AN EVALUATION OF THE ADOPTION LEVELS OF GREEN IT PRACTICES AND THEIR IMPLICATIONS ON COMPETITIVENESS: THE CASE OF NMB BANK LIMITED (2007 TO 2013)

BY

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FACULTY OF COMMERCE
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FEBRUARY 2013
DECLARATION

I, Brian Mwoyoweshumba, 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 : Brian Mwoyoweshumba
Student Number : R073957Y

Signature:.................................Date:............................

Name: Engineer Martin Manuhwa
DEDICATION

I dedicate this dissertation to my wife Gloria, my children Sean and Samantha, as well as my parents Eliah and Theresa.
ACKNOWLEDGEMENTS

I thank God almighty for His grace that has sustained me throughout the MBA program. A special acknowledgement goes to my wife and children for their support and endurance during the many hours that I could not spend with them as a result of the program.

The MBA program has been a challenging but interesting and motivating program which has transformed my way of thinking both in management and in general life. I thank the GSM lecturers and staff for making this possible, as well as my fellow MBA students who also contributed towards my development and success in the program. A special mention goes to my supervisor Engineer Martin Manuhwa for sharing his time and knowledge in providing guidance in this research.
ABSTRACT

Organisations across the world together with governments have recently been giving unprecedented attention to environmental issues. Green IT has emerged as one key element in efforts to reverse global warming, and reducing the environmental footprint as organisations conduct business. These initiatives come in the form of improving efficiencies of ICT hardware systems in order to reduce emissions into the environment; ICTs replacing traditional environmental polluters; and offering ICT based solutions in all facets of life in order to eliminate or reduce environmental impact. Green IT does not only benefit the environment, but has a triple bottom line effect of environmental (planet), social (people), and economic (profit) benefits. Such technologies like virtualisation and VoIP over computer networks, combined with practices like printing reduction, and switching off computer equipment when it is not in use, are all Green IT aspects that can significantly reduce energy consumption thereby reducing carbon emissions in the power generation process. Green IT offers business opportunities of improving operational efficiency, reducing costs, and green branding, all of which can provide sustainable competitive advantages. This study sought to investigate the adoption levels of Green IT practices and the implications on competitiveness in NMB Bank, which operates in Zimbabwe. The study also looked at practices already in place that are Green IT compliant, as well as assessing the competitiveness of the bank, and the challenges being faced in implementing Green IT initiatives. The case study approach was used with focus being on the period from the year 2007 to 2013. The study concluded that there are some practices and technologies in NMB Bank that are Green IT compliant. However the level of adoption of Green IT is generally low mainly because there is no clear Green IT governance framework and strategy in the bank. The bank is generally highly competitive in its industry and can ride on existing infrastructure and systems to implement Green IT initiatives and become even more competitive. The study recommends a decentralised Green IT governance structure, and the environmental cost leadership strategy of Green IT. Follow up studies can be done on whether statutory bodies responsible for environmental management in Zimbabwe have embraced Green IT and what is it that they are doing to promote Green IT adoption by banks.
# TABLE OF CONTENTS

## PRELIMINARIES

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration</td>
<td>i</td>
</tr>
<tr>
<td>Dedication</td>
<td>ii</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>iii</td>
</tr>
<tr>
<td>Abstract</td>
<td>iv</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>v</td>
</tr>
<tr>
<td>List of Tables</td>
<td>xii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>xiii</td>
</tr>
<tr>
<td>Abbreviations/Acronyms</td>
<td>xv</td>
</tr>
</tbody>
</table>

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAPTER ONE</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Background of the Study</td>
<td>1</td>
</tr>
<tr>
<td>1.3 Environmental Analysis</td>
<td>2</td>
</tr>
<tr>
<td>1.3.1 The Macro Environment</td>
<td>2</td>
</tr>
<tr>
<td>1.3.1.1 Political Environment</td>
<td>3</td>
</tr>
<tr>
<td>1.3.1.2 Economic Environment</td>
<td>4</td>
</tr>
<tr>
<td>1.3.1.3 Social Environment</td>
<td>4</td>
</tr>
<tr>
<td>1.3.1.4 Technological Environment</td>
<td>5</td>
</tr>
<tr>
<td>1.3.2 The Micro Environment</td>
<td>6</td>
</tr>
<tr>
<td>1.3.2.1 The Zimbabwean Banking Industry Structure</td>
<td>6</td>
</tr>
<tr>
<td>1.3.2.2 Porter’s 5 forces</td>
<td>6</td>
</tr>
<tr>
<td>1.3.2.3 Industry competition (Industry Rivalry)</td>
<td>7</td>
</tr>
<tr>
<td>1.3.2.4 Bargaining Power of Suppliers</td>
<td>8</td>
</tr>
</tbody>
</table>
1.3.2.5 Bargaining Power of Buyers 9
1.3.2.6 Threat of Substitutes 10
1.3.2.7 Threat of New Entrants 10
1.3.3 The Internal Environment 11
1.3.3.1 NMB Bank background 11
1.3.3.2 NMB Bank Mission 11
1.3.3.3 NMB Bank Vision 11
1.3.3.4 NMB Bank Values 12
1.3.3.5 NMB Bank Business Model 12
1.3.3.6 NMB Bank SWOT Analysis 13
1.4 NMB Bank Critical Success Factors 14
1.4.1 Exceptional service provision 14
1.4.2 Strong Brand 14
1.4.3 Customer loyalty 14
1.4.4 Cost management 15
1.4.5 IT infrastructure 15
1.5 Problem Statement 16
1.5.1 Problem to be investigated 16
1.6 Research Objectives 16
1.7 Research Questions 17
1.8 Research Hypothesis 17
1.9 Justification of Research 17
1.10 Scope of Research 18
1.10 Chapter Summary 18

CHAPTER TWO 19
LITERATURE REVIEW 19
2.0 Introduction 19
2.1 Green IT

2.2 Green IT Framework

2.3 Green IT Adoption Drivers
   2.3.1 Regulatory Driver
   2.3.2 Customer and investor demands
      2.3.2.1 AU Optronics Corporation case
   2.3.3 Business demands
   2.3.4 Cost considerations
   2.3.5 Organisational resources
   2.3.6 Other organisational factors
   2.3.7 Employee demands
   2.3.8 Constrained electricity generation capacity

2.4 Pillars of Green IT
   2.4.1 ICT Processes and Governance
      2.4.1.1 Centralized
      2.4.1.2 Federal
      2.4.1.3 Decentralized
   2.4.2 ICT Equipment lifecycle and procurement
      2.4.2.1 Reuse
      2.4.2.2 Refurbish
      2.4.2.3 Recycle
   2.4.3 Office environment
      2.4.3.1 Reducing energy consumption by PCs
      2.4.3.2 Switching off the system when idle
      2.4.3.3 Using thin-client computers
      2.4.3.4 Reducing unnecessary printing
   2.4.4 Data centre and infrastructure
3.5.1 Primary Data 56
3.5.2 Secondary Data 57
3.6 Research Instruments 58
3.6.1 Questionnaires 58
3.6.2 Interviews 59
3.7 Data Analysis Techniques 60
3.8 Research Limitations 60
3.9 Chapter summary 61

CHAPTER FOUR 62
RESULTS AND DISCUSSION 62
4.0 Introduction 62
4.1 Response Rate 62
4.1.1 Demographic Data 63
4.2 Green IT practices and Adoption levels 66
4.2.1 Green IT awareness 67
4.2.2 Green IT end-user practices 68
4.2.2.1 Communication 68
4.2.2.2 Travelling 72
4.2.2.3 Meetings 75
4.2.2.4 Teleworking 76
4.2.2.5 Energy conservation practices 77
4.2.2.6 Printing practices 80
4.2.2.7 Banking Automation 83
4.2.2.8 Environmental and ICT awareness 84
4.2.2.9 Remote user support 84
4.2.3 Data centre and infrastructure 85
4.2.3.1 Green IT governance framework 85
4.2.3.2 Green IT strategy 85
4.2.3.3 Data centre Green IT policy 85
4.2.3.4 Energy conservation 86
4.2.3.5 Eco-friendly energy use 86
4.2.3.6 Virtualisation 86
4.2.5 ICT Equipment lifecycle and procurement 86

4.2.4 Summary of section results 87
4.2.4.1 Current Green IT practices within NMB Bank 87
4.2.4.2 Levels of Green IT adoption by NMB Bank 87

4.3 Competitiveness 87

4.4 Challenges in implementing Green IT initiatives 91
4.4.1 Lack of coordination 92
4.4.2 Cultural and behavioural challenge 92
4.4.3 Obtaining priority funding for Green IT 92
4.4.4 Limited value network readiness 93
4.4.5 Inconsistent electricity supply 93
4.4.6 Unreliable and expensive internet access 93
4.4.7 Environment regulations. 94

4.5 Conclusion 94

CHAPTER FIVE 95

CONCLUSIONS AND RECOMMENDATIONS 95

5.0 Introduction 95

5.1 Conclusions 95
5.1.1 Green IT practices in NMB Bank 95
5.1.2 Levels of Green IT adoption by NMB Bank 96
5.1.3 Competitiveness 96
5.1.4 Challenges in implementing Green IT initiatives 97

5.2 Recommendations of the Study 97
5.2.1 Develop a Green IT Governance framework 97
5.2.2 Develop a Green IT Strategy 98
5.2.3 Training and development 98
5.2.4 Implement more Green IT technologies and practices 99
   5.2.4.1 Videoconferencing and teleconferencing 99
   5.2.4.2 Monitor Datacentre power consumption 99
   5.2.4.3 Document Management System 100
   5.2.4.4 Eco-friendly datacentre designs 100
   5.2.4.5 Voice over IP (VoIP) 100
   5.2.4.6 Procurement and disposal 101
5.3 Follow up Studies 101
REFERENCES 102
APENDICES 109
   APENDIX 1 109
   APENDIX 2 114

LIST OF TABLES
Table 1.1 Structure of the banking sector
Table 1.2 Compliant Banks by 31 December 2012
Table 1.3 Non-compliant Banks
Table 4.1 Response rate
Table 4.2 Response rate by business unit (Department/Branch)
Table 4.3 Response rate by position
Table 4.4 Green IT awareness by position
Table 4.5 Green IT awareness by department
Table 4.6 Typical monthly telephone extension bill
Table 4.7 Have ICTs reduced telephone costs?
Table 4.8 Can ICTs further reduce telephone costs?
Table 4.9 Voice over IP usage
Table 4.10 Are some meetings conducted using ICTs
Table 4.11 Awareness of monthly power consumption
Table 4.12 Use of remote access tools by IT department
Table 4.13 Net engagement ratio rankings
Table 4.14 What do you think about the service at your bank?
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.1 Porter’s five forces</td>
<td>7</td>
</tr>
<tr>
<td>Figure 1.2 The NMB Bank organogram</td>
<td>12</td>
</tr>
<tr>
<td>Figure 1.3 The NMB SWOT analysis</td>
<td>13</td>
</tr>
<tr>
<td>Figure 2.1 The triple bottom line</td>
<td>21</td>
</tr>
<tr>
<td>Figure 2.2 Eurogroup Consulting’s Sustainable IT Framework</td>
<td>22</td>
</tr>
<tr>
<td>Figure 2.3 The Connection Research Green ICT Framework</td>
<td>23</td>
</tr>
<tr>
<td>Figure 2.4 Green IT Governance Archetypes</td>
<td>30</td>
</tr>
<tr>
<td>Figure 2.5 Green Computer Lifecycle</td>
<td>32</td>
</tr>
<tr>
<td>Figure 2.6 How different stakeholder groups benefit from Green IT</td>
<td>42</td>
</tr>
<tr>
<td>Figure 2.7 Benefits of using Green IT</td>
<td>43</td>
</tr>
<tr>
<td>Figure 2.8 Generic competitive Environmental Strategies</td>
<td>46</td>
</tr>
<tr>
<td>Figure 4.1 Responses by gender</td>
<td>64</td>
</tr>
<tr>
<td>Figure 4.2 Responses by qualification</td>
<td>65</td>
</tr>
<tr>
<td>Figure 4.3 Green IT awareness</td>
<td>66</td>
</tr>
<tr>
<td>Figure 4.4 Instant messaging</td>
<td>68</td>
</tr>
<tr>
<td>Figure 4.5 Instant messaging vs. phoning</td>
<td>69</td>
</tr>
<tr>
<td>Figure 4.6 Awareness of telephone costs</td>
<td>70</td>
</tr>
<tr>
<td>Figure 4.7 Average travelling per month</td>
<td>73</td>
</tr>
<tr>
<td>Figure 4.8 Average distance per month</td>
<td>73</td>
</tr>
<tr>
<td>Figure 4.9 ICTs have reduced travelling</td>
<td>74</td>
</tr>
<tr>
<td>Figure 4.10 ICTs can further reduce travelling</td>
<td>75</td>
</tr>
<tr>
<td>Figure 4.11 Staff members sometimes work from home</td>
<td>77</td>
</tr>
<tr>
<td>Figure 4.12 Staff members switch off computer equipment when they go home</td>
<td>78</td>
</tr>
<tr>
<td>Figure 4.13 Behaviour of computer when idle for more than 30 minutes</td>
<td>78</td>
</tr>
</tbody>
</table>
Figure 4.14 Unnecessary printing 80
Figure 4.15 soft copy preferences over printing 80
Figure 4.16 Document Management System 81
Figure 4.17 Documents printed for compliance purposes 82
Figure 4.18 Policies promoting printing reduction 82
Figure 4.19 Banking Automation 84
Figure 4.20 Bank competitiveness 88
Figure 4.21 Customer view on bank competitiveness 89
# ABBREVIATIONS/ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADB</td>
<td>African Development Bank</td>
</tr>
<tr>
<td>ATMs</td>
<td>Automated Teller Machines</td>
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<tr>
<td>AUO</td>
<td>AU Optronics Corporation</td>
</tr>
<tr>
<td>CD</td>
<td>Compact Disc</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
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<tr>
<td>CEP</td>
<td>Council of Economic Priorities</td>
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<tr>
<td>CFL</td>
<td>Compact Fluorescent Lamp</td>
</tr>
<tr>
<td>CIO</td>
<td>Chief Information Officer</td>
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<tr>
<td>CO²</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processing Unit</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>DVD</td>
<td>Digital Versatile Disc</td>
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<tr>
<td>EMS</td>
<td>Emergency Medical Services</td>
</tr>
<tr>
<td>EPA</td>
<td>United States Environmental Protection Agency</td>
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<tr>
<td>EPEAT</td>
<td>Electronic Product Environmental Assessment Tool</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>Gtalk</td>
<td>Google talk</td>
</tr>
<tr>
<td>GNU</td>
<td>Government of National Unity</td>
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<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>ICTs</td>
<td>Information and Communication Technologies</td>
</tr>
<tr>
<td>IPC</td>
<td>Industrial Psychology Consultants</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
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<tr>
<td>MDC</td>
<td>Movement of Democratic Change</td>
</tr>
<tr>
<td>NMB</td>
<td>NMB Bank Limited</td>
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<tr>
<td>NMBZ</td>
<td>NMB Zimbabwe Holdings</td>
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<tr>
<td>PABX</td>
<td>Private Automated Branch Exchange</td>
</tr>
<tr>
<td>PEST</td>
<td>Political, Economic, Social, and Technology analysis</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>PCs</td>
<td>Personal Computers</td>
</tr>
<tr>
<td>POS</td>
<td>Point of Sale</td>
</tr>
<tr>
<td>RBZ</td>
<td>Reserve Bank of Zimbabwe</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>TFT-LCD</td>
<td>Thin Film Transistor Liquid Crystal Display</td>
</tr>
<tr>
<td>TV</td>
<td>Television</td>
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<tr>
<td>UNCED</td>
<td>United Nations Conference on Environment and Development</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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<tr>
<td>VMM</td>
<td>Virtual Machine Manager</td>
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<tr>
<td>VOC</td>
<td>Volatile Organic Compound</td>
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<td>VoIP</td>
<td>Voice over IP</td>
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<tr>
<td>WAN</td>
<td>Wide Area Network</td>
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<tr>
<td>ZABG</td>
<td>Zimbabwe Allied Banking Group</td>
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<tr>
<td>ZANU PF</td>
<td>Zimbabwe African National Union (Patriotic Front)</td>
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<td>ZESA</td>
<td>Zimbabwe Electricity Supply Authority</td>
</tr>
</tbody>
</table>
CHAPTER ONE

1.1 INTRODUCTION

This chapter outlines the background of the research, and the environmental context of the study looking at the macro environment, micro environment, as well as the internal environment of NMB Bank. The research problem is defined in this chapter, together with the research objectives. This provides a platform which leads to the justification of the research in order to explain the relevance of the research to management. The scope of the research is also outlined in this chapter.

1.2 BACKGROUND OF THE STUDY

At the Davos World Economic Forum in 2005, Tony Blair, the Prime Minister of the United Kingdom at the time, argued that in order to address global warming, swift action must be taken urgently (InfoTech, 2010). This comes as the climate change agenda has taken centre stage as demonstrated by such conventions as, the Vienna Convention for the Protection of the Ozone Layer in 1985, the Rio de Janeiro Earth Summit in 1992, the Kyoto Protocol in 1997, and the Copenhagen Climate Change Summit in 2009 (UNCED, 2009). Businesses are now under pressure to reduce their carbon footprints while on the other hand they are trying to remain profitable (InfoTech, 2010). As organisations face pressure from stakeholders such as customers and investors, serious improvements are being noticed in the environmental performance of some organisations, as they realise that ignoring environmental performance will subsequently have an undesirable impact on profit (ibid).
In the modern dynamic global business environment, competition is very high and each organisation always strives to lead their competitors regardless of the industry in which they operate. In the Zimbabwean banking sector, banks are faced with multiple challenges in a recovering economy and in such situations, environmental issues tend to take a back seat as organisations fight for survival and seek business growth. However, many organisations across the world have discovered that Green IT solutions do not only help in the fight to save the environment, but they also generate competitive advantages.

This research seeks to investigate the adoption levels of Green IT practices in NMB Bank and the related implications on competitiveness. NMB Bank Limited is a registered commercial bank operating in Zimbabwe. The Bank uses ICT systems extensively, both in datacentres and in offices resulting in high energy consumption and ICT related activities that have an environmental footprint, for example e-waste, and carbon emissions. In order to effectively carry out the investigation, there is need to analyse the environment in which NMB Bank is operating in particularly focusing on the period 2007 to 2013. This will look at the macro-environment, the micro-environment, as well as the organisation’s internal environment.

1.3 ENVIRONMENTAL ANALYSIS

1.3.1 The Macro Environment

The macro environment consists of conditions existing in the economy as a whole, rather than in a particular sector or industry. According to Lancaster and Reynolds (2005), the macro environment generally consists of forces which cannot be controlled which pose the most important sources of opportunities as well as threats to the company. The macro environment in which a company operates will influence its performance and the magnitude of the influence will
depend on how much of the company’s business is dependent on the state of the overall economy. The macro environment can be analysed using the PEST analysis. The PEST analysis is a tool that can be used to analyse the political factors, economic factors, social factors and technological factors.

1.3.1.1 Political Environment

The political environment in Zimbabwe for the period 2007 to 2013 is largely highlighted by the 2008 harmonised elections and the formation of the Government of National Unity in 2009. Political violence was experienced during the 2008 general election period which negatively affected the country’s economy and development. Although political tensions and policy differences exist among the major political parties, the political environment in Zimbabwe has generally been stable. This stability has been experienced especially after the formation of the inclusive government by the three major political parties in Zimbabwe which are ZANU PF and the two MDC factions. However, the tenure and future of the inclusive government is not clear and this has stifled economic growth and reduced investor confidence in the country. Investors are waiting to see if the inclusive government remains in place to implement a sustainable economic recovery and as a result, they are making limited investments (Kwenda, 2010). While the political stability has created opportunities for economic recovery and business growth, the uncertainty on the political and policy direction of the country has negatively affected large scale investments into the economy. This results in the unavailability of capital investments as well as the much needed credit lines for local banks.

The Indigenisation and Economic Empowerment Act was also a major development in Zimbabwe during the period 2007 to 2012. The different views in government over the implementation of the act has resulted in conflicting statements from government officials belonging to different political parties, thus negatively affecting business confidence. In the mid-term monetary policy statement by the RBZ (2012), Dr Gono points out that he supports the implementation of Indigenization and Economic Empowerment in the various
sectors but is of the view that this should be done in a way that upholds confidence especially in the banking sector. Any adverse developments in the banking sector could grind economic activity in Zimbabwe to a halt (RBZ, 2012).

1.3.1.2 Economic Environment

On the economic front the country experienced a hyper-inflationary environment, with recorded inflation rates of over 231 million percent (Biti, 2012). This was characterised at its peak around the year 2007 to 2008 by cash shortages, foreign currency shortages, and very high exchange and interest rates, currency debasing exercises (slashing of zeros), printing of bearer cheques, and shortages of basic commodities. This only came to a halt after the government abandoned the Zimbabwe dollar in favour of a multi-currency regime, switching to the use mainly of the United States dollar, the South African rand, and to a lesser extent the Botswana pula and the British pound (Mzumara, 2012). Economic reforms implemented since the signing of the GPA have borne positive results for the economy (ADB, 2012). According to the ADB (2012), Real GDP grew by about 6% in 2009 and 9% in 2010 and the inflation rate dropped to 3.0% by April 2011 following the adoption of the multi-currency regime along with the tightening of fiscal policy. In the medium term, Zimbabwe’s prospects and performance seem to be largely determined by political developments and how these impact the economy (ibid).

1.3.1.3 Social Environment

The Zimbabwean society’s confidence in the banking sector remains largely on the low side (IPC, 2012). The period 2004 – 2008 was a nightmare period for Zimbabwe’s banking public as it started with nine banking institutions being placed under recuperative curatorship (RBZ, 2012). Subsequently, cash shortages, withdrawal limits, and furtherbank closures, shattered Zimbabweans’ confidence in the banking sector. Although efforts were made to restore confidence from 2009, some challenges remain in the sector with some banks failing to meet capital requirements and some closing, which has resulted in the Zimbabwean banking customer becoming alert and selective.
1.3.1.4 Technological Environment

To match what is offered internationally, the Zimbabwean banks are working on their information and communication technology (ICT) systems. The decade long economic challenges made it difficult for banks in Zimbabwe especially the indigenous banks, to pay for annual licences and in many cases system upgrades became impossible as foreign currency was not available. Following the formation of the Government of National Unity and the introduction of the multi-currency system, banks are now in a better position to service their software agreements and the ICT sector has witnessed growth. According to NMB (2011) the bank successfully upgraded its core banking system to the latest version of T24. The bank is also upgrading existing electronic systems as well as acquiring new systems to enhance electronic delivery channels in an effort to bring more convenience to clients (NMB, 2011). AfrAsia Kingdom Zimbabwe also announced the implementation of a major system upgrade exercise that will see the Group’s core banking system being upgraded to T24 R10 (Kingdom, 2012). Likewise, other Zimbabwean Banks have also been embarking on system upgrades on different platforms and this has allowed banks to reduce the ICT gap with regional and international banks.

Another positive development was the suspension of customs duty on information communication technology (ICT) products by the government. However ICT gadgets in Zimbabwe remain relatively highly priced compared to the region and this remains a drawback in the development of the ICT sector.
1.3.2 The Micro Environment

1.3.2.1 The Zimbabwean Banking Industry Structure

According to the RBZ (2013), the number of operating banking institutions is 22, following the placing of Interfin under curatorship and the on-going liquidation of Royal Bank. Considering that in June 2012, the RBZ (2012) reported that financial institutions reduced to 25 from 26 following the voluntary surrender by Genesis Investment Bank of their banking license, the banking industry is an industry facing some challenges. The current structure of the banking sector is shown in the Table below.

Table 1.1: Structure of the banking sector (RBZ, 2013)

<table>
<thead>
<tr>
<th>TYPE OF INSTITUTION</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Banks</td>
<td>16</td>
</tr>
<tr>
<td>Building Societies</td>
<td>3</td>
</tr>
<tr>
<td>Merchant Banks</td>
<td>2</td>
</tr>
<tr>
<td>Savings Banks</td>
<td>1</td>
</tr>
<tr>
<td>Total Banking Institutions</td>
<td>22</td>
</tr>
</tbody>
</table>

1.3.2.2 Porter’s 5 forces

Porter’s five forces model can be used to analyse the micro environment. Michael Porter defined five forces that determine the intrinsic long-run attractiveness of a market or market segment and these are industry competitors, potential entrants, substitutes, buyers, and suppliers as shown in Figure 2 below (Kotler and Keller, 2006).
1.3.2.3 Industry competition (Industry Rivalry)

The Zimbabwean banking sector following the sector liberalisation in the 1990s has seen many players entering the sector resulting in a new era of serious competition. While foreign banks still dominate the market, new entrants like new commercial banks, merchant banks, finance houses, unit trusts, leasing firms, exchange bureaux, venture capital companies, formal and informal microfinance institutions, emerged that created competition (UND P, 2009).

According to Strickland and Thompson (1999), rivalry amongst players in any industry is usually stronger when demand for a product is growing slowly. This tends to explain the Zimbabwean banking sector. The banking sector is currently saddled with 16 commercial banks in a market where there is a low savings rate. The situation is further compounded by the low confidence in the sector by the Zimbabwean public. Further, arguments have often arisen on whether or not Zimbabwe is overbanked. According to (IPC, 2012), there are many registered banks in Zimbabwe which are battling for a meagre total deposits of just over US$ 4.00 billion (including interbank deposits).
1.3.2.4 Bargaining Power of Suppliers

Following dollarization in 2009 and the subsequent increase in minimum capital requirements by the RBZ to 100 million by December 2014, there is a huge demand for capital from Zimbabwean banks at the same time. The tables below show capitalisation levels as at 31 December 2012.

Table 1.2: Compliant Banks by 31 December 2012 (RBZ, 2013)

<table>
<thead>
<tr>
<th>BANK</th>
<th>LEVEL OF CAPITALISATION ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBZ Bank Limited</td>
<td>111.79</td>
</tr>
<tr>
<td>Standard Bank</td>
<td>56.50</td>
</tr>
<tr>
<td>Stanbic Bank</td>
<td>45.62</td>
</tr>
<tr>
<td>BancABC</td>
<td>38.42</td>
</tr>
<tr>
<td>Barclays Bank</td>
<td>34.30</td>
</tr>
<tr>
<td>ZB Bank</td>
<td>32.34</td>
</tr>
<tr>
<td>Kingdom Bank</td>
<td>28.79</td>
</tr>
<tr>
<td>Ecobank</td>
<td>28.18</td>
</tr>
<tr>
<td>FBC Bank</td>
<td>27.97</td>
</tr>
<tr>
<td>MBCA Bank</td>
<td>27.14</td>
</tr>
<tr>
<td>TN Bank</td>
<td>26.90</td>
</tr>
<tr>
<td>CABS</td>
<td>26.76</td>
</tr>
<tr>
<td>Tetrad</td>
<td>25.19</td>
</tr>
<tr>
<td>NMB Bank</td>
<td>25.01</td>
</tr>
</tbody>
</table>
Table 1.3: Non-compliant Banks (RBZ, 2013)

<table>
<thead>
<tr>
<th>BANK</th>
<th>LEVEL OF CAPITALISATION ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agribank</td>
<td>22.64</td>
</tr>
<tr>
<td>FBC Building Society</td>
<td>18.97</td>
</tr>
<tr>
<td>Trust Bank</td>
<td>18.70</td>
</tr>
<tr>
<td>Metbank</td>
<td>17.70</td>
</tr>
<tr>
<td>ZB Building Society</td>
<td>14.56</td>
</tr>
<tr>
<td>ZABG Bank</td>
<td>15.80</td>
</tr>
<tr>
<td>Capital Bank</td>
<td>7.50</td>
</tr>
</tbody>
</table>

As shown in the two tables above, about 90% of the banks are yet to reach half of the required 100 million, and 7 banks have failed to comply with the 25 million threshold for 31 December 2012. This shows that there is high demand for capital by Zimbabwean banks in a market where local investors have struggled to raise capital to the previous 12.5 million capital level. This coupled with the global financial challenges that are highlighted by the Eurozone crisis, as well as the high country risk for Zimbabwe, leaves local banks with a daunting task to raise capital. The increased demand for both capital and credit lines coupled with short supply of funds increases the bargaining power of investors. Investors especially from abroad are demanding high cost of capital and high interest rates on credit lines.

1.3.2.5 Bargaining Power of Buyers

The Zimbabwean bank clients are currently being faced with high interest rates on loans, high bank charges, short term loans and inadequate funding for capital projects. This is mainly due to short term deposits, high cost of funds on the supply side as well as demand which outstrip supply. This tends to drive customers who are already short of confidence away from banks. Banks have to compete for depositors and this improves customer service. The bargaining
power of clients with surplus (money to save) is very high, but for the deficit units (borrowers), the opposite is true.

1.3.2.6 Threat of Substitutes

The first 2013 monetary policy statement, states that there are 150 microfinance institutions in Zimbabwe (RBZ, 2013). These institutions are lending out to traditional bank customers. Even though some of the microfinance institutions are charging higher interest rates than banks, unavailability of loan facilities within banks leaves clients with few options such that they end up borrowing expensive money from microfinance institutions.

The emergence of money transfer services by mobile phone operators has emerged as a new threat of substitutes. Econet’s Ecocash is the most popular money transfer service which is outside the banking system. Recently, banks have lobbied for the Reserve Bank of Zimbabwe to act against Econet Wireless’ reluctance to open up its mobile banking platform and partner with banks so as to allow transactions to be initiated from bank accounts (Sibanda, 2013).

1.3.2.7 Threat of New Entrants

The Reserve Bank of Zimbabwe re-issued licences to Trust Bank, Royal Bank and Barbican Bank in 2010 although some of the recipients have failed to take off. The issuing of new licences to new banks brings new entrants who add to the existing competition which can reduce the customer base for all existing banks. Banks have to compete by reducing interest rates, bank charges and service fees in order to gain market share. However, this threat has recently been reduced because of the introduced high capital requirements, which have become an entry barrier. Recently Barbican Bank failed to resume banking operations after their licence was reissued in 2010. Barbican bank failed to meet the extended recapitalisation deadline of 31 July 2012 and the RBZ has recommended cancellation of the bank’s licence to the Minister of Finance (RBZ, 2013). The RBZ (2013) also highlights that Genesis Investment Bank
surrendered its banking licence in 2012 after failing to meet the minimum capital requirements. These developments tend to weaken the threat of new entrants.

1.3.3 The Internal Environment

1.3.3.1 NMB Bank background

NMB Bank Limited is a registered commercial bank and is the principal subsidiary of NMBZ Holdings, which is an investment holding company which is based in Zimbabwe (NMB, 2013). According to NMB (2013), the Bank was established in October 1992 by a group of Zimbabwean entrepreneurs who had previously held senior positions in renowned international financial institutions such as the World Bank and the International Finance Corporation. The liberalization of the Zimbabwean economy including the financial sector in the early 1990s gave impetus to the rise of NMB Bank which was registered as an accepting house under the Banking Act in June 1993 and the NMBZ Group was successfully listed both on the Zimbabwe Stock Exchange and the London Stock Exchange (ibid). In December 1999, NMB Bank was granted a commercial banking licence and the commercial bank opened its doors to the public in July 2000 (NMB, 2013).

1.3.3.2 NMB Bank Mission

The mission of NMB Bank is “To provide premium financial services to existing and potential high net worth individuals and businesses through the practise and promotion of: Professionalism, Integrity and Excellence” (NMB, 2013)

1.3.3.3 NMB Bank Vision
“To be recognised as the leading financial services group in our chosen market” (NMB, 2013).

1.3.3.4 NMB Bank Values

Integrity, professionalism, excellence, loyal and dedicated staff, innovation, and shareholder value (NMB, 2013).

1.3.3.5 NMB Bank Business Model

The business model of NMB Bank is premised on delivering superior value and service excellence to corporate organisations and individuals of a high net-worth. The model aims to build a solid corporate book on the back of a proven record of unprecedented service delivery. The bank operates through positioning of branches and service centres at important industrial and commercial locations in the major Zimbabwean cities of Harare, Bulawayo, Gweru, and Mutare.

The bank’s organic growth is largely attributed to a dynamic and innovative service oriented banking which carves into the market which was traditionally dominated by foreign owned banks. The nucleus of NMB Bank is a selective wholesale service oriented bank with additional treasury and advisory services.
The NMB Bank internal environment can be analysed using the SWOT analysis to identify the strengths and weaknesses in the organisation. These can in turn be linked to the external environment by using them to exploit opportunities and counter threats from the external environment. The big question is whether the business should limit itself to those opportunities in which it possesses the required strengths or consider better opportunities to acquire or develop certain strengths (Kotler, 2002). Figure 1.3 above shows the NMB Bank SWOT analysis.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Strong brand</td>
<td>• Low market visibility</td>
</tr>
<tr>
<td>• Resilience</td>
<td>• Limited branch network</td>
</tr>
<tr>
<td>• High net worth loyal customers</td>
<td>• High staff turnover</td>
</tr>
<tr>
<td>• Strong IT infrastructure</td>
<td>• Negative reputation as a result of bad publicity in 2004</td>
</tr>
<tr>
<td>• Exceptional service provision</td>
<td>• Increasing competition</td>
</tr>
<tr>
<td>• Highly qualified staff</td>
<td>• Liquidity risks</td>
</tr>
<tr>
<td></td>
<td>• Default risks</td>
</tr>
<tr>
<td></td>
<td>• High capital requirements</td>
</tr>
<tr>
<td>OPPORTUNITIES</td>
<td>THREATS</td>
</tr>
<tr>
<td>• Diversifying into new products</td>
<td>• Increasing competition</td>
</tr>
<tr>
<td>• Growth into international markets</td>
<td>• Liquidity risks</td>
</tr>
<tr>
<td>• Recapitalisation opportunities</td>
<td>• Default risks</td>
</tr>
<tr>
<td>• Use technology to drive business</td>
<td>• High capital requirements</td>
</tr>
</tbody>
</table>

Figure 1.3: The NMB SWOT analysis
1.4 NMB BANK CRITICAL SUCCESS FACTORS

1.4.1 Exceptional service provision

The bank has over the years developed a reputation of high quality personalised customer service. A recent example is that of one of the bank’s clients, who was hospitalised at the Avenues Clinic in 2012, but required banking services. The client was unable to physically go to the bank, and could not use his debit or credit card. The bank assisted by visiting the client in order to provide access to the required banking service in the hospital. The bank goes the extra mile in many respects in order to offer excellent service using both human skills and technology.

1.4.2 Strong Brand

The strength of NMB in the high net-worth client market is its strong brand. The NMB brand has developed to become associated with affluence, and has become a symbol of high status for clients and high quality service. Even though the bank has received negative publicity in the past, the brand has remained strong because of what it is associated with.

1.4.3 Customer loyalty

NMB Bank has managed to develop a bond with its major clients through exceptional service delivery that has resulted in customer loyalty. The bank managed to survive trying times by retaining its major customers for example during the Zimbabwe banking industry crisis of 2004 which led to the closure of a couple of banks. Even though bad publicity was experienced and some fears were raised that the bank may collapse in some sections of the country, the major customers remained loyal thereby ensuring the bank’s survival.
1.4.4 Cost management

Zimbabwean banks are now required to charge gazetted interest rates as agreed through a memorandum of understanding between the RBZ and the BAZ. This is set to reduce revenues from interest in the face of other challenges like high overhead costs, lack of customer confidence, financing challenges, liquidity challenges, volatile deposits, inadequate lines of Credit, and the nonexistence of a functional interbank market. As revenues are squeezed, it is important to manage costs and reduce them where possible.

1.4.5 IT infrastructure

NMB Bank has a strong IT infrastructure which includes a high capacity datacentre, a huge wide area network, as well as desktop machines across all branches. This provides a platform for cost reduction and improved efficiencies in service delivery which allows the bank to ride on technology in order to offer services that go beyond customer expectations.
1.5 PROBLEM STATEMENT

1.5.2 Problem to be investigated

The challenge to business organisations and to everyone else is to realise that development and economic growth should be done in a way that is sustainable for the benefit of future generations. Therefore, all actions that we take should spare a thought for the environment, by considering the environmental impact of our actions. Contemporary ICT governance is there to foster IT strategy in order to support corporate strategy. Similarly Green IT initiatives can significantly support business strategy by improving efficiencies and reducing business costs for the organisation as well as making a positive impact on the environment and the society.

The main problem to be investigated in this study is to assess whether there has been significant uptake of Green IT practices by NMB Bank and how Green IT has impacted on the competitiveness of the bank. The bank has extensive computer systems and IT infrastructure which consume a significantly high amount of energy and consumables which place a heavy burden on the resources of the organisation as well as leave an environmental footprint. This high consumption translates into high costs for the organisation, yet high cost structures are affecting Zimbabwean banks and cost reduction is a critical success factor. On the other hand, high consumption means high environmental pollution through carbon emissions.

1.6 RESEARCH OBJECTIVES

a) To determine the Green IT practices in NMB Bank.
b) To ascertain the levels of Green IT adoption in NMB Bank.
c) To evaluate the competitiveness of the bank in the Zimbabwean Banking sector.
d) To investigate the challenges that the bank is facing in undertaking green IT initiatives.

e) Recommend Green IT initiatives that the bank can adopt to become more competitive in a banking environment.

1.7 RESEARCH QUESTIONS

a) What are the Green IT practices in NMB Bank?
b) What is the adoption level of green IT by NMB Bank staff? 
c) How competitive is the bank in the Zimbabwean banking industry? 
d) What are the challenges that the bank is facing in their Green IT initiatives? 
e) What Green Computing initiatives can the bank undertake in order to gain competitiveness in the banking industry?

1.8 RESEARCH HYPOTHESIS

There is a generally low level of Green IT adoption, and awareness of Green IT and its associated benefits within NMB Bank.

1.9 JUSTIFICATION OF RESEARCH

IT is very important for everyone in NMB Bank to be aware of Green IT issues. NMB Bank is in a highly competitive industry where multiple challenges are being faced and more and more stringent regulatory requirements are posing a viability threat to banks. It is important to reduce costs and boost revenues for NMB Bank in any way possible. Research on the bank’s position on awareness and uptake of Green IT has the potential to identify gaps that can lead to cost reduction, and improved operational efficiency.
On the other hand, the bank can improve its corporate image to a more visible, good corporate citizen who is sensitive to the environment, thereby increasing business opportunities with environmentally sensitive customers. This has the potential to increase business revenue. Closing the gaps can also make the bank compliant to national and international environmental standards, thereby offering green compliant branding opportunities. It is also important to determine the challenges that the bank is facing in undertaking green initiatives so that solutions can be recommended.

1.10 SCOPE OF RESEARCH

The research will be confined to NMB Bank staff members. This is in order to ascertain the levels of awareness of Green IT issues and their importance to the organisation. Special attention will be given to IT staff who implement IT solutions as well as senior management who oversee policy formulation and implementation.

1.11 CHAPTERSUMMARY

The chapter introduced the research study and highlighted the background to the research. The NMB Bank background was discussed together with the organisation's environment. The research problem was then explained and an outline of research objectives, research questions, justification for the research, and the scope of the research.
CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

Literature review is an account of what has been published on the topic by accredited scholars and researchers, and it forms the foundation on which to build a research (Saunders, Lewis, and Thornhill, 2003). The chapter will focus on critical analysis of the views of different authors on the topic of Green IT and the benefits that businesses can accrue in order to become more competitive.

2.1 GREEN IT

“I have always believed that IT is the engine of an efficient economy; also can drive a greener one” Michael Dell (as cited in Greenpeace, 2010, P.2).

The concept of Green IT consists of two main building blocks which are ‘green’ and ‘information technology’. The ‘green’ in Green IT refers to the environmentally sustainable application of Information Technologies (Sobotta, Sobotta and Cotze, 2010). Green generally refers to the use and development of environmentally friendly competencies by meeting the needs of present generations without compromising the ability of future generations to meet their needs (Hart, 1997).

Information Technology refers to information systems that are computer based particularly software applications and computer hardware (Sobotta et al., 2010). Information Technology can therefore be viewed as the application of
computer hardware, communication systems, and software technologies to the management, processing and dissemination of information. The United Nations Educational, Scientific and Cultural Organization (as cited in Paas, 2008) uses the term IT, or information technologies, to describe the tools and processes that are used to access, retrieve, store, organise, manipulate, produce, present and exchange information by electronic and other automated means. The technologies include hardware, software and telecommunications in the forms of personal computers, scanners, digital cameras, phones, faxes, modems, CD and DVD players and recorders, digitised video, radio and TV programmes, database programmes and multimedia programmes (Paas, 2008).

According to Molla, (2009) Green IT is an organisation’s ability to systematically apply environmental sustainability criteria to the design, production, sourcing, use and disposal of the IT technical infrastructure as well as within the human and managerial components of the IT infrastructure. Ahola, Ahlqvist, Ermes, Myllyoja, and Savola, (2010), define Green IT as the use of IT to improve environmental sustainability by optimising societal activities. Burnet (2010) points out that Green IT can be viewed from three facets:

- Green IT focuses on computing itself by looking at issues to do with power consumed by computer hardware like monitors, processors, routers, switches, printers and other computer equipment. This facet also considers the computer hardware manufacturing processes, commissioning, decommissioning, and disposal.
- Green IT offers opportunities to replace traditional high carbon functions with low carbon technologies, for example, virtual meetings reduce corporate travel.
- Green IT is about what IT can do to deal with the largest sources of energy consumption and carbon emissions in all facets of life, be it in heating and cooling offices, in homes, and in manufacturing processes.

These perspectives provide opportunities for ICT industry to provide technologies that can be applied in order to help in reducing global warming and environmental
damage, while at the same time improving people’s lives and economic prospects for organisations (Burnet, 2010). Green IT can therefore be seen as the practice and study of supporting the organisation’s IT needs by using IT resources in a way that is efficient to the benefit of the organisation and the society, while at the same time being friendly to the environment. As shown in figure 2.1 below, Green IT takes into account the triple bottom line of economic viability (profit), social responsibility (people), and environmental impact (planet) (Yu, 2010).

Figure 2.1: The triple bottom line (Yu 2010)
2.2 THE GREEN IT FRAMEWORK

In 2010 Eurogroup Consulting, which is a European management consulting group developed the Green IT framework which has become a model for interrelating the different Green IT components (Van de Mark, 2012). The model as shown in figure 2.2 below can be seamlessly applied in the analysis of organizational sustainability issues by offering a high level view of the entire field of Green IT.

![Diagram of Eurogroup Consulting's Sustainable IT Framework](image)

**Figure 2.2: Eurogroup Consulting’s Sustainable IT Framework (Van de Mark, 2012)**

Van de Mark (2012) points out that the framework can be used to support strategic discussions in three different ways:

- **Descriptive** – the framework can be used as a map for the organisation’s Green IT domain, by positioning specific Green IT issues that are being
discussed in the organization, avoiding technical jargon (Graaff et al, 2012).

- Directive – The framework can be used as a map define and prioritize activities due to their contributions to the realisation of set targets (Graaff et al, 2012).
- Prescriptive, normative – The framework can assist organizations to build their own Sustainable IT policy, thus the map can act as a diagnostic instrument to find gaps in the way Green IT is being adopted in an organization, especially by identifying missing interrelationships between the various components of the framework (Graaff et al, 2012).

A closer look at the Framework shows that it defines four Green IT adoption drivers, six pillars or general areas, and four enablers or influencing areas of Green IT.

Another Green IT framework that can be used is the one developed by Connection Research in Australia (Philipson, 2010). The Connection Research framework is shown in figure 2.4 below and this framework focuses more on the pillars and the enablers of Green IT.

![Connection Research Green ICT Framework](image-url)

Figure 2.3: The Connection Research Green ICT Framework (Philipson, 2010)
2.3 GREEN IT ADOPTION DRIVERS

2.3.1 Regulatory driver

The regulatory driver refers to the pursuit of legitimacy within the wider social context (DiMaggio and Powell (1983). Regulatory demands can be mandatory or voluntary, and the need to meet these demands can drive certain actions from members of the society. Green IT or Sustainable IT has become a prominent topic, leading to pressures on the organisation from external stakeholders, and regulators (Burnet, 2010). Governments are increasing regulations on environmental protection, and industry standards are becoming greener, which acts as a driver for the adoption of Green IT as organisations comply (Kavanagh, 2009).

According to Atlas and Florida (1997) facilities engage in environmental innovation including green design, due to pressure from environmental regulation. Henriques and Sadorsky (1996) argue that facilities develop innovative environmental management strategies as a way of responding to more stringent and comprehensive environmental regulation. This view asserts that facilities become more creative and revisit their operations in response to changes in regulation which pressurises them to comply. Likewise Porter and Van der Linde (1995) points out that regulatory pressure tends to overcome organisational inertia to accepting new ideas and changes, thereby stimulating creative thinking, and alerting facilities to possible resource inefficiencies and technological improvements.

Traditionally, environmental compliance has been viewed negatively by businesses. According to Mathur and Mathur (2000), compliance to environmental issues has been traditionally viewed as an additional cost of doing business and managers are sceptical that such initiatives might negatively affect their business’ competitiveness. Olson (2008) agrees with that view when he
states that green initiatives take longer to break-even and are likely to be motivated by softer benefits such as good corporate citizenship than by hard dollar gains. Where organisations hold such a view, regulatory and legislative requirements are very important in driving the adoption of green technologies, by forcing such organisations to comply even if they do not have a strong intention to do so (Olson, 2008).

2.3.2 Customer and investor demands

Chen, Chang, and Wu (2012) argue that clients and investors have become more environmentally conscious thereby exerting pressure of environmentalism to organisations by demanding disclosure of environment-related information, for example on hazardous substances. This leads to reactive green innovation brought about by the environmentalism pressure of investors and clients, thereby playing an important role in the adoption of Green IT (Johnsen, Phillips, Caldwell, and Lewis, 2006). As highlighted by Hoffman (1997), Institutional theory stresses the impact of external institutions, including clients and investors, on the companies’ operations and activities which often have to comply with external pressures for legitimacy. On the other hand, stakeholder theory asserts that firms need to take the interests of their stakeholders into consideration when they formulate their strategies, in order to gain the trust of their stakeholders (Mitchell, Agle, and Wood, 1997). It can be argued that based on the stakeholder theory and the reactive compliance from the institutional theory, the pressure of environmentalism of clients and investors can positively influence the adoption of Green IT (Chen et al., 2012).

2.3.2.1 AU Optronics Corporation case

According to AU Optronics Corporation (cited in Chen et al., 2012) consumers in recent years are seeking a longer lifetime and do not want products that contain substances that might be harmful to the environment and human health, and are
demanding TFT-LCD products that are thin and light with lower energy consumption. The growing global warming concerns from customers, has resulted in AU Optronics actively developing green products. According to Chen et al. (2012), one of the managers at AU Optronics noted in a recent study that the pressure from clients to satisfy the requirements of restrictions on hazardous substances leads the organisation to request the Research and Development department to develop green solutions to improve the functionality and quality of products. AUO also discloses to investors the environment-related information about its services, products, and business activities (Chen, et al. 2012).

2.3.3 Business demands

Besides the previous external demands, highlighted above, another important driver is the business itself, due to the pressure on costs, organisational resources, and other organisational factors (Van der Mark, 2012).

2.3.4 Cost considerations

The modern dynamic business environment puts pressure on the organisation’s costs. According to Kavanagh (2009), the need to reduce costs is a major driver in the adoption of Green IT, as savings can be achieved by improving energy efficiency, reduced hardware costs, reduced IT administration costs, and management costs. Cost reduction is one of the main reasons for facilities to adopt green designs in order to reduce costs of energy bills, waste management and disposal fees, pollution penalties, and reduced costs from increased production efficiencies (Atlas and Florida, 1997). Cost savings far outweigh the expenses for adopting Green IT and when this is combined with the improved resource utilisation and efficiency, the organisation becomes more competitive (Porter and Van de Linde, 1995).
The global business expansion coupled with the need to keep several copies of data to comply with regulations, and to meet business continuity requirements, has resulted in a very rapid rise in stored data for organisations (Molla, 2009). Larger data-centres and more demand for power to cater for more data, increases the cost of powering and cooling the data centres which can surpass both the cost of the IT and electrical equipment (Philipson, 2010). The need to reduce costs can drive the adoption of Green IT technologies like server consolidation, server virtualisation, and cloud computing (Molla, 2009).

### 2.3.5 Organisational resources

Big organisations are in a better position to engage in Green IT adoption and innovation because they are more likely to have the finances and the personnel necessary to cater for the initial costs of such initiatives (Atlas and Florida, 1997). Kemp, Olsthoorn, Oosterhuis, and Vebruggen, (1992) argue that the important factor in an organisation’s ability to adopt Green IT initiatives lies in its ability to absorb the immediate costs, rather than the incremental benefits of future cost savings. The relatively large asset base of large companies places them in a better position to adopt Green IT and the important resources can include spending on research and development, financial availability, size and skills of the labour force, and partner companies (Williams, Medhurst, and Drew, 1993). It therefore follows that organisations with more of such resources are more likely to adopt Green IT.

### 2.3.6 Other organisational factors

Other factors peculiar to an organisation can also be important as a driver for the adoption of Green IT and green designs. This view is supported by Atlas and Florida (1997) when they point out that green design is associated with organisational factors, especially the capabilities and opportunities for the organisation to engage in green design. Their argument is that those facilities or
organisations that are in industries where there is a continuous evaluation and change of product design will have greater opportunities to engage in environmental considerations into product design processes (ibid). The processes that are already on-going make it easier to consider changes and absorb immediate costs of adopting green IT as the processes of re-design are constantly taking place already.

2.3.7 Employee demands

According to the research group InfoTech (2010) one CIO of a North American public company notes that people do not want to move especially for low salaries and believes that teleworking is going to open up some avenues to get employees that are, out of our their reach right now. Employee demands have become another driver for the adoption of green IT initiatives especially telecommuting strategies. Companies wish to satisfy their employees by reducing their travel costs given recent high fuel costs as well as to decrease the negative impact on the environment as employees develop greater awareness of environmental issues (Van der Mark, 2012).

2.3.8 Constrained electricity generation capacity

Constrained power generation capacity in many countries across the world has resulted in power utility companies urging their consumers to save energy and in some cases give rewards to energy efficient customers. In Zimbabwe, the Zimbabwe Electricity Supply Authority (ZESA) is substituting incandescent bulbs with energy efficient compact fluorescent lamp (CFL) bulbs for free in households as part of efforts to reduce Zimbabwe’s electricity consumption (Zimbabwe Electricity Supply Authority [ZESA], 2013). According to ZESA spokesman Mr Fullard Gwasira (as cited by ZESA, 2013), a 10 percent power saving of the country’s 2 200 megawatts will be achieved through the energy saver bulbs being distributed countrywide. The 200 megawatts saving is enough to cater for half of
Harare or the whole of Bulawayo or at least four small towns such as Gweru, Kwekwe, Masvingo and Mutare (ibid).

Governments are also promoting the use of alternative forms of energy and the conservative use of the available energy. The time to diversify energy sources is now and there is need for long term environmentally friendly alternative sources of energy with great consideration towards solar, wind and water power (Groen, 2008). According to Groen (2008), overdependence on fossil fuel is causing a scare to the environment, and at the rate at which exploration of natural resources is taking place, humanity is threatened.

2.4 PILLARS OF GREEN IT

2.4.1 ICT Processes and Governance (organization, governance)

Molla (2009) defines green IT governance as an operating model that describes the administration of Green IT initiatives. According to Weil and Woodham (2002), Green IT governance specifies the accountability framework and decision rights to encourage desirable environmental behaviour in the use, sourcing, and disposal of ICT hardware. For this to be achievable certain responsibilities, roles, accountability, and control for Green IT initiatives of the organisation have to be clearly defined (Molla, 2009).

According to Schmidt and Kolbe (2011) there is no general IT governance design fitting all organizations because IT governance is different in each organisation depending on different factors. Different studies on IT governance state different elements that contribute to the ideal shape of both IT and Green IT governance for the organisation. Some of the factors are organization structure, firm size, competitive strategy, diversification, performance strategy, as well as IT infusion and IT diffusion (Schmidt and Kolbe 2011).
There are significant differences in how organisations can practice Green IT governance. The responsibility to govern Green IT in some organisations is more centralized to IT managers; while some organisations follow a more decentralized approach by taking Green IT as part of enterprise wide sustainability initiatives (Molla, 2009).

Schmidt, and Kolbe (2011) developed the Green IT governance archetypes which are shown in figure 2.5 above to represent a continuum of coordination arrangements like centralized (marked 1), federal (marked 2) and decentralized (marked 3). They argue that the archetypes provide a first approach to structure in Green IT governance although in practice, Green IT governance is likely to occur in a specific form along the continuum, varying slightly from the proposed archetypes (ibid).
2.4.1.1 Centralized

The Chief Information Officer has primary authority and Green IT is centralized in the IT department such that Green IT initiatives are treated like other IT projects. According to Schmidt, and Kolbe (2011), such organisations are mainly focused on lowering energy consumption in the data centre and the office environment in order to reduce costs, and Green IT is of low importance for the company.

2.4.1.2 Federal

This is where Green IT is coordinated by a designated Green IT manager who typically would be a member of the IT department but keeps track of all Green IT initiatives, proposes new ideas, and reports to the CIO (Schmidt, and Kolbe 2011). Green IT is addressed in the entire IT department and the Green IT manager can be the contact partner for the sustainability or environmental manager (ibid). According to Schmidt and Kolbe (2011) in such an arrangement, Green IT is of medium importance for the company.

2.4.1.3 Decentralized

In the decentralised setup, there is a designated Green IT committee which is represented by members of different business units of the company following a matrix approach (Schmidt and Kolbe 2011). The Green IT committee should also consist of the Green IT manager, and the sustainability manager or environmental manager, who ideally should report to the CEO (Chief Executive Officer) (ibid). According to Schmidt and Kolbe (2011) Green IT activities form an integral part of the company’s sustainability strategy and Green IT is of high importance to the company.
2.4.2 ICT Equipment lifecycle and procurement

According to Van de Mark (2012), the procurement and lifecycle policy addresses the green buying and replacing processes for software and all equipment for the data centre as well as the office environment. A marked difference to institutional performance can be derived from buying ICT equipment that utilises energyefficiently and has a small footprint on the environment over its lifetime especially for devices that are regularly replenished, such as PCs and servers (ibid). The ICT procurement and lifecycle policy normally looks at quality, performance, price and availability, but should also address environmental considerations from planning to the final disposal (Pritchard, 2007).

Figure 2.5: Green Computer Lifecycle (Murugesan, 2008)

As shown in figure 2.5 above, Murugesan (2008) points out that for environmental impacts to be comprehensively and effectively addressed, a holistic approach must be adopted along the following four complementary paths:
**Green use**—This is to reduce the energy that is consumed by information systems and to use them in a way that is friendly to the environment.

**Green disposal**—Old computers and other electronic equipment can be refurbished, reused, or recycled in order to ensure proper disposal.

**Green designs**—Computer components, servers, and cooling equipment can be designed to be energy efficient and environmentally sound.

**Green manufacturing**—Minimal or no impact on the environment and associated subsystems can be achieved by green manufacturing of electronic components, and computers.

The disposal of unwanted computers and monitors in rubbish bins results in landfills which cause serious environmental problems (Pritchard 2007). According to Murugesan (2008), old computer equipment should be refurbished and reused or recycled in environmentally sound ways some of which are highlighted below.

### 2.4.2.1 Reuse

An old computer should be used if it meets current requirements and there is no need to buy new computers for each and every project or once every two or three years (Pritchard 2007). The old computer equipment should be given or donated to others who needs it, or to those who may want to use functional components from a retired product (Murugesan, 2008). The total environmental footprint caused by computer manufacturing and disposal can be reduced by using computer hardware equipment for a longer period of time.
2.4.2.2 Refurbish

Old computers and servers can be refurbished and upgraded by reconditioning and replacing their parts to meet new requirements rather than buying a new computer. According to Murugesan (2008), the market for refurbished IT equipment is growing and more enterprises are open to purchasing refurbished goods. Refurbished computers can also be donated to charities or schools so that they can be used by those in need.

2.4.2.3 Recycle

The computer equipment that can no longer be reused or refurbished can be a valuable source for secondary raw materials. According to Groen (2008) old computer equipment should be recycled by reprocessing component materials or breaking it down into constituent materials for reuse. The United Nations Environment Program (as cited in Pritchard, 2007) points out that e-waste is increasing each day, and they estimate that 20 to 50 million tons of e-waste are generated worldwide each year. Toxic materials such as mercury, lead, chromium, and cadmium are found in computer components and disposing computers in landfills leads to leaching of harmful chemicals into waterways and the environment (Murugesan 2008). Improper e-waste disposal can harm the environment and people by burning computer equipment which releases toxic gases into the air.

2.4.3 Office environment (End user computing, communication)

According to Van de Mark (2012), the office environment looks at the end user environment as a whole, including devices such as monitors, scanners, desktops, printers, laptops, faxes, and telecommunication equipment.
2.4.3.1 Reducing energy consumption by PCs

In many organisations, PC use has become widespread and it is becoming increasingly more difficult for the IT staff to manage the PC power consumption of the enterprise. Network-level control over PCs and monitors can be used by acquiring software such as Surveyor which can be used to switch PCs into a lower-power consumption mode, such as standby, hibernation, and shutdown, or sleep mode for monitors when they are idle for a given amount of time (Murugesan 2008).

2.4.3.2 Switching off the system when idle

Turning off computer systems and equipment when not in use, is the most basic energy conservation strategy in any organisation. According to T-Systems (2012), significant power savings can be realized by encouraging office workers to change their habits by switching off computer equipment when not in use, the use of hibernation mode, and power management software for hardware. A screensaver that displays moving images continually interacts with the CPU therefore it uses more power than a blank screensaver (Murugesan 2008). Leaving a copier switched on overnight uses as much power as it takes to make 1,500 copies, therefore, policies and procedures should be developed and published to encourage end-users to switch off their systems when not in use (T-Systems 2012).

2.4.3.3 Using thin-client computers

Thin-client architectures and state-of-the-art LCD screens offer opportunities for savings. A study by Fraunhofer (2008) found out that CO₂ emissions and the cost of purchase and operation can be significantly reduced by using thin clients as they are much more energy-efficient than conventional desktop PCs. The study
concluded that replacing a desktop PC with a thin client reduces the CO² emissions of the desktop system by over 54% (Fraunhofer, 2008). Murugesan (2008) agrees with this notion by pointing out that thin-client computers draw about only a fifth of the power of a desktop PC.

2.4.3.4 Reducing unnecessary printing

The complex landscape of a large number of different devices for printing, copying, faxing, and scanning often leads to a lack of transparency, and in most cases there are no accurate figures available on the total cost of operation (T-Systems (2012). According to T-Systems (2012), carefully analysing the current infrastructure and actual user requirements can improve the ratio of users to devices and enable changes to the type, number and position of devices. This can help to ensure that there is better use of available capacity, and there is a reduction of stand-by and idle times.

A document management system can also be used to reduce printing. A case study conducted by Xerox (2010) at Hobart and William Smith Colleges shows that a document management system reduces printing costs, reduces power consumption, speeds up service response through enhanced workflow management, and expands usage of digital documents.

2.4.4 Data centre and infrastructure (building design and use, hardware)

The datacentre and infrastructure policy essentially covers the hardware or infrastructure in the datacentre and the datacentre building itself (Murugesan 2008). Data centre efficiency can be improved by using equipment which is energy-efficient, reducing cooling requirements by improving airflow management, investing in energy management software, and adopting datacentre designs that are environmentally friendly, are some of the measures that can be employed to curb energy consumption in datacentres (ibid).
2.4.4.1 Energy conservation

To keep datacentre equipment and the software stable, it is necessary to have cooling systems that counter the tremendous amounts of heat that is generated by computers. According to Carinhas (2009) 30% to 50% of the energy used in the datacentre is used for cooling the hardware which means that for each 100 kilowatt-hours used to power a system, 50 kilowatt-hours could be required to cool it. In the face of increasing energy costs and high carbon emissions during electricity generation, it is necessary to adopt technologies that reduce power consumption in the datacentre. Such technologies as nano fluid-cooling systems, liquid cooling, in-server, in-rack, and in-row cooling can be adopted together with other innovative ways like server consolidation, using hydrogen fuel cells as alternative green power sources, and applying virtualization technologies can all reduce the total power consumption of the datacentre (Murugesan 2008).

2.4.4.2 Eco-friendly design

Datacentre designs can also be made eco-friendly by using eco-friendly paint, a carpet that contains a low volatileorganic compound (VOC), a synthetic white rubber roof, countertops made of recycled products, and energy-efficient mechanical and electrical systems at optimal efficiency (Murugesan 2008). According to Carinhas (2009) green energy like solar or wind energy can be used to power the datacentre and natural light can be used in an eco-friendly datacentre. According to the EPA (2013) in the United States, some banks like TD Bank, Deutsche Bank, World Bank Group, BMO Harris Bank, and Eastern Bank are using 100% green power for their United States organisation wide power requirements. The total green power used by all the top green power organisations in the United States amounts to more than 7.2 billion kilowatt-hours of green power annually (EPA, 2013). The EPA (2013) also estimates that this is approximately equivalent to the carbon dioxide emissions from the generation of electricity used by more than 760,000 average households in America. This has a significantly positive impact on reducing environmental pollution as well as
reducing energy costs in the long run. Mutugesan (2008) also points out that an organisation can derive competitive advantage from eco-friendly designs through tax incentives and customers who want to work with eco-friendly firms.

### 2.4.4.3 Virtualisation

Virtualisation is a technology that enables multiple systems to simultaneously run on the same physical hardware (Kavanagh 2009). According to Murphy (2012), virtual operating systems (or virtual machines) are the most prevalent form of virtualisation and this has become a core component of the modern IT infrastructure. Standard operating systems, such as Microsoft Windows Server 2008 or Red Hat Enterprise Linux 6.3 can be fully implemented on Virtual machines, running simultaneously on the same physical hardware, using Virtual Machine Managers (VMMs) to manage each virtual machine individually (Murphy 2012).

The use of virtualisation reduces the datacentre’s energy demands, reduces datacentre floor space, makes better use of computing power, and enables efficient usage of hardware components (Murugesan 2008). In a virtualised environment servers that are largely idle can be shut down, and access to processing power, storage resources, software and bandwidth demand over networks can be managed, thereby lowering hardware energy consumption by up to 80% (T-Systems 2012).

### 2.4.5 Metrics and reporting (monitoring, KPI’s)

According to IBM (as cited in Wagner, 2012) Key Performance indicators (KPIs) are the detailed specifications used to track business objectives. ICT systems can be used to support in the design and development of a sustainability dashboard for the organisation, where KPI’s can be used as the basis for the Plan-do-check-act cycle (Van der Mark 2012). It is difficult if not impossible to manage what you
cannot measure, therefore a Green IT strategy that is effective should be clear on identifying reduction measures in areas such as conserving water, reducing carbon emissions, reducing energy consumption, and improving recycling efforts (Philipson, 2009). Connection Research (as cited in Philipson, 2009) identifies four phases which they term the “Four Ms” of the metrics process given below:

**Measure**: This is where metrics are applied to Green IT processes which involve determining the units of measurement. The most common challenge is that some areas of Green IT cannot be measured and no units of measurement exist in some aspects.

**Monitor**: This involves continuous measurement which allows determining of standards and setting of targets.

**Manage**: This seeks to take the results of the measurement and monitoring process in order to take corrective action where negative deviations are observed, and to improve processes.

**Mitigate**: This means a change to the process in such a way that a permanent improvement is made in the process.

### 2.4.6 IT as low footprint enabler

According to Van der Mark (2012), information technologies are enablers for the design and deployment of sustainable solutions that are required in order to create a low carbon society whose ecological footprint is sustainable. Electricity generation, the combustion of fossil fuels such as gasoline and diesel to transport people and goods, and many industrial processed emit carbon gasses into the atmosphere. Efficient use of ICT systems as well as the contribution of ICT towards providing green solutions enables a reduction in the environmental footprint (T-Systems 2012).

### 2.4.6.1 Teleworking
Considerable burdens are being exerted on the environment every day by people just getting to and from the office and travelling to business meetings as commuters spend hours every day on the road, releasing exhaust gases into the atmosphere (T-Systems 2012). According to Kavanagh (2009) mobile technologies have the capacity to make work an activity and not a place. ICT systems can enable employees on the road, at home, in the warehouse, and in factories to connect to the organisation’s network and applications as effectively as employees in the office (ibid). Videoconferencing systems are also available for business meetings to be conducted independent of the geographical location of the participants, through realistic face-to-face communication on the screen, which can be as effective as real meetings (T-Systems, 2012). Teleworking or telecommuting technologies reduces the need for employees to commute and still get the job done, thus reducing the carbon emissions into the environment. Teleworking also benefits the organisation by reducing time, costs, office space, and by increasing productivity through increased home-working (Kolman, 2008).

Despite the benefits of teleworking, there are challenges that can come with the initial capital investment required to enable and administer virtual teams. Security issues also are a concern for organisations as they lose control of who may actually be accessing the system at home if the employee is not stringent enough on the connection passwords and client applications.

2.5 ENABLERS

As shown in figure 2.3, there are four aspects that are in the background of enabling all possible actions across the pillars and external influences discussed above (Van der Mark 2012). These are:

**Technology**—Technology is an enabler for the application of Green IT initiatives. Science and technology suppliers and organisations in general need to fully exploit existing technologies and keep inventing new technologies that enable
Green IT initiatives in order to minimise the environmental footprint (Van der Mark 2012).

**Practice**—Green IT best practices are used to guide people in their Green IT initiatives and these should be shared in order to make sustainability a design parameter for IT Service Management processes. Green IT best practice enables organisations to make a positive impact in fighting environmental degradation (Van der Mark 2012).

**Policy**—Policies, laws, and regulations are an enabler of green initiatives by offering incentives for sustainable actions and compliance requirements to enhance Green IT adoption and practice (Van der Mark 2012).

**Attitude**—The attitude of employees is the key enabler of Green IT culture within the organization. Systems will not change if the people do not change (Van der Mark 2012).

### 2.6 DOES IT PAY TO BE GREEN DEBATE

In Reinhardt’s view (as cited in Orsato, 2006), Green IT is an economic and sustainable approach that provides competitive advantages to a business, and like other aspects of corporate strategy, its implementation needs to be based on the economic fundamentals of the business (Orsato 2006).
According to T-Systems (2012), the organisation will derive competitive advantages as it satisfies the different stakeholders through Green IT initiatives as shown in figure 2.6 above and the benefits are:

**Society or environment** – The organisation will benefit the environment by complying with legal requirements, lowering carbon emissions, and reducing the resource consumption from the environment.

**Companies** – The organisation can enjoy reduced energy costs, reduced datacentre operation costs, and less hardware will be required. Green branding opportunities can also benefit the organisation.

**Employees** – Green IT initiatives offers opportunities for increased employee satisfaction, greater employee loyalty, as well as easier recruitment.

**Capital markets** – The organisation derive opportunities to satisfy environmentally sensitive investors and as a result, can gain improved ratings, a higher share price, and greater overall company value.

**Customers** – Green IT offers the organisation an opportunity to appeal to new customer groups, enhance customer satisfaction, and derive customer loyalty.
Public — Green IT initiatives provide the organisation an improved public image, reduced environment taxes and fees, as well as providing a greater brand value.

Several authors seem to agree that there is a positive relationship between Green IT and company performance. Russo and Fouts (1997) found out in their study that there is a significant correlation between the CEP (Council of Economic Priorities) index of environmental performance and organisational financial returns. According to Dowell (2000) all over the world, organisations that employ stringent environmental standards, have higher market valuation compared to those organisations that ignore environmental standards. White (1996) agrees with this view by pointing out that there is a significantly higher risk-adjusted return for a portfolio of green firms using the CEP ratings of environmental performance. Murugesan (2008) as shown in figure 2.7 below, points out the benefits of Green IT adoption following his study as, 75% reduction in power consumption, 73% reduction in costs, 56% reduction in carbon emissions and environmental impact, 55% improvement in system performance and use, and 47% reduction in space.

![Figure 2.7: Benefits of using Green IT (Murugesan 2008)](image-url)
According to Hart and Ahuja (1996) there is a general view by many authors, that organisations should make Green IT investments in order to improve their competitiveness and financial performance.

Orsato (2006) however points out that in as much as it makes business sense to do investments in Green IT technologies for profit generation; this might make business sense in certain circumstances only and not in all. According to King and Lenox (2001) the interpretation of the relationship between environmental and financial performance must be carried out with caution. The results of their studies support the view that going green pays, but they highlight the importance of understanding the underlying firm characteristics; for example it may pay to reduce pollution by certain methods but not others, or firms with certain attributes can profitably reduce their pollution (ibid).

Reinhardt (as cited in Orsato, 2006), sums it all up by highlighting that debate should no longer be on whether it pays to go green, but rather on when is it feasible to implement green initiatives. Orsato, (2006) points out that just like other aspects of corporate strategy, green policies and initiatives must be based on economic fundamentals of the business i.e. the organisational capabilities, the structure of the industry in which it operates, as well as its position within that structure. Despite the arguments, there is bound to be different experiences on green design, as organisations do their Green IT implementation differently, in different environments, and in organisations with different characteristics. Having said that, most authors agree that, it pays to implement Green IT solutions.

2.7 GENERIC TYPES OF COMPETITIVE ENVIRONMENTAL STRATEGIES

As discussed above, Green IT is generally viewed as a source of competitive advantage, it is important to look at the competitive environmental strategies that can be used by an organisation. A framework for generic competitive
environmental strategies was proposed by Orsato (2006) as shown in figure 2.8 below. The framework can be used by an organisation to choose the best green strategy to use which best suits the organisation’s specific conditions in order to improve competitiveness. The types of markets the company serves, the structure of the industry in which a firm operates, its position within that industry, and its capabilities will suggest the appropriate competitive focus (organizational processes or products/services) and the potential source of competitive advantage (cost or differentiation) for a firm (Orsato 2006).

2.7.1 Strategy 1: Eco-Efficiency

Porter and Claas van der Linde (1995) assert that companies can improve competitiveness by improving resource productivity through better utilisation of by-products from waste, material savings, increase in process yields, and, eliminating inefficient use of resources. For this strategy, the company should find concealed opportunities to profit from Green IT investments and reengineer business processes to turn identified green investments into sources of competitive advantage (ibid). This strategy can be used in a high cost structure industry and in industries where there is environmental pollution, where firms need to reduce their environmental impact and costs (Orsato, 2006). According to Orsato (2006) eco-efficiency strategies have greater potential to generate competitive advantages in firms that supply industrial markets, face relatively high costs, and generate wastes or by-products.
2.7.2 Strategy 2: Beyond Compliance Leadership

In addition to increasing efficiency some organisations also want the general public and customers to acknowledge their efforts by spending money in unprofitable environmental improvements, subscribe to business codes of environmental management, and the certification of their Environmental Management Systems (Orsato 2006). This is largely driven by the need to enhance corporate image and building a positive public opinion about the organisation’s practices. This is a strategy that can be used for companies that supply products to other corporations (industrial markets), for example, when automakers Ford, General Motors, and Toyota announced in 1999 that they would require their suppliers to certify their EMS according to ISO 14001, the first ones to obtain certification certainly had an advantage (ibid). However, the first-mover advantage was for a relatively short period because by 2002, EMS certification became a mere license to operate in the industry as all other suppliers followed suit (Orsoto 2006). The strategy is also useful when environmental concerns become important to consumers, when a controversial...
event mobilizes negative public opinion, or when there is a charismatic leader in the industry (ibid).

2.7.3 Strategy 3: Eco-Branding

Eco-branding is when an organisation creates a green brand identity which is related to positive environmental impact of the brand such that the brand is perceived as being environmentally sound (Hartmann, Ibáñez, and Sainz, 2005). Marketing differentiation based on the environmental attributes of products can be used by organisations in ecology-oriented niche markets (Orsato 2006). Orsato further states that companies intending to derive competitive advantage from eco-branding strategies need to observe three basic pre-requisites: the differentiation should be difficult to be imitated by competitors; consumers must be willing to pay for the costs of ecological differentiation; and reliable information about product’s environmental performance must be available to the consumer.

2.7.4 Strategy 4: Environmental Cost Leadership

This is a strategy where an organisation achieves cost leadership by using green initiatives in organisational processes (Orsato 2006). In industries where there is little scope for differentiation, and where competition is heavily based on price, environmental cost leadership can be used. By implementing the strategy, the organisation will achieve low cost advantages which can increase profit margins.

The generic competitive environmental strategies framework by Orsato (2006) can be a good tool for company management to make decisions on environmental investment priorities. The overall strategy of the company also needs to be considered, and when combined with the environmental strategy framework, the company is in a better position to prioritise and optimise the overall return on environmental investments.
2.8 CONCLUSION

This chapter carried out a literature review of the study, where the meaning of Green IT was explored in detail. The Eurogroup Consulting's Sustainable IT Framework was introduced, and various Green IT technologies were discussed together with existing Green IT governance archetypes and generic strategies.
CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter presents an overview of the philosophy and strategy that was used to carry out the research. The reasons for choosing certain methods and approaches are also outlined which assisted the researcher to collect data in order to achieve the objectives and address the research problem which was outlined in chapter one.

3.1 RESEARCH DESIGN

According to Cooper and Schindler (2003), a research design constitutes the blueprint for the allocation, measurement and analysis of data. Research design can be defined as a set of guidelines and instructions to be followed in addressing the research problem (Mauton, 1996). In order to obtain information from data, a certain order or systematic approach has to be designed and followed in the collection and analysis of the data. Research design can therefore be seen as the procedures involved in the last three stages of the research process, which are data collection, data analysis, and report writing (Creswell, 2005). The different components of the study are integrated in a coherent and logical way in order to choose the overall strategy that effectively addresses the research problem.
3.2 RESEARCH PHILOSOPHY

Research philosophies can be classified into two main broad categories namely the positivism (quantitative) approach and the phenomenological (qualitative) approach (Hakim, 1987). These two philosophies determine the direction of the research, the data collection methods, the forms of data analysis, and the methods of data presentation.

3.2.1 Positivism approach

According to Saunders, Lewis, and Thornhill (2003), quantitative research is all research where numerical data or data which can be usefully quantified is used to help answer the research questions based on meanings derived from the numbers. Statistics are used to conduct an inquiry in an objective and unbiased manner as the method emphasizes on the measurement and analysis of causal relationships between variables (Salkind, 2003). Therefore positivism approach generally seeks to draw conclusions from statistical calculations from collected data or after converting collected data into numerical form. Positivists’ view is that there are systems and patterns in the world that can be measured and verified, which constitute facts, thus the task of the researcher is to identify recurring patterns of association between selected facts (Fisher 2004).

Strengths of the positivism approach

The approach encourages objectivity through measurement and deduction. When accurately and correctly used, positivism approach can provide precision and control. Hypotheses can also be tested and sample data can be inferred to a large population (Creswell, 2005).
Limitations of the positivism approach

The positivism approach at times cannot reliably measure social phenomena as the results provide less detail of human behaviour, attitudes, and motivation. Salkind (2003) notes that, although statistical methods are used to produce impressive numerical results, the numbers often leave no meaning to the researchers.

3.2.2 Phenomenological approach

The phenomenological approach focuses on the meanings that research subjects attach to social phenomena by looking at how individuals shape and give meaning to the social world (Cooper and Schindler, 2001). Dillon, Malden, and Firtle (1993) define qualitative research as an approach that involves respondents who provide descriptive information which includes their feelings and thoughts. Social settings are subjective; therefore the emphasis of this approach is on processes and meanings that are not necessarily measurable using amounts, quantities, etc. The phenomenological approach tries to understand and explore the feelings, opinions, attitudes, and behaviour of individuals or groups of individuals through such methods like open-ended interviewing (Saunders et al, 2003).

Strengths of Phenomenological approach

According to Creswell (2005), the phenomenological approach enables research where the problem requires:

- Learning of views from individuals
- Building theories based on participant perspectives
Assessing a process over time
Obtaining detailed information about a few people

For discovering underlying perceptions, values, feelings, motivations, and attitudes, the phenomenological approach is the best method.

Limitations of the phenomenological approach

Projecting the findings statistically to the population under study is unreliable because in qualitative research you normally have a small sample size. According to Salkind (2003), the subjectivity of the researcher, and the poor reliability of findings are the major drawbacks of the phenomenological approach.

3.2.3 Triangulation

According to Mathison (1988), Good research practice obligates the researcher to triangulate, that is, to use multiple methods, data sources, and researchers to enhance the validity of research findings. According to Miles and Huberman (as cited in Mathison, 1988), triangulation is typically perceived to be a strategy for improving the validity of research or evaluation of findings, thus triangulation is supposed to support a finding by showing that independent measures of it agree with it or, at least, do not contradict it.

In this research, the researcher has used triangulation by collecting both qualitative and quantitative data in order to increase the validity and reliability of the results. In this study where an evaluation of the adoption levels of Green IT practices and the implications on competitiveness, there is need to have quantitative data and explore why certain outcomes have been obtained. According to Creswell (2005), triangulation helps to counter the weaknesses of adopting one approach. The other reason for using triangulation in this study is as pointed out by Denzin (1978), that triangulation also aids in reducing or
eliminating bias and enables the dismissal for plausible rival explanations such that a truthful proposition about some social phenomenon can be made.

3.3 RESEARCH STRATEGY

Research strategy is a general plan of how the researcher will go about answering the research questions and will contain sources from which the researcher intends to collect data and will consider the constraints which the researcher will inevitably encounter (Saunders et al., 2003). They further state that research strategies that can be employed are: experimentation, action research, surveys, case study, ethnography, cross sectional, longitudinal studies, exploratory, and descriptive studies (ibid).

3.3.1 Case Study

Case study is a research methodology that focuses on understanding the dynamics present in a management situation (Johansson, 2003). Robson (1993) defines case study as the development of detailed intensive knowledge about a single case or a number of related cases, or a small number of related cases. As pointed out by Johansson (2003) one major feature of case study methodology is that different methods are combined with the purpose of illuminating a case from different angles, that is, to triangulate by combining methodologies. Case studies encourage the use of different techniques to achieve study objectives such as personal observations, interviews, questionnaires, focus group discussions and other techniques (Sekaran, 2003).

Given the nature of the research problem as outlined in chapter one, the case study approach was chosen as the most appropriate for this study. The study focuses on NMB Bank; therefore the case study approach enables in-depth analysis of a phenomenon inside its real life context rather than broad conceptual overviews (Sounders, 2003). The researcher’s motive for conducting the case
study was to gain a rich and detailed understanding in terms of the adoption levels of Green IT practices within NMB Bank Limited and the implications on competitiveness. The data collection methods employed were questionnaires and interviews to follow up and clarify answers provided in the questionnaires. However, case studies are time consuming and tend to capture depth rather than breadth. In order to counter this challenge, a large sample was used and less time consuming methods of administering questionnaires, were selected.

3.4 POPULATION AND SAMPLE

Wegner (2005) defines a population as the collection of all the observations of a random variable under study and about which one is trying to draw conclusions in practice. A population can also be defined as the entire group of people, events or things of interest that the researcher wishes to investigate (Sekaran, 2003). In this study, the target population is the entire NMB Bank staff members of 350 employees (NMB Bank, 2013). The research topic affects all staff members within NMB Bank regardless of their positions, therefore population elements were made up of Managers, and Non managerial staff.

3.4.1 Sampling Techniques

The purpose of the sample is to approximate the measurement of the whole population well enough, within acceptable limits. According Wegner (2005), in most cases, it is not possible to measure every member of the population for reasons mainly of cost, time, and possibly unit destruction; thus, a subset of the population on which observations are made or measurements taken is referred to as the sample. The idea behind sampling is that, by selecting a representation of the population, the researcher can infer or draw conclusions about the entire population (Cooper and Schindler, 2003). In this study, it was not possible to study all population elements for the reasons below:
- **Feasibility** – NMB Bank has a branch network that includes branches in Harare, Bulawayo, Gweru, and Mutare. It was not possible to travel or to use technology to interview everyone and to send and receive questionnaires to everyone in the bank. Some staff members were also on leave or not at work for different reasons, during the time of the study.

- **Cost** – It was expensive to travel to all branches for interviews and to administer questionnaires to the entire NMB Bank population.

- **Time** – Given the limited time for undertaking the study, there was not enough time to adequately study every element of the population.

In this study, a sample size of 100 staff members was chosen which represents 32.6% of the study population of 307 staff members. The sample is rather high in order to obtain more population representative results, based on the view that the higher the sample, the higher the chances of the results being representative of the population. 40 members of the sample are managerial staff and 60 are non-managerial staff. This was based on the fact that there are more non-managerial staff members in the bank's population. However there was also need to capture as many responses as possible from managerial staff also as they are at the forefront of strategy implementation and are likely to have better insight than non-managerial staff in terms of what the bank is doing about Green IT. Stratified sampling was used to segment staff members into business units and simple random sampling was used to select elements in each segment maintaining the sample ratio of managerial as to non-managerial staff. Stratified sampling according to De Vaus (1990) is sampling which involves dividing the population into a number of groups or strata where members of a group share particular characteristics and then random sampling is used within the strata. The reasons for choosing stratified sampling in this study were:

- The population is segmented into classes of the same characteristics like managers and non-managerial staff, as well as the different business units like Information Technology, Retail Harare, Bulawayo Branch, Gweru Branch, Mutare Branch, Risk and Compliance, Treasury, Operations, Internal Audit, Human Resources, Marketing, Finance and Administration, Corporate Banking, Security, Cards and E-Banking, and International
Banking. This ensures representation of all strata or groups of the population.

- There is more statistical precision than random sampling when the groups are homogenous. The variability within groups are generally lower than the variability for the population, therefore, stratified sampling can capitalize on this fact (De Vaus, 1990).

Interviews were also carried out to further probe and understand the reasons behind the questionnaire responses.

3.5 DATA COLLECTION METHODS

There is no best single way of collecting data and this requires an understanding of the nature of the data to be collected in order to choose the best method for the study. Questionnaires, screening records and reports, direct observation of behavior, face-to-face interviews, internet based, and telephone interviews are some of the data collection techniques. It is important to consider technical adequacy (reliability, validity, freedom from bias), practicality (costs and duration of study), and ethics are followed in the data collection method chosen (Summerhill and Taylor, 1992). In this study, questionnaires were used and they were administered through internal NMB Bank electronic mail after pre-testing with 10 respondents. Face-to-face interviews were also conducted.

3.5.1 Primary Data

Data which is captured at the point where it is generated and is collected for the first time with a specific purpose in mind is what is known as primary data (Wegner, 2005). This can be through the use of the questionnaire, in-depth interviews, observations, experimentation, as well as participatory approach. The advantages of primary data are that the data is directly applicable, or relevant to the problem under investigation. It also offers greater control to the researcher
over data accuracy. For these reasons, primary data was collected in this research.

However primary data collection has some disadvantages which can become a challenge in carrying out research. Such problems can come in the form of time and cost. Primary data takes more time to collect and is generally more expensive than secondary data (De Vaus, 1990). To mitigate these challenges, questionnaires were administered through internal electronic mail to eliminate the costs and time required for travelling to branches and different departments, making telephone calls and sending questionnaires through postal mail.

3.5.2 Secondary Data

Zikmund (2003) defines secondary data as the data gathered and recorded by someone else prior to, and for purpose other than the current needs of the researcher. According to Wegner (2005) secondary data is the data collected and processed by others for a purpose other than the problem at hand, and this data is already in existence either within or outside the organisation. The advantages of secondary data are that:

- Obtaining data is less expensive than acquiring primary data because of the time and money that is saved, for example to obtain population estimates of a town in between the ten year census period (Zikmund, 2003).
- Data can be obtained quickly because it is already available (Wegner, 2005).

The limitations of secondary data are that:

- The data was not designed specifically for the problem at hand and may not be relevant to the current problem mainly due to outdated information, variance in definition of terms, different units of measurement, and the lack of information to verify the data's accuracy (Zikmund, 2003).
The data may not be subject to further manipulation (Wegner, 2005)

In this research, secondary data was also used in cases where collecting primary data was not possible. For instance, it was not possible to collect data on NMB Bank’s market share in Zimbabwe, as this would require a different research from this case study. As a result, both primary and secondary data was used in order for the two methods to complement each other. This is supported by the argument that combining different techniques results in a more thorough understanding of the problem being investigated (White, 2000).

3.6 RESEARCH INSTRUMENTS

3.6.1 Questionnaires

According to Salkind (2003), a questionnaire is a set of structured and focused questions which respondents can complete without the direct assistance of the researcher which is designed to solicit views of individuals on certain phenomena or variables. In this research, questionnaires were used to collect data, and these were administered through internal electronic mail mainly for the reasons below:

- Geographic flexibility – Electronic mail enables the researcher to reach a geographically dispersed sample simultaneously (Zikmund, 2003). In this research, there was need to reach out to respondents in all the NMB Bank branches in Harare, Bulawayo, Mutare and Gweru.
- Costs – Costs are low when using electronic mail to administer questionnaires that other methods.
- Time – Electronic mail is instantaneous therefore allowing for fast transmission of questionnaires and follow up with respondents.
- Convenience – Respondents are able to attend to the questionnaires at the time that is convenient to them. According to Zikmund (2003), there is a better chance that the respondents will take time to think about their replies.
• Interviewer bias is eliminated (Wegner, 2005)

There were also limitations of electronic mail questionnaires. The main limitations are:

• Low response rate – Response rates are low and according to Wegner (2005), these can be as low as between 5% to 15%. This was countered in this research by follow up email reminders.

• Anonymity - In electronic mail, electronic responses eliminate the anonymity of the respondent which enhances the chances of more honest answers. In this research, the issue of anonymity was considered and respondents were given an option to submit hard copies through internal NMB mail, such that it would not be possible to know the source of the responses.

• Body language – The body language and attitude of the respondent cannot be captured.

• Probing – There is no possibility of probing and check backs to check on the validity of responses (Wegner, 2005)

3.6.2 Interviews

An interview is a data collection method in which an interviewer asks questions, to a respondent and gets answers face-to-face or by telephone (Zikmund, 2003). Face-to-face interviews were used in this research in an attempt to get a deeper understanding of Green IT issues and trends within NMB Bank. The strengths of face-to-face interviews as outlined by Wegner (2003) are:

• High response rate
• Questioning allows probing
• Data collection is immediate
• Non-verbal responses like body language and attitude can be observed and captured.
• Responses are spontaneous
The limitations of the interview method are:

- According to Wegner (2003), face to face interviews are expensive due to the need to travel and to send trained interviewers, hence a very few interviews for specialised deeper responses were conducted in this research.
- Interviewer bias can be introduced in the data gathering because of the interviewer influence (Zikmund, 2003).

Two managers were interviewed in the IT department. This was done in order to collect information on the datacentre practices, and IT managers were selected because they steer the Green IT implementation especially in the datacentre (NMB Bank, 2013). The researcher would have wanted to conduct more interviews with other staff members particularly from Human Resources, and Marketing. This was not possible due to time constraints.

3.7 DATA ANALYSIS TECHNIQUES

After the data has been collected, interrelated procedures are performed to summarise and rearrange the data, with the goal of providing useful information (Zikmund, 2003). In this research, the SPSS (Statistical Package for Social Sciences) was used.

3.8 RESEARCH LIMITATIONS

Resource constraints – The researcher could not travel to most of the branches to meet with respondents because of resource constraints. More extensive interviews required trained interviewers and the resources were not available for such an exercise.
Geographical dispersion – NMB Bank has several branches in Harare, Bulawayo, Mutare, and Gweru. Given resource and time constraints, it was not possible to do interviews with more staff members.

3.9 CHAPTER SUMMARY

The chapter reviewed the research methodology which adopted both the phenomenological and the positivism approaches using triangulation to dilute the weaknesses of adopting one approach. The research design chosen was the case study approach with stratified sampling being employed to represent the NMB staff segments of the population. Both primary and secondary data was used in the research and the primary data was collected through electronic mail questionnaires and interviews. The data collected will be analysed in the next chapter.
CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 INTRODUCTION

The chapter presents the results of the research and their discussion within the context of the objectives focussing on specific themes. The discussion of the results draws parallels from literature that was reviewed in chapter two. As pointed out by Saunders et al. (2003), this chapter presents an opportunity for the researcher to present facts that the research has discovered. The data gathered during the research, both primary and secondary data is analysed and evaluated against literature in chapter two. The research questions and the proposition in chapter one is revisited in order to establish the extent to which results relate to them.

4.1 RESPONSE RATE

Table 4.1: Response rate

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of respondents</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid response</td>
<td>67</td>
<td>67%</td>
</tr>
<tr>
<td>No response</td>
<td>33</td>
<td>33%</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>

A total of 100 questionnaires were administered to NMB Bank staff members. The questionnaire that was used is shown in Apendix 1. As shown in table 4.1 above, the response rate was 67%. Hwang (1999) argues that a 20% response rate of usable questionnaires is a valid response for a study, while Cooper and Schindler (2003) point to a 30% response rate as satisfactory. The response rate of 67% in this study was therefore high enough to warrant validity and reliability of
the data collected, and for the researcher to proceed to data presentation and analysis.

4.1.1 Demographic Data

Table 4.2: Response rate by business unit (Department/Branch)

<table>
<thead>
<tr>
<th>Department/Branch</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Technology</td>
<td>5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Retail Harare</td>
<td>11</td>
<td>16.4</td>
<td>16.4</td>
<td>23.9</td>
</tr>
<tr>
<td>Bulawayo Branch</td>
<td>5</td>
<td>7.5</td>
<td>7.5</td>
<td>31.3</td>
</tr>
<tr>
<td>Mutare Branch</td>
<td>4</td>
<td>6.0</td>
<td>6.0</td>
<td>37.3</td>
</tr>
<tr>
<td>Gweru Branch</td>
<td>3</td>
<td>4.5</td>
<td>4.5</td>
<td>41.8</td>
</tr>
<tr>
<td>Risk and Compliance</td>
<td>2</td>
<td>3.0</td>
<td>3.0</td>
<td>44.8</td>
</tr>
<tr>
<td>Treasury</td>
<td>2</td>
<td>3.0</td>
<td>3.0</td>
<td>47.8</td>
</tr>
<tr>
<td>Operations</td>
<td>5</td>
<td>7.5</td>
<td>7.5</td>
<td>55.2</td>
</tr>
<tr>
<td>Internal Audit</td>
<td>3</td>
<td>4.5</td>
<td>4.5</td>
<td>59.7</td>
</tr>
<tr>
<td>Human Resources</td>
<td>3</td>
<td>4.5</td>
<td>4.5</td>
<td>64.2</td>
</tr>
<tr>
<td>Marketing</td>
<td>1</td>
<td>1.5</td>
<td>1.5</td>
<td>65.7</td>
</tr>
<tr>
<td>Finance and Administration</td>
<td>7</td>
<td>10.4</td>
<td>10.4</td>
<td>76.1</td>
</tr>
<tr>
<td>Corporate Banking</td>
<td>4</td>
<td>6.0</td>
<td>6.0</td>
<td>82.1</td>
</tr>
<tr>
<td>International Banking</td>
<td>5</td>
<td>7.5</td>
<td>7.5</td>
<td>89.6</td>
</tr>
<tr>
<td>Security</td>
<td>2</td>
<td>3.0</td>
<td>3.0</td>
<td>92.5</td>
</tr>
<tr>
<td>Cards and E-Banking</td>
<td>5</td>
<td>7.5</td>
<td>7.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table 4.2 above shows that 16 business units responded to the questionnaire that was administered. Retail Harare provided the highest number of respondents representing 16.4% of all respondents. This is mainly because Retail Harare had the highest number of staff members with members of the department at Msasa, Angwa City, Joina, Southerton, Borrowdale, Avondale, Eastgate, and the head office at Unity Court building.
Table 4.3: Response rate by position

<table>
<thead>
<tr>
<th>Position</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managerial</td>
<td>23</td>
<td>34.3</td>
<td>34.3</td>
<td>34.3</td>
</tr>
<tr>
<td>Non-Managerial</td>
<td>44</td>
<td>65.7</td>
<td>65.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

From table 4.3 above, 23 respondents were managerial staff members representing 34.3% of total respondents and 44 were non-managerial staff members representing 65.7% of total respondents. There were more non-managerial respondents than managers mainly because more questionnaires were administered to non-managers than managers. However the response rate for non-managers of 44 out of 60 (73%) was higher than that of managers which was 23 out of 40 (58%).

Figure 4.1: Responses by gender

Figure 4.1 above, shows a pie chart which reveals that 32.8% of the respondents (22) were female while 67.2% of the respondents (45) were male. This is mainly because there were more male employees than female employees among the NMB Bank employees.
The respondents were predominantly holders of diplomas and undergraduate degrees as shown in figure 4.2 above. From the 63 respondents, 32 of them (47.8%) had undergraduate degrees, while 27 (40.3%) were diploma holders, and 8 (11.9%) were holders of post-graduate degrees. These responses generally represent the qualifications of NMB Bank staff members as most of the employees held either a diploma or an undergraduate degree.

The demographic distribution and the overall response rate of 67% gave the researcher enough justification to conclude that the results of the study were representative of the NMB Bank population. Generally the responses were adequately significant to warrant validity and reliability.
4.2 GREEN IT PRACTICES AND ADOPTION LEVELS

The discussion of the results in this section will seek to provide answers to the research objectives below:

- To determine the current Green IT practices within NMB Bank.
- To ascertain the levels of Green IT adoption by NMB Bank.

4.2.1 Green IT awareness

The results shown in figure 4.3 above indicate a relatively low awareness level of Green IT and its associated benefits among NMB Bank staff members. The respondents, who were aware of Green IT and its associated benefits numbered 17, representing 25.4%, while 50 (74.6%) of the respondents were not aware.

![Figure 4.3: Green IT awareness](image)

Table 4.4: Green IT awareness by position

<table>
<thead>
<tr>
<th>Position</th>
<th>Green IT awareness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Managerial</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>Non-Managerial</td>
<td>11</td>
<td>33</td>
</tr>
</tbody>
</table>
The Green IT awareness results also show that, 6 managers were aware of Green IT and the associated benefits while 11 non-managers were aware as shown in table 4.4 above. This indicates that 35% of the managers who responded were aware of Green IT and 33% of the non-manager respondents were aware, and 54% of all the respondents who were aware are managers. For any initiative to be successful in an organisation, management should have a high level of awareness in order to make recommendations to senior management, as well as cascade downwards the implementation of the initiatives (Molla, 2009). However, awareness at all levels remains very important in order to drive the Green IT adoption as it provides a solid base for successful adoption.

Table 4.5: Green IT awareness by department

<table>
<thead>
<tr>
<th>Department</th>
<th>Green IT awareness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Technology</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Retail Harare</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Bulawayo Branch</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Mutare Branch</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Gweru Branch</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Risk and Compliance</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Treasury</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Operations</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Internal Audit</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Human Resources</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Marketing</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Finance and Administration</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Corporate Banking</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>International Banking</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Security</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Cards and E-Banking</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>50</td>
</tr>
</tbody>
</table>

The other noticeable result is that the highest number of respondents who were aware of Green IT is from the Information Technology (IT) department with 5
respondents, as shown in table 4.5 above. This apparently represents 100% of the IT department respondents, which shows that there was a very high level of awareness of Green IT and its associated benefits in the IT department.

As discussed in literature review in Chapter two, employee demands have become a major driver for the adoption of green IT initiatives. Companies are being pushed by their employees to reduce carbon emissions and decrease environmental harm as employees develop greater awareness of environmental issues (Van der Mark, 2012). Therefore the low awareness level has a negative impact on the success of Green IT initiatives.

4.2.2 Green IT end-user practices

4.2.2.1 Communication

![Figure 4.4: Instant messaging](image)

Figure 4.4: Instant messaging

Figure 4.4 above shows that 94% of the respondents were using instant messaging tools to communicate both within and outside the organisation. The respondents used Microsoft Lync 2010 as the instant messaging tool for internal communication while some also used Gtalk. When respondents were asked
whether NMB staff members prefer to use instant messaging to making telephone calls, the result was quite different. As shown in figure 4.5 below, about 50% of the respondents either agreed or strongly agreed that there is a preference for instant messaging, while 28.4% were neutral and 20.8% either disagreed or strongly disagreed. This shows that even though almost all the respondents were using instant messaging, opinion is divided on whether instant messaging was preferred ahead of calling. About half of the respondents were either unsure or disagree that instant messaging is preferred, while the other half believed that instant messaging is preferred.

Follow-up interviews showed that this outcome was mainly because some staff members were not yet comfortable with the Microsoft Lync application. Microsoft Lync was introduced relatively recently (in the year 2012), and no training was offered on how to use the platform as the interface was assumed to be easy to master. However some users were still learning how to use the application extensively and had not yet changed their communication culture, even though
staff members were encouraged to use instant messaging in order to reduce telephone costs.

Figure 4.6 shows the result of the awareness levels by users of their telephone extension bills. The majority of the respondents (80.6%) indicated that they were aware of their telephone extension bill, while 19.4% indicated that they were not aware. Follow-up interviews with respondents indicated that NMB Bank had a PABX systems in all branches and a call accounting system was in place which was used for billing all extensions. Follow-up interviews showed that those who were not aware of their extension bills were those staff members who do not have direct access to make calls outside the organisation on their extensions. The call accounting system enables accountability for every telephone user in terms of the calls that they make. As was discussed in chapter two, organisational pressures like telephone costs drive organisations into adopting Green IT technologies in order to reduce costs. This seems to be the case in NMB Bank where awareness levels of telephone costs were high, which tends to drive staff members towards Green IT platforms like Microsoft Lync 2010 as they endeavour to reduce their individual telephone bills.
Table 4.6 Typical monthly telephone extension bill

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below $20</td>
<td>24</td>
<td>35.8</td>
<td>35.8</td>
</tr>
<tr>
<td>$20 - $50</td>
<td>17</td>
<td>25.4</td>
<td>61.2</td>
</tr>
<tr>
<td>$50 - $100</td>
<td>13</td>
<td>19.4</td>
<td>80.6</td>
</tr>
<tr>
<td>N/A</td>
<td>13</td>
<td>19.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.6 above indicates that 35.8% of the respondents on average used less than $20 per month on business calls, 25.4% used $20 to $50 per month, and 19.4% used $50 to $100. This shows that there were some considerable control measures to ensure that telephone costs are minimised using ICT technologies such as the PABX systems, the call accounting software, and the instant messaging applications. As shown in table 4.7 below, 74.6% of the respondents either did agree or strongly agree that the use of ICT technologies like instant messaging platforms and remote assistance (which are Green IT technologies) had greatly reduced their telephone bills. Table 4.8 also shows that 85% of the respondents believed there is room for deployment of more ICT technologies to further reduce telephone costs and videoconferencing was recommended by most of the respondents.

Table 4.7 Have ICTs reduced telephone costs?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>10</td>
<td>14.9</td>
<td>14.9</td>
</tr>
<tr>
<td>Agree</td>
<td>27</td>
<td>40.3</td>
<td>55.2</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>23</td>
<td>34.3</td>
<td>89.6</td>
</tr>
<tr>
<td>Don't know</td>
<td>7</td>
<td>10.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.9 below shows that 91% of the staff members were not using voice over IP (VoIP) for inter-branch communication. Follow up interviews revealed that the VoIP platform that was at NMB Bank which was extensively used in the past was no longer functional in most branches.

Table 4.7 Have ICTs reduced telephone costs?
Table 4.8 Can ICTs further reduce telephone costs?

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>4</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>3</td>
<td>4.5</td>
<td>4.5</td>
<td>10.4</td>
</tr>
<tr>
<td>Agree</td>
<td>13</td>
<td>19.4</td>
<td>19.4</td>
<td>29.9</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>44</td>
<td>65.7</td>
<td>65.7</td>
<td>95.5</td>
</tr>
<tr>
<td>Don't know</td>
<td>3</td>
<td>4.5</td>
<td>4.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.9: Voice over IP usage

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>9.0</td>
<td>9.0</td>
<td>9.0</td>
</tr>
<tr>
<td>No</td>
<td>61</td>
<td>91.0</td>
<td>91.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

These results show that the majority of staff members were using existing ICT platforms to reduce telephone costs, but some staff members had not yet changed their culture. NMB Bank had managed to reduce telephone costs using ICTs although there is room to improve. Green IT initiatives and practices reduce telephone costs as was discussed in chapter two and the full adoption by NMB Bank can further reduce communication costs significantly.

4.2.2.2 Travelling

Figure 4.7 below, shows that only 14 respondents (20.9%) did not travel at work, while a total of 53 respondents (79.1%) at least travelled at work within a month with 11 of them (16%) travelling more than 100km per month. As shown in figure 4.8, most of the respondents who travelled are in the 1 to 40km range making up 60% of the respondents, while 4% of the respondents travelled above 100km per month.
Figure 4.7 Average travelling per month

Figure 4.8 Average distance per month
The main reasons for traveling that were cited by respondents during follow up interviews are client visits, and meetings. As discussed in chapter two, travelling has a triple bottom line negative effect on the quality of people’s life, travelling costs, as well as exhaust gas emissions into the environment.

![Figure 4.9 ICTs have reduced travelling](image)

Figure 4.9 above indicates that almost half of the respondents (49.3%) did agree that ICTs had reduced travelling costs within NMB Bank. A further 14.9% did strongly agree, which indicates that the majority of respondents (64.2%) generally agreed that ICT systems had reduced travelling at work. Respondents highlighted that applications like Microsoft Lync and remote access tools like NetMeeting and WebEx, were the reason why IT systems had reduced travelling costs.
While the majority of respondents generally agreed that ICT systems had reduced travelling at work, figure 4.10 above highlights that the majority of the respondents (58.2%) did strongly agree while 31.3% agreed that there is a gap that ICTs can fill in order to further reduce travelling at work in NMB Bank. There were no respondents who disagreed and 10.4% indicated that they did not know. This shows an overwhelming agreement by respondents that more can be done to reduce travelling at work with the majority of them highlighting videoconferencing and teleconferencing as platforms necessary for travelling reduction to be achieved.

4.2.2.3 Meetings

Respondents were asked if meetings are sometimes conducted using computer applications and 20 respondents (29.9%) agreed, 9 respondents (13.4%) strongly agreed, thus making those who did at least agree 43.3% of all respondents as shown in table 4.10 below. Those who strongly disagreed were only 3 respondents (4.5%) while 10 respondents (14.9%) disagreed which result shows that 19.4% of all respondents either disagreed or did strongly disagree.
Table 4.10 Are some meetings conducted using ICTs

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>3</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Disagree</td>
<td>10</td>
<td>14.9</td>
<td>14.9</td>
<td>19.4</td>
</tr>
<tr>
<td>Neutral</td>
<td>18</td>
<td>26.9</td>
<td>26.9</td>
<td>46.3</td>
</tr>
<tr>
<td>Agree</td>
<td>20</td>
<td>29.9</td>
<td>29.9</td>
<td>76.1</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>9</td>
<td>13.4</td>
<td>13.4</td>
<td>89.6</td>
</tr>
<tr>
<td>Don't know</td>
<td>7</td>
<td>10.4</td>
<td>10.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

There were also respondents who were neutral and some who did not know, and these make up a total of 25 respondents (37.3%). This shows that there was some use of ICT applications to conduct meetings in the organisation, but however more than half of the respondents did not agree, which shows that slightly more than half of the respondents were not conducting meetings through ICTs. Some of the respondents who at least disagreed, pointed out that they did not know how to use existing applications for meetings while others did not have internet access. Some also highlighted that that the internet was unreliable in terms of speed and availability and this deters smooth voice and video communication on Microsoft Lync.

4.2.2.4 Teleworking

As discussed in chapter two, considerable burdens are being exerted on the environment by people just getting to and from the office and travelling to business meetings, thus releasing exhaust gases into the atmosphere (T-Systems 2012). Teleworking is one Green IT technology that can reduce this negative impact on the environment, while at the same time reducing travelling costs, and improving people’s standard of life. Figure 4.11 below shows that 80.6% of respondents (54 respondents) believed that there are no staff members who sometimes work from home, while 13 respondents (19.4%) believed that there are some staff members who sometimes work from home.
This suggests that working from home through mobile devices and home computers was still not yet developed in NMB Bank. In an interview with a manager in the IT department, security concerns were an issue in the sense that negligence on security profiles and passwords by the staff member working from home can easily result in the information in the hands of a non-staff member. The information in a bank is very sensitive and is of a highly confidential nature, and security of information is of a high priority.

4.2.2.5 Energy conservation practices

Figure 4.12 below shows that about 72% of respondents agreed that staff members switch off their computer equipment when going home, while 19% disagreed and 9% were not sure.
Figure 4.12 Staff members switch off computer equipment when they go home

Figure 4.13 Behaviour of computer when idle for more than 30 minutes
The majority of the respondents making up about 85% pointed out that their computers hibernated when idle for more than 30 minutes as shown in figure 4.13. On the other hand, 6% of the respondents said that their computers switch off, while 9% reported that their computers remain on.

As was discussed in chapter two, significant power savings can be realized by encouraging office workers to change their habits by switching off computer equipment when not in use, the use of hibernation mode, and power management software for hardware (T-Systems 2012). As highlighted above, the majority of respondents highlighted that most staff members switched off their computer equipment when they go home and most machines were setup to hibernate when they are idle.

Table 4.11 Awareness of monthly power consumption

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid No</td>
<td>67</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As shown in table 4.11 above, 100% of the respondents did not know their power consumption patterns. Awareness can encourage staff members to develop a power saving culture, through initiatives that reduce consumption, thus contributing to the reduction of power generation related carbon emissions as well as the reduction of energy costs for the organisation.
4.2.2.6 Printing practices

When asked if there were unnecessary documents that were being printed, the outcome shown in figure 4.14 was obtained where 27 respondents (40%) strongly agreed and 18 respondents (27%) agreed. Of the respondents 12 were neutral making up 18% while 7 respondents (10%) disagreed and 3 respondents (5%) strongly disagreed. This shows that 67% of the respondents at least agreed that there is unnecessary printing of documents that was going on within NMB Bank, with about 15% at least disagreeing.

Figure 4.15 soft copy preferences over printing
While most respondents agreed that there was unnecessary printing of documents, figure 4.15 above shows that the highest number of respondents (39%) strongly agreed that soft copies are generally preferred instead of printing. Those who did agree make up 13%, while 24% were neutral, 19% disagreed, and 5% strongly disagreed. Preference for soft copies reduces paper waste in the environment as well as the costs of printing.

Figure 4.16 Document Management System

Figure 4.16 above highlights that most of the respondents making up about 49% disagreed and a further 15% did strongly disagree that there was a document management system within NMB Bank, making 64% at least disagree. Follow up interviews showed that the few respondents, who agreed and those who strongly agree to the existence of a document management system, did not have enough knowledge of a document management system. In essence, the outcome of the interviews is that there was no document management system in place within NMB Bank.
One of the reasons why many documents were printed in NMB Bank was for compliance purposes. Figure 4.17 above highlights that most of the respondents generally agreed that there were some documents and forms which had to be printed for compliance purposes. The pie chart is showing that 53.7% of the respondents agreed, 40.3% strongly agreed, and 6% did not know. However no respondent disagreed or did strongly disagree.

Figure 4.18 Policies promoting printing reduction
Respondents were asked if there were policies in place that encourage printing reduction. Figure 4.18 above shows that the highest number of respondents (38.8%) was neutral, followed by those who disagreed who make up 22.4%. The respondents who agreed were 13.4%, and those who did strongly agree were 10.4%, while 4.5% strongly disagreed and 10.4% did not know. This shows that there might be policies that promote printing reduction or elimination, but most of the respondents were not convinced that such policies were in place or were not aware of their existence.

4.2.2.7 Banking Automation

Automation of processes and procedures is another way of going green using ICT systems by for example, reducing printing of forms, and reducing client travelling. Figure 4.19 below shows that the highest number of respondents (55.2%) agreed that banking in NMB Bank is automated, followed by those who strongly agreed (26.9%), 11.9% were neutral, 4.5% disagreed, and 1.5% strongly disagreed. Follow up interviews revealed that the bank had a banking system in place, coupled with several systems that support banking ATMs, POS transactions, Internet Banking, SMS notifications, Emailing of statements, and so forth. These systems reduce printing, energy use in banking halls, and client travelling, thus positively contributing towards reducing environmental pollution.
4.2.2.8 Environmental and ICT awareness

Respondents were asked to give their opinions on what can be done to improve awareness on issues to do with ICT and the environment. Most of the respondents generally pointed out that training and development was required through the human resources training calendar. Others suggested occasional publication of bulletins to staff members, as well as using the intranet (NMB Staffnet) to publish environmental education programs and Green IT issues.

4.2.2.9 Remote user support

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.12 Use of remote access tools by IT department

Figure 4.19 Banking Automation
As shown in table 4.12 above, all the 67 respondents (100%) agreed that the IT department used remote access tools to provide user support such as NetMeeting, Windows Meeting Space, and Remote Desktop Connection.

4.2.3 Data centre and infrastructure

4.2.3.1 Green IT governance framework

The interviewees were not aware of the existence of a Green IT governance framework document in the bank although there was an existing IT Governance framework document. Green initiatives were considered as part of other projects. This setup is in line with the centralised Green IT Governance framework discussed in chapter two. In the centralised framework, primary authority and Green IT is centralized in the IT department such that Green IT initiatives are treated like other IT projects. According to Schmidt, and Kolbe (2011), such organisations are mainly focused on lowering energy consumption in the data centre and the office environment in order to reduce costs, and Green IT is of low importance for the company.

4.2.3.2 Green IT strategy

The interviewees were not aware of the Green IT strategy of the bank although the bank had an active IT strategy. The Green IT initiatives were part of the IT strategy.

4.2.3.3 Green IT policy

The interviewees were not aware of a Green IT policy. The bank had an IT policy which provides guidelines on practices and use of IT equipment. There was no separate Green IT policy.
4.2.3.4 Energy conservation in the datacentre

Interviewees highlighted server consolidation, server virtualisation, and in-rack cooling as some of the technologies that were being used that improve efficiencies and reduce power consumption in the datacentre.

4.2.3.5 Eco-friendly energy use

Respondents revealed that there was no use of eco-friendly energy like solar, and wind energy to power the datacentre. Raw power supplied by ZESA was used, and diesel generators were in place for backup power.

4.2.3.6 Virtualisation

Interviewees agreed that virtualisation is one of the technologies already being used to conserve energy in the datacentre.

4.2.5 ICT Equipment lifecycle and procurement

The interviews revealed that the bank had a policy in place for procurement and replacement of IT equipment and it does take into account green issues. The PCs that were being used by all users were all state of the art energy efficient machines with LCD screens. Old computers were disposed either by donations or by auction, thus promoting re-use, which is one of the green disposal recommended practices.
4.2.4 Summary of section results

4.2.4.1 Current Green IT practices within NMB Bank

The results discussed in this section show that there were Green IT practices in NMB Bank. These are mainly: use of instant messaging; accountability on telephone calls; using ICTs to conduct meetings; switching off computers when going home; using the hibernate option; automation of banking processes; datacentre energy conservation; server consolidation; virtualisation; remote user support; energy efficient PCs and LCD screens; and green disposal through reuse.

4.2.4.2 Levels of Green IT adoption by NMB Bank

Although there were many Green IT practices in NMB Bank, most of them seem to be a result of efforts to reduce costs rather than to achieve green objectives. The level of adoption was generally low at corporate level mainly as a result of the following outcomes: lack of a clear Green IT Governance structure; no clear Green IT strategy; and no Green IT policy; low awareness of Green IT concepts by respondents in general; no videoconferencing or teleconferencing facilities; no functional VoIP system; no teleworking; no awareness and monitoring of power consumption; no document management system; printing of unnecessary documents; and no training programmes on Green IT or on the environment.

4.3 COMPETITIVENESS

The results in this section seek to provide answers to the research objective below

■ To evaluate the competitiveness of the bank in the Zimbabwean Banking sector.
Respondents were asked to rank the bank on a 1 to 10 rating scale with 1 being the lowest rank and 10 being the highest. When asked if they believe the bank was one of the top 5 most competitive in its industry, the most common ranking was a 7 given by 21 respondents (31.3%) as shown in figure 4.20 below. On the same result, a ranking of a 3 was provided by 4.5% of the respondents, a 4 by 10.4%, a 5 by 20.9%, a 6 by 4.5%, an 8 by 9%, a 9 by 14.9%, and a 10 by 4.5%. This result shows that the respondents generally believed that the bank is among the 5 most competitive banks in its industry as 64.2% of them gave a ranking of 6 and above.

![Figure 4.20 Bank competitiveness](image)

Asked if customers view the bank as one of the top 5 competitive players in its industry, the outcome was more positive as 68.7% gave a ranking of a 7 and above. This is shown in figure 4.21 below which also highlights that a ranking of a 3 was given by 4.5% of the respondents, a 4 by 16.4%, a 5 by 6%, a 6 by 4.5%, a 7 by 25.4%, an 8 by 19.4%, a 9 by 14.9%, and a 10 by 9% of the respondents.
This shows that the respondents generally believed that the bank is competitive in its industry although some respondents were somehow sceptical. However, given the nature of the industry, primary data alone may not be enough to give a conclusive position on the bank’s competitiveness. IPC (2012) the Industrial Psychology Consultants carried out a very recent study which ranked banks’ competitiveness according to their customer engagement ratio. The engagement ratio is an indicator of an organization’s health at a macro level that allows executives to track the proportion of fully engaged to actively disengaged customers (IPC 2012). A focus on increasing this ratio by improving customer satisfaction is a critical part of any growth strategy considering the return that fully engaged customers are worth to any organization (ibid).

The outcome of the study is shown in table 4.13 below where NMB Bank was ranked 6th with a net engagement score of 5.4%. Table 4.14 shows that when asked about what they like about their bank, the most frequent response (23.9%) for NMB was the turnaround time, while personalised service was second most frequent response with 12%. However, even though there were respondents from
customers of some of the banks that are not listed in table 4.13, these are not stated because they had an insufficient sample (IPC 2012). These banks and building societies are: MetBank, Agribank, Interfin, CBZ Building Society, FBC Building Society, ZB Building Society and POSB, Trust Bank, ZABG, Renaissance, Tetrad Merchant Bank, while Royal Bank and Genesis Bank were excluded because these are no longer registered banks (IPC 2012).

Table 4.13 Net engagement ratio rankings (IPC 2012)

<table>
<thead>
<tr>
<th>Bank</th>
<th>Net Engagement Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBC Bank Limited</td>
<td>34.20%</td>
</tr>
<tr>
<td>TN Bank</td>
<td>23.40%</td>
</tr>
<tr>
<td>Ecobank</td>
<td>22.20%</td>
</tr>
<tr>
<td>Stanbic Bank Zimbabwe Limited</td>
<td>16.30%</td>
</tr>
<tr>
<td>ZB Bank Limited</td>
<td>11.60%</td>
</tr>
<tr>
<td>NMB Bank Limited</td>
<td>5.40%</td>
</tr>
<tr>
<td>Central Africa Building Society (CABS)</td>
<td>5.20%</td>
</tr>
<tr>
<td>CBZ Bank Limited</td>
<td>0.00%</td>
</tr>
<tr>
<td>Standard Chartered Bank Zimbabwe Limited</td>
<td>0.00%</td>
</tr>
<tr>
<td>BancABC</td>
<td>-3.30%</td>
</tr>
<tr>
<td>MBCA Bank Limited</td>
<td>-3.70%</td>
</tr>
<tr>
<td>Barclays Bank of Zimbabwe Limited</td>
<td>-6.70%</td>
</tr>
<tr>
<td>AfrAsia Kingdom Zimbabwe Limited</td>
<td>-13.50%</td>
</tr>
</tbody>
</table>
Table 4.14 What do you think about the service at your bank? (IPC 2012)

<table>
<thead>
<tr>
<th>Bank</th>
<th>Most frequently appearing response</th>
<th>Second most mentioned response</th>
</tr>
</thead>
<tbody>
<tr>
<td>BancABC</td>
<td>Turnaround (20.90%)</td>
<td>Staff (15.40%)</td>
</tr>
<tr>
<td>Barclays Bank</td>
<td>Turnaround (25.50%)</td>
<td>Staff (12.20%)</td>
</tr>
<tr>
<td>CBZ Bank</td>
<td>Turnaround (21.70%)</td>
<td>Staff (13.90%)</td>
</tr>
<tr>
<td>Ecobank</td>
<td>Turnaround (22.20%)</td>
<td>Stability of bank (16.70%)</td>
</tr>
<tr>
<td>FBC Bank</td>
<td>Turnaround (28.40%)</td>
<td>General customer service (13.40%)</td>
</tr>
<tr>
<td>Kingdom Bank</td>
<td>Turnaround (20.00%)</td>
<td>Staff (15.80%)</td>
</tr>
<tr>
<td>MBCA Bank</td>
<td>Turnaround, Personalized Service, Staff (16.00%)</td>
<td></td>
</tr>
<tr>
<td>NMB Bank</td>
<td>Turnaround (23.90%)</td>
<td>Personalized Service (12.00%)</td>
</tr>
<tr>
<td>Stanbic Bank</td>
<td>Turnaround (28.60%)</td>
<td>General customer service (13.40%)</td>
</tr>
<tr>
<td>Standard Chartered Bank</td>
<td>Turnaround (25.90%)</td>
<td>Staff (11.60%)</td>
</tr>
<tr>
<td>TN Bank</td>
<td>Turnaround (32.40%)</td>
<td>General Customer Service (14.70%)</td>
</tr>
<tr>
<td>ZB Bank</td>
<td>Staff (19.00%)</td>
<td>Turnaround (14.30%)</td>
</tr>
<tr>
<td>CABS</td>
<td>Turnaround (27.80%)</td>
<td>Loans, Staff (11.10%)</td>
</tr>
</tbody>
</table>

This study generally shows that by Zimbabwean standards, NMB’s net engagement ratio was way below that of the highest ranked FBC Bank Limited whose score is 34.20%, but was however much higher than the lowest ranked institution. Combining the results of this secondary data with the primary data discussed above, the bank may not have been necessarily in the top 5, but the bank was generally highly competitive in its industry, even though there is room for improvement in order to catch up with the top competitors.

4.4 CHALLENGES IN IMPLEMENTING GREEN IT INITIATIVES

The results in this section will provide results for the research objective below:

- To investigate the challenges that the bank is facing in undertaking green IT initiatives.
4.4.1 Lack of coordination

NMB Bank did not have a clear Green IT strategy and there were no policies specific to Green IT. This creates discord and lack of coordination in implementing Green IT initiatives. No individual or business unit was directly responsible for the crafting of Green IT strategies and initiatives which makes adoption and implementation difficult. A Green IT strategy can help ensure that issues to do with the environment are considered when designing and developing new systems.

4.4.2 Cultural and behavioural challenge

As was shown in the result 4.2.2.6 above where there was printing of unnecessary documents going on, and the existence of a cultural and behavioural challenge within the organisation was noticed. There is need to encourage staff to change their culture and behaviour, in areas such as reducing print volumes, using the full capabilities of Microsoft Lync 2010, using conference calls to reduce unnecessary travelling, and using all the existing Green IT technologies. The cultural and behavioural change is the most important aspect in order to establish an environmentally-focused organisational culture for staff.

The culture of the clients will also need to change by exposing them to more and more technologies and the associated benefits. Many clients still prefer the face to face interactions, and are not comfortable to do their banking online. This tends to negatively impact Green IT initiatives.

4.4.3 Obtaining priority funding for Green IT

Funding towards IT programs was biased towards upgrades and other initiatives to boost revenues or to reduce costs. Green IT programs tend to be long term and require a high initial capital investment, making it difficult to justify and obtain funding.
4.4.4 Limited value network readiness

The value networks in Zimbabwe were are fully ready for Green IT implementations. For example, it is difficult to easily get green certified IT products from suppliers in Zimbabwe at competitive prices. Insisting on a policy of buying green certified equipment only is a challenge as most of the suppliers do not readily have the certified equipment.

4.4.5 Inconsistent electricity supply

Constant power cuts were another challenge that was cited as resulting in connectivity disruptions which affect green platforms like internet banking and videoconferencing. Staff members have grown to believe that it is better to have face-to-face meetings where you are assured of no disruptions especially with clients. Power challenges also make green solutions like teleworking inefficient as working from home may not be productive given the magnitude of power cuts in Zimbabwe.

4.4.6 Unreliable and expensive internet access

The other practical challenge that was highlighted is that of unreliable internet access which is also expensive compared to other countries in the region and beyond. The deployment of Green IT technologies is hampered by the unreliable internet access which also proves to be expensive for most clients. For example, conducting a meeting with a client using videoconferencing may prove to be expensive especially to the client, and the meeting may experience disconnections. In order to offer excellent service, staff members end up visiting the client to ensure that fruitful discussions take place.
4.4.7 Environment regulations

Environmental regulations by the Environmental Management Agency are in most cases persuasive rather than mandatory in the banking sector because the sector is regarded as a light polluter. This makes it difficult to get support for Green IT initiatives in a sector where compliance to many Reserve Bank of Zimbabwe regulations is mandatory. Priority is generally given to those projects that facilitate and enhance compliance. As was discussed in chapter two, regulatory demands can be mandatory or voluntary, and the need to meet these demands can drive certain actions from members of the society.

4.5 CONCLUSION

The results of the research were presented in this chapter as well as brief discussions referring to literature within the context of the objectives. The data which was collected was analysed and evaluated against literature in chapter two while at the same time revisiting research questions and the hypothesis in chapter one in order to establish the extent to which results relate to them.
CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

The chapter summarises the major findings after data analysis and discussion in chapter four, in order to address the research questions. Based on the findings in undertaking the research and the conclusions, recommendations are then provided.

5.1 CONCLUSIONS

From the results discussed in chapter four, the research conclusions are noted below.

5.1.1 Green IT practices in NMB Bank

The results show that there are practices in NMB Bank that are Green IT compliant and some of the practices are:

- The use of instant messaging tools like Microsoft Lync 2010
- Accountability of telephone calls and bill reduction efforts using ICTs
- Reducing travelling by using ICTs to conduct meetings, and using remote user support.
- Energy saving through switching off computers overnight, using the hibernate setting on desktop PCs, and the use of energy efficient PCs with LCD screens.
- Datacentre energy conservation through server consolidation, virtualisation, and in-rack cooling.
- Automation of banking processes
- Green disposal through reuse by donating and auctioning old computers.

5.1.2 Levels of Green IT adoption by NMB Bank

Although there are many Green IT practices in NMB Bank, most of them are a result of efforts to reduce costs rather than to achieve green objectives. The level of Green IT adoption is generally low at corporate level mainly as a result of:

- Low awareness of Green IT by staff members.
- There is no Green IT Governance structure and there are no positions in the organogram (like Green IT manager) that champion Green IT implementation.
- There is no clear Green IT strategy
- There are no clear Green IT policies
- Little use of ICTs to conduct meetings, and there are no videoconferencing or teleconferencing facilities.
- There is no awareness and monitoring of power consumption at unit level for end-users and for the datacentre.
- There is no document management system
- There are no training programmes on Green IT or on the environment which promotes a green culture in the organisation.

5.1.3 Competitiveness

- Combining the results of secondary and primary data, the bank may not necessarily be in the top 5, but the bank is generally highly competitive in its industry. The turnaround time and the personalised service were cited by most of the customers as important attributes of the bank’s service. The majority of staff members also believe the bank is highly competitive.
Green IT practices that have been adopted have improved the bank’s competitiveness, especially through reducing costs in these areas: communication, travelling, energy, and printing.

Further Green IT initiatives can improve competitiveness by further reducing costs while at the same time reducing environmental footprint.

5.1.4 Challenges in implementing Green IT initiatives

- Lack of coordination
- Cultural and behavioural challenge
- Obtaining priority funding for Green IT
- Limited value network readiness
- Inconsistent electricity supply
- Unreliable and expensive internet access
- Environmental regulations

5.2 RECOMMENDATIONS OF THE STUDY

5.2.1 Develop a Green IT Governance framework

Effective IT governance is supposed to be the single most important predictor of the value an organization generates from IT (Weill and Ross 2004). In order for Green IT activities to form an integral part of the company’s sustainability, a decentralised Green IT Governance structure is recommended. As was discussed in chapter two of this study, in the decentralised setup, there is a designated Green IT committee which is represented by members of different business units of the company following a matrix approach (Schmidt and Kolbe 2011). The Green IT committee should also consist of the Green IT manager, and the sustainability manager or environmental manager, who ideally should report to the CEO (Chief Executive Officer) (ibid). Such a structure becomes the bedrock for the formulation of effective Green IT policies and their implementation.
across all units. The structure also demonstrates that Green IT is of high importance to the company.

5.2.2 Develop a Green IT Strategy

The research recommends that NMB Bank adopt the environmental cost leadership strategy of Green IT. This is a strategy where the organisation achieves cost leadership by using green initiatives in organisational processes (Orsato 2006). According to Orsato (2006), in industries where there is little scope for differentiation, and where competition is heavily based on price, environmental cost leadership is recommended. The strategy formulation should involve all organisational levels, from the Chief Executive Officer to the low level employees. This enables support for Green IT strategy from senior management as well as buy-in from employees which will be important for the strategy execution. By implementing the strategy, the organisation will achieve low cost advantages which can increase profit margins. This coupled with eco-branding, can improve revenues as well, and the overall effect is a more competitive and profitable bank.

5.2.3 Training and development

Training was cited by respondents as a requirement to improve employee awareness of Green IT and the associated benefits. Training and development is an important tool in developing a Green IT culture that transcends across all employee levels and business units. The Human Resources department can include Green IT programs in the annual training calendar that ensures that all employees are covered. This research recommends classroom training especially in the initial stages to ensure that everyone gets the message across. Additionally, Green IT training bulletins and e-tutorials can be published on the intranet, and a green payoff line on electronic emails like “please consider the environment before printing” can be used to keep everyone reminded. This will in turn develop the green culture as time goes on, that will give the organisation competitive advantage.
5.2.4 Implement more Green IT technologies and practices

More Green IT technologies and practices are recommended in addition to improving the utilisation of the existing ICT technologies in a way that is green. Some of the technologies that are important in the case of NMB Bank are recommended below.

5.2.4.1 Videoconferencing and teleconferencing facilities

Videoconferencing and teleconferencing facilities are recommended, as these will facilitate conducting meetings without participants gathering in one room. Videoconferencing will particularly give a face-to-face experience as participants will be seeing each other just like in a traditional meeting. This provides opportunities to reduce travelling thereby reducing carbon emissions as well as travelling costs. This can also provide employee satisfaction which can translate into improved productivity.

5.2.4.2 Monitor Datacentre and business unit power consumption

It is recommended that mechanisms be put in place to monitor power consumption by business units and the datacentre. This involves developing processes for measuring, and monitoring power consumption at unit level in order to set benchmarks which will be used to control and develop mitigation measures in order to achieve power savings.

To achieve power monitoring and control, the research recommends the bank to install smart metering for the datacentre and units where it is feasible. As noted by Ahola et al. (2010) smart metering solutions have the capability to measure in detail energy consumption at any given time and then communicate through networks, the relevant information to stated recipients. Such information can be carefully analysed in order to develop novel business models that form a basis for new green digital services and practices to control energy consumption.
5.2.4.3 Document Management System

A document management system is recommended in order to provide a platform for effective and efficient digital document management. One of the reasons why so many documents are printed is for filing for future reference, but when the documents are required, it takes time to go through the files. A document management system offers efficient storage and retrieval mechanisms for digital documents which reduces the need to print documents. In addition to reducing environmental pollution, a document management system will reduce printing costs, reduce power consumption by printers, speeds up service response through enhanced workflow management, and expand the usage of digital documents.

5.2.4.4 Eco-friendly datacentre energy

The research recommends that datacentre designs be made eco-friendly through the use of eco-friendly energy like solar energy. This reduces the huge cost of powering the datacentre, as well as reducing carbon emissions. The datacentre design can also take advantage of natural light which reduces energy requirements to power lighting for the datacentre.

5.2.4.5 Voice over IP (VoIP)

The study recommends the resuscitation of VoIP over the existing wide area network (WAN) in order to maximize network utilization, while at the same time reducing telephone costs for inter-branch connections. This can provide a platform for teleconferencing and other technologies which reduce telephone costs as there are no charges for communication within the bank regardless of physical location.
5.2.4.6 Procurement and disposal

In order to make an overall impact on sustainability, the research recommends that the procurement policy includes Green IT considerations. This can look at the nature of equipment suppliers and the equipment itself, and consider environmental standards such as Energy Star and the Electronic Product Environmental Assessment Tool (EPEAT) (Philipson, 2009). Evaluating the suppliers' environmental credentials is very important alongside the service levels, price, and performance considerations. The research also recommends exploring the possibility of identifying vendors who offer opportunities for hardware recycling at disposal, on top of the disposal through reuse that the bank is already practicing.

5.3 Follow up Studies

Follow up studies can be done on whether statutory bodies responsible for environmental management in Zimbabwe like EMA have embraced Green IT and what is it that they are doing to promote Green IT adoption by banks like NMB Bank. This is one area the researcher intended to cover, but could not as a result of resource and time constraints.
REFERENCES


59. RBZ. (2012). **RBZ Mid-term Monetary Policy Statement**. Reserve Bank of Zimbabwe

60. RBZ. (2013). **RBZ Monetary Policy Statement**. Reserve Bank of Zimbabwe


**APPENDICES**

**APPENDIX 1: SURVEY QUESTIONNAIRE**
RE: MASTERS IN BUSINESS ADMINISTRATION RESEARCH QUESTIONNAIRE

The researcher is a final year student, carrying out academic research in partial fulfilment of the requirements of the MBA degree program with the University of Zimbabwe’s Graduate School of Management (GSM). You are one of the few people who have been chosen to assist with your opinions by completing the attached questionnaire. The researcher would greatly appreciate it if you could assist by completing and returning the attached questionnaire.

This is a purely academic research. All the collected information will be treated with high levels of confidentiality and ethical standards will be followed in conducting the research. If you have any questions feel free to contact the researcher using the details below:

Email: brianmw@nmbz.co.zw
Contact Number: 0773 444 259

Thank you in advance for your assistance.

Yours Sincerely

__________________________
Brian Mwoyoweshumba (R073957Y)
MBA Research Student

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Questionnaire No……………………
(For official use only)

Instructions

• Do not write your name for confidentiality purposes
• Please put a tick in the appropriate box where needed
• If a question is difficult to answer, put your best approximation
• Please answer in full if an explanation is necessary

SECTION A

1. Gender

[ ] Female [ ] Male

2. Position in the organisation (Place an X in the appropriate box)

[ ] Manager [ ] Non Managerial

3. Department ______________________________________________________

4. Indicate your highest qualification (Place an X in the appropriate box)

[ ] Diploma [ ] Undergraduate degree [ ] Postgraduate degree [ ] Other

5. Are you aware of Green IT and its associated benefits? (Place an X in the appropriate box)

[ ] Yes [ ] No

SECTION B

6. Do you know the monthly telephone bill for your telephone extension?

[ ] Yes [ ] No

7. What is your typical monthly total telephone bill?

[ ] Below $20 [ ] $20- $50 [ ] $50-$100 [ ] Above $100 [ ] N/A

8. Do you use Voice over IP (VoIP) to make calls?

[ ] Yes [ ] No

9. Do you use an instant messaging application at work (e.g. Microsoft Lync, Google talk, iChat etc.)?

[ ] Yes [ ] No
If yes, state the application name

10. Does your IT department use remote access tools (e.g. NetMeeting, Windows Meeting Space, Remote Desktop Connection etc.) to offer user support?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

11. How often do you travel to meetings or for other business purposes per month?

<table>
<thead>
<tr>
<th>None</th>
<th>1 – 5 times</th>
<th>5 – 10 times</th>
<th>Above 10 times</th>
</tr>
</thead>
</table>

12. What is the average distance that you travel to attend meetings or for work purposes per month?

<table>
<thead>
<tr>
<th>None</th>
<th>1 – 40km</th>
<th>40 – 100km</th>
<th>Above 100km</th>
</tr>
</thead>
</table>

13. Are there staff members who sometimes work from home?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

14. What do you think can be done to reduce or minimise travelling at work?

Mark with an ‘X’, the best answer from the given options on each question below. For each of the statements give the response that best suits your opinion/feeling from the Five Point Likert’s scale as below:

<table>
<thead>
<tr>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
<th>DON’T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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</tbody>
</table>

15

<table>
<thead>
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<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</tbody>
</table>
16. Staff members in your unit typically switch off their computer equipment (computers, printers, photocopiers etc.) when they go home.

Yes  No  Not Sure

17. How does your computer behave when it is idle (not being used) for more than 30 minutes?

Remains switched on  Switches off  Hibernates

18. Do you know the monthly power consumption by your business unit?

Yes  No

19. What is your typical monthly power consumption?

Below 100Kwh  100–500 Kwh  500-1000 Kwh  Above 1000Kwh  N/A

20. What do you think can be done to manage power consumption at work?

Mark with an ‘X’, the best answer from the given options on each question below. For each of the statements give the response that best suits your opinion/feeling from the Five Point Likert’s scale as below:

<table>
<thead>
<tr>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
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<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

21

A There are unnecessary documents that are being printed
B Soft copies are generally preferred instead of printing
C There is a document management system
22. What do you think can be done to reduce printing?


SECTION C

23. Read and rank the statements below about your organisation according to your opinion

<table>
<thead>
<tr>
<th></th>
<th>Lowest Ranking</th>
<th>Highest Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The organisation is one of the top 5 most competitive in its industry</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Customers view the organisation as one of the top 5 competitive players in its industry</td>
<td></td>
</tr>
</tbody>
</table>

24. In general, why do you think your organisation ranks high or low competitively?


35. What can be done to strengthen ICTs and environmental awareness among staff members?


APPENDIX 2: INTERVIEW QUESTIONS

1. Do you have a Green IT governance structure? What is it like?

2. Do you have a Green IT strategy? In general what is it like?

3. Do you have a datacentre Green IT policy?
4. Do you have mechanisms to measure datacentre power consumption patterns?

5. What datacentre technologies are being used to conserve energy?

6. Are you using eco-friendly energy like solar and wind energy?

7. Are you using virtualisation?

8. Do you have an IT procurement policy which takes into account green issues?

9. How do you dispose old computer equipment?