhibiting factor to the adoption of OSS.

In terms of prioritising of the factors, the respondents answered along functional lines for instance those on the finance departments' prioritised financial issues. Therefore, the responses were grouped into the categories of critical, most important, important and least important.

The factors that were quoted as critical are:

• Security and stability
• Understanding technical functionality
• Ability to meet basic requirements
• Cost
• Organisational Culture

The most important factors are:

• Skills availability
• Availability of support and maintenance

Important factors

• Brand recognisability and supplier reputation
• Prior use

Least important factors

• Top management support

Top management support was mentioned by a single respondent.
In all cases the decision to adopt use of any software lies entirely with the organisation. However, since the organisations interconnect with other entities they sometimes get guidelines from other stakeholders on which software to adopt. The guidelines are recommendation rather than prescriptive. If the organisation tends to benefit from the relationship with the recommending party the recommendations are usually adopted. For instance in one of the cases they adopted OSS because the other party was willing to train the organisation of the administration of OSS. In another instance they adopted because the other party would provide the software free acquisition and licensing charges. In the other case the organisation adopted because they would benefit financial by integrating their platform with the other party.

In organisation where there is an IT representation in top management in the form of an IT director or IT executive, the organisations respondents note that the top management in general would be familiar with the innovations such as OSS. In the one case were the organisation has no IT representation in top management level, the respondents agreed that top management is not aware of innovations such as OSS.
In order to bridge the gap on IT innovation especially as it relates to top management and acquisition teams, it was suggested that the government can enact policies that drive adoption of OSS since we have an ICT ministry in the country. Business executives and acquisition teams should attend IT seminars and conferences that focus on OSS. IT professional should share their knowledge and experiences through newspaper articles and blogs.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Advantages of Open Source Software</th>
<th>Reservation for OSS adoption</th>
<th>Cost of OSS</th>
<th>Recommendations on OSS Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CASE A</strong></td>
<td>skills development, low acquisition costs, flexibility to enforce high security, ability to handle big file with variable file formats, ease of installation, ability to manipulate to suit your environment.</td>
<td>there is limited knowledge on OSS even from IT practitioners, absence of vendor support, limited availability of skill within the organisation and in the market, need to be in continuous knowledge of the development in the OSS community and track the stable versions.</td>
<td><strong>Benefit:</strong> OSS is cheap to acquire and the license fees are low. adoption of OSS will result in skills of IT employees being fully utilised hence matching costs of employment with the productivity of. <strong>Driver:</strong> the cost of training the technical stuff and the cost of regular updates increase the maintenance costs of OSS.</td>
<td></td>
</tr>
<tr>
<td><strong>CASE B</strong></td>
<td>Low cost of acquisition, efficient, security especially on the server software.</td>
<td>Risk that the adopted software may not be supported into the future, the unavailability of support, not very secure in some instances, Requires a lot of attention from IT staff, and is misunderstood by inexperienced users.</td>
<td><strong>Benefit:</strong> It's cheap to acquire and you do not have to pay license fee. <strong>Driver:</strong> You have to invest a lot in training.</td>
<td></td>
</tr>
<tr>
<td><strong>CASE C</strong></td>
<td>Access to source code, bridging digital divide, cost savings, and foundation for system development especially for small or new firms.</td>
<td>Availability of capable human resources especially at initiation, maturity of open source software, absence of ready assistance which leads one to depend on themselves and online community for support. It is a novel and hence risky decision to take.</td>
<td><strong>Benefit:</strong> The cost of purchase and licensing are negligible</td>
<td>Consider the number of users using that OSS and they should have access to the relevant skills to administer the OSS environment.</td>
</tr>
</tbody>
</table>

Table 4.12 Cross-Case Adoptability of OSS
The advantages of adopting OSS that came out from the study are:

• skills development
• low acquisition and licensing costs
• flexibility to enforce high security
• ability to handle big file with variable file formats
• ease of installation
• access to source code and ability to manipulate the software to suit your requirements
• bridging digital divide
• foundation for system development

The advantages of access to source code, foundation for system development were noted by tertiary institute which has adopted OSS in most of its software deployments. The other advantages were common in all the cases.

The disadvantages of adopting OSS are:

• there is limited knowledge on OSS even from IT practitioners
• limited availability of skills within the organisation and in the market
• need to be in continuous knowledge of the development in the OSS community and track the stable versions
• risk that the adopted software may not be supported into the future
• requires a lot of attention from IT staff
• misunderstood by inexperienced users
• availability of capable human resources especially at initiation
• maturity of open source software
• absence of ready assistance which leads one to depend on internal and online community for support

• It is a novel and hence risky decision to take due to limited points to reference

The absence of ready support, availability of skills at initiation, and need for the IT staff to be continuous touch with developments in the OSS was noted in all cases as the disadvantages of using OSS.
There was agreement that the cost of acquisition and licensing of OSS is low and hence the adoption of OSS has huge cost saving implications. However, in cases A and B the quoted the cost of training as a significant cost driver of using OSS.

4.3 Discussion of Key Findings

The facilitating factors that influence adoption of OSS that the research found out are low cost of acquisition and licensing, availability of skills in the organisation, security and stability of the software, traceable references of users of the software, brand name familiarity, recommendation by a business partner, prior use and experience with the software, compatibility with other systems, access to source code, ability to meet basic requirements, number of users using the OSS, access to training on OSS administration, understanding technical functionality of the OSS, top management support.

The cited inhibiting factors are availability of vendor support locally and organisational culture.

These factors are consistent with literature although some of them influence adoption in a manner that varies with literature. To discuss these factors, the researcher grouped them into Technological, Organisational, Environmental and Individual factors as proposed in chapter 2 of this study.

4.3.1 Technological factors

The technological factors that emanated from the study are access to source code, skills availability, relative cost advantage, prior use of OSS, technical skills in management.

4.3.1.1 Access to source code

The access to source code was a facilitating factor to the adoption of OSS as it allowed for the manipulation of the software to meet the organisational needs. This was true in Case A and C where the access to source code provided a platform for research and development. It also provided ability to manipulate the software so that it functions in a way that fits the organisational needs. This was highlighted by the respondent who mentioned that;
“...the beauty about OSS is that it comes with the source code so students can develop some of the software and in addition we have a vibrant IT department from the computer centre and the library IT so I think we do have the skills and knowledge to go ahead and adopt most of the OS.” – ICT Projects Manager

In the other cases the idea of being able to access the source code was a motivating factor although they noted that they had never manipulated the software and where not likely to do so going into the future.

“the amount of control when working with OSS you can manipulate it the way you see fit if you have the skills to do so it's interesting if u have that kind of control unlike in licensed software you can't temper with anything.” – Computer Network Specialist

This is in line with the literature that the idea of having access to the source code gives organisations a sense of self-reliance (Van Beulen et al., 2009). This confirms the proposition made that access to source code has a positive influence of OSS adoption.

4.3.1.2 Compatibility

Compatibility can be in the form of the compatibility of the OSS adopted with other systems. It can also be in relation to the skills of the IT personnel in relation to the task performed. In consistent with literature those that adopted OSS adopted to the extent of the skills that where available to them internally.

“We wanted something that give us power of knowledge on the side of configurations so that we do not need too much of retraining.” – Roaming Controller

These sentiments were also expressed by IT respondents in other organisations. The OSS adopted was also compatible with existing systems and hence would not require investing in new hardware or software. Literature notes that were OSS is compatible with the existing technological architecture that would facilitate adoption.
4.3.1.3 Relative cost advantage

The relative cost advantage of using OSS facilitated its adoption. As quoted from the respondents were adoption of OSS offered a cheap and reliable solution it was adopted.

“there was really no incentive to move to extra costs when we have something (SSH on Linux which is an OSS) we know and already trust and we have already worked with for that solution.”– Computer Network Specialist

This is consistent with studies by (Dedrick & West, 2004) and (Johnston et al., 2013).

4.3.1.4 Observability

In all cases where OSS was adopted the particular software they choose to adopt there would have used it before without good results or will have seen where it is adopted successfully. This visibility of results from OSS implementations motivated its adoption. This confirms the proposition that the existence of successful OSS adopters improves its adoption. The adoptions made in the cases studied where to the extent of the software they had seen to be successful.

“Obviously that one is an important issue, the number of users using the OSS”– Systems Manager

4.3.1.5 Complexity

The complexity of the tasks to be performed did not seem to be a factor in the adoption of OSS. The organisations implemented OSS to handle both complex and non-complex tasks in the same organisation and support by the same people. This contradicts literature which put task complexity as an inhibiting factor especially at implementation stage.

4.3.1.6 Triability

The ability to download and use OSS facilitated the adoption of OSS. Most deployments of OSS were downloaded and used with no requirement for licensing. This motivated their adoption as the users became familiar with the software and that took away reservations they had. This is consistent with findings by (Dedrick & West, 2004).
4.3.2 Organisational factors

The organisational factors that facilitate adoption that emanate from the study are; quality and the availability of human resources, top management support, and training, and limited resources.

The inhibiting organisational factor noted is organisational culture.

4.3.2.1 Quality of human resources

It was found that in all cases they adopted OSS because they had the right skills to adopt OSS. In one case they stopped the use of OSS with inexperienced users since they noted that it caused in efficiencies and confusion. In that particular case they have therefore restricted the use of OSS to experienced IT personnel. The study by (Lippert, 2006) is consistent with these findings.

4.3.2.2 Top Management Support

In cases where there was an IT manager as part of top management, this helped in adoption of OSS. In the organisation were OSS has been deployed to a great extent it was noted by the respondents that the presence of a Director helped the other top management employees to appreciate OSS and hence allow its adoption.

"Because we had the fortunate advantage of our Director, is a learned Doctor in computer science and at the end of the day he is a very important person as to making decisions on which software to use and I think he has been making positive influence to the top administration." – ICT Projects Manager

Literature revealed that top management support is critical in adoption of innovations since it’s a risky decision. However, even in cases were the top management is not informed adoption has also taken place and in the other case there is an IT executive in top management but adoption is minimal.

4.3.2.3 Training

Having access to training has positively influenced the adoption of OSS. Case C was provided with training for its staff and this has resulted in the wide adoption of OSS. Even, those organisations that have deployed to a small extent they note that investment in training is of importance in order to facilitate adoption.
“The way we adopted it there was a training that was done and funded and one of our IT guys and librarian were sent to South Africa to be trained on the software so as a natural outcome of the workshop after seeing the advantages of the software we actually opted to adopt.” – ICT Projects Manager

4.3.2.4 Limited Resources

When confronted with limited financial resources OSS adoption is facilitated as it eases the financial pressure on the IT budget.

“We wanted was that after the partners pulled out we will be able to sustain the various things that we would have started. So one of the things that we deliberately tried to do was where possible we would go the open source route because of its affordable price tag.” – ICT Projects Manager

This is consistent with literature that where there is limited financial resources and the skills for operating OSS are available within the organisation, this will facilitate adoption of OSS (Dedrick & West, 2004).

4.3.2.5 Cost

There was agreement that acquisition costs and licensing costs are low since on acquisition one usually just download and start to use in most cases the licensing fees are low and almost negligible.

“If you are looking at our Linux for instance on our web server, the Apache web server, the platform that we using we are paying almost next to nothing besides our staff time.” – ICT Projects Manager

However, there other respondents believed that OSS requires a lot of investment in training and finding the right skills to administer an OSS environment is costly.

“But there is costs that comes for example technical stuff, beginning to learn se as much as people try to work , the training for example Linux is not very common so it needs someone who is very skilled so in a way it is a cost to have someone who is highly skilled.” – Computer Network Specialist
This contradiction in relation to the total cost of adoption of OSS is also prevalent in literature with varying schools of thought when it comes to accounting for the cost of adopting OSS.

However, the low cost of acquisition and licensing is a facilitating factor and therefore those who have to train or acquire the OSS skills they cost of nurturing that skill is the inhibiting factor.

4.3.2.6 Organisational culture

The respondents Case A and B revealed that organisation culture in the organisation dictates the software to be used. Because of an engrained dependence on proprietary software organisation are reluctant to use OSS. The culture of dependence on vendor support for technical issues has inhibited the adoption of OSS.

“Use of OSS is to have an open mind about it do not restrict themselves to the culture we had of getting some proprietary software because it’s something which has bone that way by culture we have been cultured to use a licensed software so for someone to just move on from the old way to doing new things, you know starting new arguments is always difficult.” – Senior Systems Auditor

This is variance with literature reviewed which argued that organisational culture facilitates adoption. It also refutes the proposition made that organisational culture is a positive driver of OSS.

4.3.3 Environmental Factors

The environmental factors that emanate from the study which facilitate adoption are institutional support and security. The inhibiting factors are availability of services and legitimacy.

4.3.3.1 Institutional Support

In Case C adoption was to a large extent and this was attributed to a partnership agreement which provided funding and skills development support for use of OSS. The partner also recommended the kind of OSS to adopt. In Case A, one of the OSS
implementation was as a result of a recommendation with a business partner who also provided the software free of any charges.

“Most of the OSS that we have adopted an important driving force would be the fact that we had a 10 year project with the Belgians so as part of that partnership, we received a lot of training on Linux based environments particularly the Red Hat.” – ICT Projects Manager

This is consistent with literature institutional support will encourage adoption of OSS.

4.3.3.2 Security

In contrast to literature, Case A and B did not adopt OSS on core systems as they viewed it as not being secure. They, however, note that some components on OSS platform are quite secure. There was consensus that OSS is secure from malicious software attacks. On the aspect of security they seemed to be contrasting responses even by the same respondent. Where OSS was viewed as secure, it facilitated adoption. The findings differed with literature in that literature considered OSS as secure since one can view the source code and check if there is any malicious code in the software. On the contrary, the findings reveal that respondents were sceptical on the use of OSS since they queried that the access to source code entails that everyone knows the system and therefore can breach security since the know the code behind the software and can exploit known weaknesses.

4.3.3.3 Availability of services and skills

The non-availability of vendors and ready support for OSS users was cited by all respondents as the inhibiting factor to the adoption of OSS. However, if the organisation has enough skills internally it will adopt although the idea of not having someone to escalate queries is a concerning matter that has slowed adoption of OSS.

“Unlike a commercial product where you can nag your supplier for assistance, with an OSS typically you do not have anyone to call so you need to have IT staffs that are willing to learn.” – Systems Manager

Available suppliers should have traceable references and have untainted reputation in the way they provide services.
4.3.4 Individual Factors

The Individual factors that came out from the study were the de-skilling of technical stuff, confusion and inefficiency of in experienced users.

4.3.4.1 De-skilling of technical stuff

IT personnel that administer closed systems end up doing routine maintenance work and if there is need for any changes they contact the vendor. This facilitates adoption of OSS as these skilled employees will feel closed systems are de-skilling them.

4.3.4.2 Confusion and Inefficiency

In Case B, they attempted to implement OSS for all the end-users and this resulted in lots of queries to the IT service desk as the users became confused of the new platform. Employees are familiar with closed system which they use at their homes and hence trying to introduce new software at work which is unfamiliar to them resulted in inefficiency of the work-force hence inhibited adoption of OSS.

4.4 Chapter Summary

This chapter presented the findings of the study that was conducted on 3 public organisations. It analysed the findings from each organisation and then a cross analysis of the findings from the 3 cases was done to compare and contrast the outcomes from each case. Following the cross-case analysis was a discussion of the key findings which were related to literature and propositions made in this study. The discussion was guided by the TOEI framework which was adopted in chapter 2.

The next section of this study will draw conclusions from the findings made in this chapter and will make recommendations in line with the research objectives. It will also make recommendation on any future areas of study in the area of open source software adoption.
Chapter 5
Conclusion

5.0 Introduction

In this chapter, the results of the study are summarised and discussed. Furthermore, recommendations are made based on the conclusions drawn. Recommendations made will be on policy and management. The chapter will highlight the limitations of this study and subsequently give the theoretical contributions that the study has made and suggest areas that require further research.

5.1 Summary and Concluding Remarks

Conclusions will now be drawn from the findings discussed in Chapter 4 and in line with the research questions raised in Chapter 1. The research questions emanated from the objectives of the study which were to identify the factors that influence adoption, to establish relations among the factors and reveal the challenges associated with adopting OSS. Results from the study suggest that adoption of OSS in Zimbabwe public organisations is an economically viable solution for them to use in order to improve productivity.

5.1.1 Major factors affecting adoption and their importance

The study concludes that factors that influence adoption can be classified as Technological, Organisational, Environmental and Individual factors. The critical factors that came out from the study were security and stability, understanding technical functionality, ability to meet basic requirements, cost, and organisational culture. These factors were prioritised highly hence the conclusion that these are the critical factors that influence adoption of OSS. The second group of factors that will be classified as most important are skills availability, and availability of support and maintenance. Then we have important factors, brand recognisability, supplier reputation, and prior use of OSS. The least important factor is top management support as it was mentioned once. The critical factors affect adoption at the initiation phase; these are the influencing factors as adoption is initiated. This category is made up of mainly technological and organisational factors of the TOEI framework.
The most important factors that influence adoption at the implementation stage of adoption can be classified as environmental factors. The third group influence adoption at initiation is comprised of technological and environmental factors. Top management support, although not prominent in the findings, is an important organisational factor at initiation.

There is no one group of factors under the TOEI framework that is more noticeable at initiation or implementation hence all components are important at these two main stages of adoption.

The study also concludes that organisations are concerned at the factors at the initiation stage of adoption.

5.1.2 Relations among the factors

Some factors are interwoven these include prior use of OSS which would eliminate the need for retraining and hence lower the cost of adoption. The availability of skills within the organisation will eliminate the need for training, lower adoption cost, eliminate the need for external support and allow the organisation to manipulate the source code to meet its requirements. This in turn lowers the cost of deploying the software as the organisation becomes self-reliant on maintenance concerns. This underpins the importance of the cost factor as everything eventually is measured according to its monetary contribution. Hence, the factors should not be viewed in isolation but rather as interrelated.

5.1.3 Extent of Adoption

The adoption of OSS in public organisations is minimal and is restricted to servers which are manned by experienced IT personnel. This is a result of unwillingness of IT employees to deploy OSS due to the fact that they will be responsible for all the technical challenges posed by the software. Furthermore, the organisations are not structured to handle internal support of all IT related issues. Also, the organisations do not have a culture of developing products or supporting the development of innovations within the organisations. The IT departments are viewed as service centres that provide technical guidance and support when required by the business sections, because of this, IT departments are not in a position to drive innovations.
5.1.4 Role of Top Management

The study concludes that top management support is important since they have the mandate to approve or deny deployment of OSS. However, the management need not be knowledgeable about OSS for them to facilitate adoption. Top management are concerned about the financial implications of adopting OSS hence if it is a cost effective way of providing a service then that would facilitate adoption.

5.1.5 Observability

The presence of organisations that have successfully adopted OSS will promote the adoption of OSS. All the organisations studied have deployed Linux and they use it for similar purposes in their organisation. This is attributed to the ease with which one can find references of deployments of Linux. Also partnership with organisations that have knowledge of OSS will also facilitate its adoption.

5.1.6 Culture

It is the organisational culture rather than the individual culture that has an impact on OSS adoption. For instance, if one is employed by an organisation that uses OSS the person will adjust to fit into the organisational way of operating and thinking. Hence, it is the organisational culture that influences adoption. And like any entity, the organisational culture can evolve.

5.1.7 Challenges with OSS adoption

Most of the reservations cited on OSS adoption can be resolved if the organisations that have successfully adopted the OSS can share their experiences. This is because most of the challenges noted are premised on the notion of “fear of the unknown”. Hence, instilling a culture of knowledge sharing will eliminate the challenges presently cited in relation to the adoption of open source software.

5.2 Recommendations

The study makes the following recommendations for policy formulation and also for managerial decision making.
5.2.1 Policy Recommendation

1. Provide guidelines on the consideration to make when adopting OSS for public organisations so as to encourage its adoption. When there are clear procedures to guide use of software it eliminates uncertainty and encourages adoption of OSS.

2. Establish a body that governs the software being used in the country and enforce piracy laws in order to promote local software development innovations through OSS. OSS provides a leaping platform to bridge the digital divide especially when it comes to software development since there is a global community of experienced developers coming together to develop products with zero training costs.

5.2.2 Managerial Recommendations

The recommendations made are to:

1. Adopt the use of OSS in order to increase the productivity of the employees since when organisations are hiring IT personnel they look at programming skills, therefore it is important that once employed these employees will continue to use this skill for the benefit of the organisation. OSS provides such a platform as it gives the programmer access to the source code.

2. Deploy OSS in order to lower pressure on limited financial resources since OSS adoption has low acquisition and licensing cost. The notable costs that arise from OSS are training cost but these costs are also incurred even when one adopts closed systems.

3. Restructure organisations so that they have a vibrant systems development department that is responsible for system development and acquisition.

4. Train top management and business acquisition teams on OSS innovation so that they will not evaluate software based on cost but other considerations such as skills developments, and driving internal innovations.

5. Consider the critical factors and the most important factors that influence adoption and determine how these apply in their organisation as they adopt OSS. Use the framework in Figure 5.1 to evaluate OSS adoption decisions.
The model in Figure 5.1 will guide decision matter on the factors to consider for OSS adoption. It contributes to the existing theoretical models in that it gives priority categorisation which is easier to understand and follow. Previous attempts to prioritise the factors used numerical values. This kind of categorisations introduces ambiguity in interpretation in that one would not know if a ranking of 6 is twice as important as a rating of 3. The other disadvantage with a numerical ranking scale is that managers do not have the time to decipher numbers especially those that have

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Figure 5.1 Adoption Framework
been allocated subjectively. The suggested framework above therefore simplifies decision making. This framework identifies the factor as either a facilitating factor (F) or an inhibiting factor (I) and also shows whether it is important at the initiation or implementation stages of adoption.

5.3 Research Limitations

The research was limited by the time the researcher had to interview the respondents since this had to be done during working hours while the researcher and the respondent were also working. This limited the number of interviewees. This limitation was compensated for by probing in detail those that took part in the study in order to gather as much information as possible on the state of OSS in the organisation.

The study was also limited by the researcher's modest experience in conducting qualitative research. The researcher had to consult the supervisor on ways to conduct qualitative research. The researcher also attended dissertation clinics that helped clarify grey areas when one conducts research.

5.4 Further Research Directions

Future researchers should investigate the extent of the relationships among the factors using quantitative methods.

The research can also be done to investigate the state of adoption in private organisation and the factors they consider in the adoption of OSS.

5.5 Summary

This chapter concluded the research study on the factors that influence OSS adoption in public organisations by providing answers to the research questions and propositions raised in the study. The conclusions were drawn from data collected and presented in Chapter 4. Policy and managerial recommendations were proposed as well as further areas that future researchers should investigate.
The main conclusion from the study is that open source software adoption in Zimbabwe public organisations is economically viable as it reduces costs and improves production.
6.0 References


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APPENDICES

Appendix I: Interview Guide Schedule

REQUEST FOR VOLUNTARY PARTICIPATION IN AN INTERVIEW

My name is Bright Martin Taruvinga. I am pursuing a Master's in Business Administration (MBA) degree with the Graduate School of Management (GSM) at the University of Zimbabwe (UZ). I am carrying out a research on factors influencing Open Source Software (OSS) adoption in Zimbabwe public organisations. I kindly request you to voluntarily participate in this interview and assist in the data collection of this research study.

This study is designed to investigate the factors that influence the adoption of OSS in Zimbabwe public organisations. By highlighting these factors, the study will enable the researcher to recommend strategic and operational considerations that should be made to influence the adoption of OSS in public organisations. This will subsequently improve the operational efficiency of public organisation and also reduce the total costs of ownership of IT software in public organisations.

Guidelines to participating in the interview:

- Answer all questions accurately and objectively.
- There is no risk, anonymity will be maintained and all responses will be kept confidential and are strictly meant for this study only.
- All results will be aggregated thus further maintaining anonymity of the participants.
- Your opinions and comments are of great value as much as your voluntary participation is greatly appreciated.
- All interviews are to be tape-recorded, at the concurrence of the participant, and the audio tape-recording sessions are to be erased at the end of the study.

Thank you for your consideration, and participation in this research study.
Interview Guide Schedule- Technical

1. What is your position in the organisation?
2. What is the nature of business that your organisation engages in?
3. What is the state of play of open source software in your organization?
4. What kinds of tasks are performed on the OSS platform? Can you classify as simple or complex?
5. What were the driving factors that lead you to use OSS in your organisation? Explain how these factors influenced adoption?
6. Of the reasons you highlighted how would you prioritise them, that is, which one is more important and which one is least important?
7. Are they any cause and effect relations on the factors you have mentioned (researcher to give examples of factors mentioned)?
8. How do you see OSS in the context of efforts to minimise costs of software ownership and contain running costs in IT budgets?
9. How do you see OSS in the context of efforts to ensure improved organisation effectiveness?
10. Do other organisations/institutions/government departments you are affiliated with influence the software you deploy in your organisation?
11. What comments would you have on the user experience that you have had with OSS?
12. What are your reservations when looking at OSS in your organisation and in general?
13. Do you think Free and Open Source software is generally better than proprietary software? Why? Can you give examples?
14. In your view is Top Management/Business adequately informed to make independent decisions on adoption of I.T innovations such as OSS?
15. What do business teams/acquisition teams need to know about OSS and what can be done to educate them?
16. What recommendation would you make to an organisation that is planning to adopt OSS?
17. What else would you want to say about OSS that maybe relevant to this study?

THANK YOU FOR YOUR COOPERATION!
Interview Guide Schedule-Business

1. What is your position in the organisation?
2. What is the nature of business that your organization engages in?
3. Are you familiar with the concept of Open Source Software, which includes software such as Linux, Fedora, and OpenOffice?
4. When buying IT software packages what factors do you take into consideration?
5. Of the reasons you highlighted how would you prioritise them, that is, which one is more important and which one is least important?
6. Looking at the factors you gave, are they factors that affect each other. Are they any cause and effect relations on the factors you have mentioned (researcher to give examples of factors mentioned)
7. Do other organisations/institutions/government departments you are affiliated with influence the software you deploy in your organisation?
8. In your view is Top Management/Business adequately informed to make independent decisions on adoption of I.T innovations such as OSS?
9. What do business teams/acquisition teams need to know about OSS and what can be done to educate them?
10. What recommendation would you make to an organisation that is planning to adopt OSS?
11. What else would you want to say about OSS that maybe relevant to this study?

THANK YOU FOR YOUR COOPERATION!