Manager's Perceptions of the Relationship Between the Use of ICTs and Organisational Performance: Case Study of the Tuvalu Financial Services Industry

A thesis presented in partial fulfilment of

the requirements for the degree of

Master of Management

in

Business Information Systems

at Massey University, Albany

New Zealand.

Taufia Patolo

2012

ABSTRACT

Many organisations have invested significant resources into the adoption and use of information and communication technologies (ICTs). This has triggered significant debate as to whether these investments are worthwhile. Much of the literature establishes a positive relationship between ICTs and improved organisational performance, but not in all contexts.

This study investigates the perceived relationship between the use of ICTs and the performance of the Tuvalu financial services industry (TFSI). It explores the views of managers in the TFSI about the level of ICT use and access, competitive advantage derived from the use of ICTs, challenges of implementing ICTs and integration of future ICT tools. The resource-based value (RBV) framework is used to develop a conceptual model. This model is tested in a positivist paradigm using semi-structured interviews in a qualitative approach.

The study finds that the TFSI managers believe that the performance of the industry has benefited from the deployment of ICTs, particularly in collaboration, efficiency, data monitoring and communication. The study finds support for increased competitive advantage for the industry from transformation of TFSI operations and increased institutional knowledge. Key challenges to fully optimise the potential of ICTs include unreliable Internet connectivity, limited financial resources, mismanagement of equipment and the threat of computer viruses. Technologies for future integration include automated teller machines (ATMs), credit cards and a centralised computer database.

The research has important implications for both theory and practice and the study provides recommendations that could be used to improve the performance of the TFSI. The study contributes to a better understanding of the relationship between ICT and organisational performance in the context of a financial services industry in a small Pacific Island nation.

ACKNOWLEDGEMENTS

This thesis is dedicated to my two adorable children, Vaieli T Patolo, and Patolo Massey T Patolo, and in loving memory of my beloved father, Patolo Elisaia.

Firstly, I would like to thank almighty GOD for his guidance and blessing upon me along this long journey. I owe my thanks to many people who have provided academic and emotional support in my journey. I am grateful to all of you who have contributed in some way to this research.

My sincere thanks to Dennis Viehland, my supervisor, whose knowledge, assistance, invaluable guidance and academic direction was greatly valued. I could not have done better without your assistance.

I also wish to express my gratitude to the Secretary of Finance for providing office space during my fieldwork in Tuvalu. I am also filled with gratitude to staff of the Tuvalu Treasury for their great hospitality, generosity and cordiality expressed to me during my fieldwork in Tuvalu.

Many thanks also go out to the Government of New Zealand for providing me with the scholarship and opportunity to study in a beautiful country and a wonderful University, Massey. The financial and logistical support for pursuing my home-located research was highly appreciated and my special thanks to Sylvia Hooker, Olive Pimentel and Anita Albert for the many supports in that regard.

The journey would not have achievable without the financial assistance I received from the School of Management, Massey, Auckland to assist with final printing and binding of my thesis as well as the generous support received from the College of Business.

To my family and friends who have been most supportive and encouraged me along the way, I am thankful for your support. Special thanks also goes to my hosts in Auckland, Teaila and Ana, for looking after my family when I was away to do my fieldwork.

Last but not the least, my sincere gratitude to my mother, Sagatua, sister, Alofagia and brother, Elisaia, for their emotional support as well as for remembering me in your prayers. To my children, Vaieli and Patolo, your companionship kept me grounded and I am filled with gratitude for having you two by my side. To my wife, Teise, thank you very much for the many sacrifices that you have made for me to pursue this research. Your unwavering support, confidence in me and encouragement has now earned recognition and I now look forward to realising our future vision together.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

ACCPAC	Accounting Package
ADB	Asian Development Bank
ATM	Automated Teller Machines
DBT	Development Bank of Tuvalu
EVI	Environmental Vulnerability Index
GDP	Gross Domestic Product
GOT	Government of Tuvalu
ICT	Information and Communication Technologies
IMF	International Monetary Fund
MCIT	Ministry of Communication, Information and Technology
MFEPI	Ministry of Finance, Economic Planning and Industry
MYOB	Manage Your Own Business
NBT	National Bank of Tuvalu
OECD	Organisation for Economic Co-operation and Development
PIFS	Pacific Island Forum Secretariat
RBV	Resource-Based Value Framework
SOPAC	South Pacific Applied Geoscience Commission
SPC	Secretariat of the Pacific Commission
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TFSI	Tuvalu Financial Services Industry
TNPF	Tuvalu National Provident Fund
TTC	Tuvalu Telecom Corporation
TTF	Tuvalu Trust Fund
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNEP	United Nations Environment Program

CHAPTER 1 - INTRODUCTION

1.1 Introduction

Since the emergence and extensive use of information and communication technologies (ICTs) over the past two decades, business organisations and government agencies have experienced significant changes to their business practices and strategies. Within this period, many organisations have invested a substantial amount of time, money and effort into the adoption of these technologies. It is estimated that the total annual worldwide expenditure on ICTs roughly exceeds one trillion US dollars per annum (Seddon et al., 2002) and now pervades almost every aspect of business operations. However, despite the widespread use of ICTs, it is surprising to note that the benefits gained from such investments have been hotly debated in many articles by both academics and practitioners (Kauffman & Weill, 1989; Alpar & Kim, 1990; Barua & Lee, 1997; Carr, 2003; Lin & Shao, 2006). While some progress has been made in this area, significant gaps and shortcomings still remain, which present a major challenge to senior management in general and ICT experts specifically (Mahmood & Mann, 1993). It is clear that the general understanding of the value of ICT in organisations is at best, incomplete. This challenge is more prominent in developing countries like Tuvalu than well-developed countries. Typically, this is due to large distances to international markets, small scale domestic markets, scattered population, low level of investments in ICTs and inadequate human resources capacity in developing countries.

1.2 Problem Statement

Since 1999, there has been an enormous increase in use of and spending on ICT in Tuvalu (Tuvalu Telecommunication Corporation, 2006 & 2010; Government of Tuvalu, 2006 & 2011a). While telecommunications-related ICT headed the group, the financial services industry was clearly a major system and software investor in Tuvalu (see Table 1). Due to the need to increase its efficiency, competitiveness and productivity, the Tuvalu financial services industry (TFSI), collaboration with the Tuvalu telecommunications industry, continues to invest heavily in networking infrastructure

and software packages to make business processes more efficient (Government of Tuvalu, 2005a; Asian Development Bank, 2008).

Table 1: TFSI System and Software Investment

Organisation	ICT Investments Period: 2000 – 2005	ICT Investments Period: 2006 – 2010
Development Bank of Tuvalu	Computer hardware MYOB system	Loan management system MYOB new version
National Bank of Tuvalu	Client database system Computer hardware	Swift banking system Money Gram System Internet infrastructure
Tuvalu National Provident Fund / Colonial	Computer hardware MYOB system	Loan management software MYOB new version
Ministry of Finance	Office equipment Desktop computers Old DOS ACCPAC	Laptops New Windows ACCPAC PC trade system Revenue management system

Source: NBT, 2006 & 2011a; DBT, 2006 & 2011a, TNPF, 2006 & 2011a, GOT, 2006 & 2011a.

This enormous level of investment in ICT leads to a strong need to better understand its relationship with organisational performance as previous studies in this area conducted in other countries (e.g., Loveman, 1994; Weill & Rosen, 1995; Brynjolfsson & Hitt, 1996; Strassman, 1997; Baldwin & Sabourin, 2002; Devaraj & Kohli, 2003) have produced conflicting results. However, it is quite clear that a lack of consistent definitions, differences in research designs and differing measures for organisational performances have further complicated research findings (Banker & Kauffman, 1988; Weill & Olson, 1989; McKeown & Curran, 2003).

This research investigates the perceived relationship between the use of ICT and the performance of the Tuvalu financial services industry. Due to its geographic dispersion with a limited population base for economic growth, the Tuvalu economy can be described as somewhat fragile and quite volatile. Therefore, ICT investment is considered a significant option for its economic and social development as it is the key to ending the despotism of distance (Pacific Island Forum Secretariat, 2004).

This research study is important because the Tuvalu financial services industry continues to invest in ICT. The international literature on this subject has produced

mixed results, so this research addresses the issue through a qualitative approach which explains the scenario in Tuvalu. The research explores the validity of the business value assessment, and therefore offers insight into the topic for the benefit of the Tuvalu financial services industry and for the country.

1.3 Purpose and Research Questions

Recognising that ICT continues to permeate various organisations at much deeper levels, this research is particularly important in the case of the Tuvalu financial services industry as evidence (Pacific Island Forum Secretariat, 2004; Asian Development Bank, 2007) suggests that, despite a substantial investment, a responsibility to understand the performance effects of this investment remains unaddressed. This topic is not well researched in developing countries so this thesis contributes to the research area of ICT and its performance effects within small developing countries. As a result, the purpose of this research is to determine the perceived relationship between the use of ICTs and the performance of the Tuvalu financial services industry. Specifically, the main objectives of this research are:

1. To investigate the perceived relationship between the use of ICT and organisational performance in the TFSI.
2. To identify the sources of competitive advantage offered by ICT investment in the TFSI.
3. To identify the challenges TFSI employees encounter when using ICT tools in their organisation.
4. To determine expectations for changes in organisational performance from future ICT investment.

The research questions pursued to address these objectives are:

1. What are the finance employees' perceptions of the relationship between the use of ICT and their organisation's performance?
2. What are sources of ICT competitive advantage in the TFSI?
3. What are the challenges TFSI employees encounters when using ICT tools?

4. What are the expectations for changes in organisational performance from future ICT investments?

The first question allows the participants to express and share their perceptions of the use, access and positive impact of ICTs within the Tuvalu financial services industry. Question two identifies whether these ICT tools create a competitive advantage for the TFSI organisations. With the utilisation of the resource-based value framework, this question enables the researcher to identify sources of competitive advantage within the TFSI as a result of using various ICT tools.

In the third question, problems encountered by managers in ICT deployment were sought in order to assess the costs that the TFSI experiences from using ICT tools. With the rapid pace of change in today's technology, it is essential that managers keep abreast with technologies in order for them to fully discharge their roles and responsibilities more effectively and efficiently (Pearlson & Saunders, 2010). Finally, question four assesses the level of employees' expectations of future integration of advanced ICTs.

1.4 Background

An evaluation of the existing literature shows that there are numerous studies that have attempted to verify the relationship between investment in ICT and organisational performance (e.g., Cron & Sobol, 1983; Bresnaham, 1986; Banker & Kauffman, 1988; Wooldridge & Floyd, 1990; Weill, 1992; Koh et al., 2000). As shown in the literature review in Chapter 2, these research studies have identified a number of limitations and constraints which have made the results difficult to generalise. Where studies did focus on a single economic sector, there has been no distinction made between different industries, and thus no contribution to the generalisability and comparability problems (Bresnaham, 1986).

With a limited and weak resource base, a high degree of vulnerability to external economic factors and limited economic opportunities, Tuvalu is caught between its

aspirations to develop its ICT infrastructure and its ability to implement the appropriate kind of infrastructure that strengthens cooperation between stakeholders, improves service delivery and increases organisational productivity. In a small economically disadvantaged country such as Tuvalu, where social and business interaction is limited by distance and cost, ICTs represent a particularly powerful tool as they offer a cost-effective means to communicate with family, friends, other citizens, businesses, organisations and government. Furthermore, ICTs expand horizons through opening new and immediate gateways for information gathering and exchange, thereby supporting the development of a knowledge-based society.

Acknowledging a systematic approach is required to study investment in ICT, the resource-based value (RBV) framework is chosen as the most appropriate theoretical framework to guide this study due to its focus on the value of resources and capabilities. The RBV framework argues that a firm's source of competitive advantage or higher performance lies with the resources and capabilities it owns and controls (Wernerfelt, 1984; Grant, 1991). The RBV framework is grounded in the seminal work of economists concerned with firm heterogeneity and imperfect competition (Chamberlin, 1993; Robinson, 1993). Within the context of the RBV framework, business strategy is concerned principally with achieving greater profits and obtaining a position of competitive advantage over others. Given that the RBV theoretical framework focuses on value and sources of competitive advantage, it's utilisation in this study provides guidance to examine ICT use within the Tuvalu financial service industry.

To gain an in-depth understanding of the perceptions of the relationship between the use of ICT and the performance of the Tuvalu financial services industry, the research utilises a qualitative approach using a semi-structured interview methodology to collect the necessary data from current and former employees of the TFSI.

1.4.1 Overview of Tuvalu

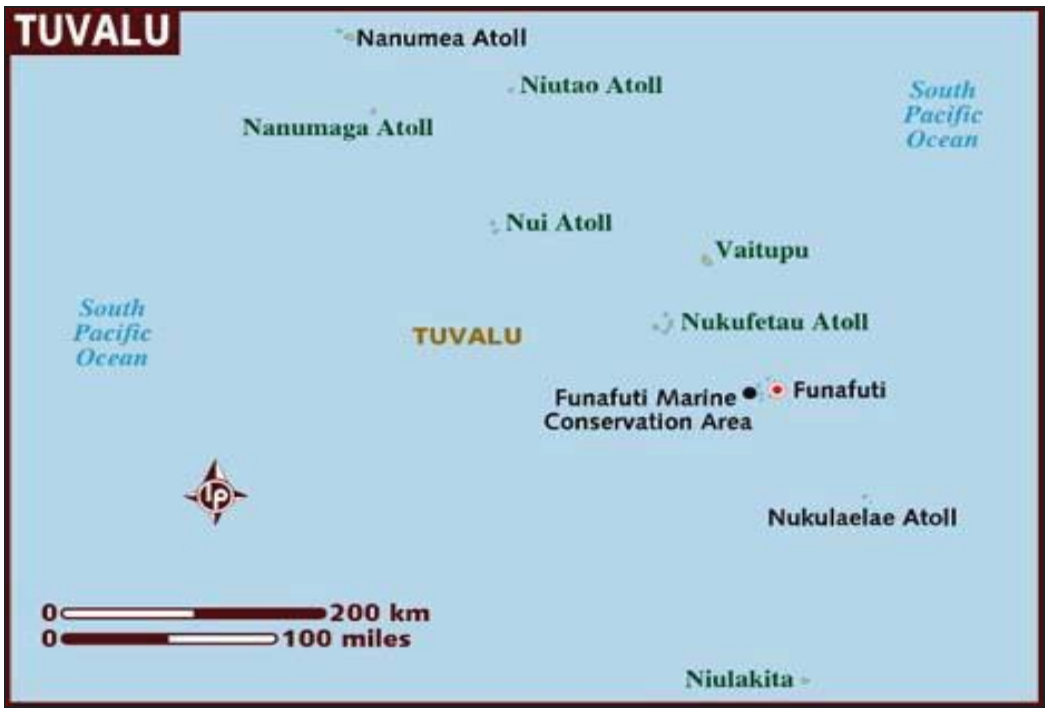
Tuvalu is a small, independent remote atoll nation in the South Pacific, located between Hawaii and Australia. It consists of nine low-lying islands and has a total land area of just 26 kilometres. It was formerly known as the Gilbert and Ellice Islands under the British administration. Tuvalu gained its independence on 1st October 1978 and became an independent state. Its name "Tuvalu" refers to "eight standing together" reflecting the eight low-lying islands of Nanumea, Nanumaga, Niutao, Nui, Vaitupu, Nukufetau, Funafuti and Nukulaelae (see Figure 1). The ninth island, Niulakita, was not included in the name Tuvalu as it was only considered as a safety population alternative for the then most populated island, Niutao (Goldsmith, 2005). In terms of its government, the powers of the Tuvalu government are exercised by three equal independent bodies – the executive branch, the legislative branch and the judiciary branch. The Tuvalu government follows a parliamentary governmental system.

Tuvalu is classified as a least developed country (LDC) by the United Nations, and it is rated as extremely vulnerable on the region's Environmental Vulnerability Index (EVI), developed by the South Pacific Applied Geoscience Commission (SOPAC) and the United Nations Environment Program (UNEP) (Secretariat of the Pacific Community, 2005). The people of Tuvalu are ethically Polynesian; the Tuvaluan language is very similar to the Tokelauan and Samoan languages. About 91% of Tuvaluans are Protestant Christians which is a legacy of the London Missionary Society (LMS) during colonisation. The other denominations (Baha'i, Seventh Day Adventist, Brethren Church and Jehovah Witness) constitute the remaining 9% of the population (Secretariat of the Pacific Community, 2005).

The national population census conducted in 2002 recorded a total population of 9,561 comprised of 4,729 males and 4,832 females, including short term visitors at that time. In 2005, the South Pacific Commission reported that the total population for Tuvalu was 9,359, apportioned as 4,647 males and 4,712 females also including short term visitors. The figures show a slight decrease in the total population of Tuvalu as the

number of emigrants increased between the years 1991 – 2005. Emigration increased due to more people moving to New Zealand under the Pacific access scheme, more Tuvaluan seafarers working abroad and more Tuvaluan students studying and working abroad (Lototele, 2006; Bolland & Dollery, 2007).

Figure 1: Map of Tuvalu



The Tuvaluan economy is small, fragmented and highly vulnerable to external economic shocks. From 1996 to 2002, the economy was growing at a rate of 7% per annum and the growth of almost all sectors resulted from expansion of the public sector (Asian Development Bank, 2003). The annual gross domestic product (GDP) was estimated to be US$27.1 million in 2009, with per capita GDP of US$2,447. Real GDP is estimated to have grown relatively strongly from 2006 to 2008 reaching an annual growth rate of 7 percent in 2008, then declining by 2 percent in 2009. Inflation was moderate over the period 2006 to 2008 reaching an annual rate of 10 percent in 2008, while prices declined slightly in 2009 and 2010. Services, including government, account for roughly two-thirds of GDP, while agriculture accounts for just less than one quarter of GDP (International Monetary Fund, 2011). Most of the economic market-based activities are operating on the main island, Funafuti. The majority of the

population remains dependent on traditional subsistence activities such as farming and fishing.

Tuvalu has long been recognised as an aid dependent country with its economy characterised by substantial offshore incomes, which make national income significantly more than its GDP. The major sources of offshore incomes are generated from its overseas investments which include the Tuvalu Trust Fund (TTF), the Tuvalu Internet domain name (.tv), license fees from overseas vessels fishing in the Tuvaluan waters and income from Tuvaluans working in the international shipping market (Government of Tuvalu, 2005). The opportunity for young Tuvaluan men to work as seamen on overseas merchant vessels is very important as it generates a total remittance of AUD$2-4 million per year for the country of which approximately 34% of the total households receive remittances (Secretariat of the Pacific Community, 2005; Asian Development Bank, 2007). Other indicators of social and economic development include: life expectancy at birth is 64 years; total fertility rate is 3.2 births per woman; infant mortality rate is 30 per 1000 live births; births attended by skilled personnel is 98 percent and adult literacy is 99 percent (Asian Development Bank, 2007).

1.4.2 Overview of the Tuvalu Financial Services Industry (TFSI)

The financial services industry is an important part of any economy, and the Tuvalu financial services industry is no exception. By definition, financial institutions are financial intermediaries acting as conduits through which the funds of many savers are channeled to borrowers who cannot raise money directly (De Lucia & Peters, 1998). The financial services industry also includes insurance companies and institutions that handle payments and facilitate processing of financial transactions.

The Tuvalu financial service industry (TFSI) is regulated by the Tuvalu government financial legislation body. The TFSI plays a vital role in the economy and principally consists of the National Bank of Tuvalu (NBT), which is a commercial bank, the Development Bank of Tuvalu (DBT), the Tuvalu National Provident Fund (TNPF), the Colonial Insurance Company and the Ministry of Finance within the government.

These institutions are all state-owned enterprises. Until recently, Colonial was privately owned but merged with TNPF in May 2011. The Colonial insurance operation in Tuvalu started in 2000 with very limited product offerings, principally life insurance cover and investment services.

As the demand for financial services increases, Tuvalu is facing a number of key challenges in generating sufficient economic development and concurrently developing efficient and sustainable financial service delivery mechanisms. At the same time, Tuvalu is also facing constraints with its geographic isolation, population dispersion, poor infrastructure, limited natural resource base, economic dominance of the public sector, a small and under-developed private sector, and communal language and land tenure uncertainties. A combination of these constraints has led to a diminished level of economic activities and opportunities, thus raising the cost of traditional financial service operations to levels that cannot be supported by the sparse population. The realities of these constraints are quite overwhelming and there are currently no simple methods or solutions to overcome these shortfalls.

1.4.3 Information and Communication Technologies (ICTs) in Tuvalu

Against the background of many previous studies (e.g., Brynjolfsson & Hitt, 1996; Pettigrew et al., 2001; Grant et al., 2002; Lin & Shao, 2006) and for the sole purpose of this research, the ICT definition utilised in this study is the one proposed by Cohen, et al. (2002, p. 35) which states that ICT is:

> A family of electronic technologies and services used to process, store and disseminate information, facilitating the performance of information related human activities, provided by, and serving the institutional and business sectors as well as the public at large.

Despite previous studies (e.g., Schwartz, 1990; Malecki, 1991; Graham & Marvin, 1996; Target, 2007) that have argued that the concept of ICT is somewhat dubious, the reality remains that ICT has become a very popular focal point of public policy due to its expected high economic benefits. This has caused some researchers to suggest that

technologies should be interpreted in a broad sense. For example, Salomon (1998) states that ICT in general is a social construct, not merely a collection of hardware.

With ICT underpinning the way businesses operate, many international businesses have increased their spending even during times of recession and hardship (Weill, 1992; Koh et al., 2000). The rate of business spending on ICT is growing at a very fast pace to ensure that it matches the constant changes in technology. The evolution of ICT has, in total, become a pillar of development and nation building for both developed and developing countries (Rahman, 2008; Shih et al., 2008). Many countries are realising the importance of ICT in almost every facet of the economy as ICT has penetrated not only the economic sector of an economy, but also social life styles (UNESCO, 2001).

The developing world has been increasing its investment in its ICT infrastructure to benefit from the opportunities presented by emerging technologies (Secretariat of the Pacific Community, 2001; Organisation for Economic Co-operation and Development, 2003). In that respect, Tuvalu has been building its ICT infrastructure, facilitated by the establishment of a Ministry for Communication and Information Technology (MCIT) in 1998. The establishment of the MCIT facilitates Tuvalu's transition into the global information society through enhancing the Tuvalu government's ability to coordinate and monitor TFSI systems.

Moreover, the MCIT expands the telecommunications infrastructure that leads to the opening up of a mobile telephone network, expanding Internet connectivity to the outer islands and supporting the development of information systems databases among government, private and non-profit organisations. Through the development and coordination of ICT investments, the government of Tuvalu has made it a priority to focus on the growth of the ICT industry, thus becoming a catalyst for the nation's development effort. This was a collective effort that was put together by a number of government ministries including the Ministry of Finance, Economic Planning and Industries (MFEPI).

The ICT sectors in Tuvalu have experienced significant improvement as a result of appropriate facilitating structures, particularly competitive reforms and market entry reforms which have led to improved service availability, reach and pricing (see Table 2). Despite the importance of ICT for economic and human development in Tuvalu, its benefits are far from clear (Meng & Li, 2002; Pacific Island Forum Secretariat, 2010). This is due to the fact that Tuvalu lacks capital investment and knowledge, and therefore lags far behind in ICT development and diffusion as opposed to developed countries.

Table 2: Tuvalu Data on ICT

	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Telephone lines (per 100 people)	9.3	10.6	10.9	13.1	14.4	19.2
Internet users (per 100 people)	10	12	19	28	36	47
Mobile phone subscribers (per 100 people)	N/A	8	10.7	13.6	14.1	16
Households with a TV set (per 100 household)	5.23	5.50	5.66	5.71	6.04	6.55
Internet subscribers (per 100 people)	8	11	12.6	16.4	18.8	22
Population covered by mobile cellular network	N/A	6%	9.3%	13.8%	14.2%	16%
Fixed broadband subscribers (per 100 people)	N/A	N/A	4.8	5.2	5.7	6

Source: PIFS, 2010; TTC, 2010.

1.4.4 ICTs in the Tuvalu Financial Services Industry

The Tuvalu financial services industry has capitalised on the use of ICT in order to increase their products, services and delivery mode. The increased in the sheer volume of electronic transactions processed by the TFSI indicate that the Tuvalu financial services industry has accepted and capitalised on the use of electronic delivery mechanisms by installing new advanced accounting software packages. Since the introduction of the Internet to Tuvalu, more than 80% (Asian Development Band, 2009; National Bank of Tuvalu, 2011a) of all transactions between different financial institution in the country are now of an electronic nature. However, in the

consumption market, most transactions are paper based as services such as EFTPOS, ATMs, credit cards or Internet banking are currently not available in Tuvalu.

The National Bank of Tuvalu has opened up bank branches on the outer islands as they considered appropriate, given the level of technologies that they have invested in. The initiative was seen as a success as customers of the outer islands need the banking services to be delivered on a timely basis. In support of the finance industry placing a high emphasis on ICT, statistics show that the use of ICT by banks and the Ministry of Finance increased by 21% from 2001 – 2006 (Asian Development Bank, 2007). This clearly indicates that the industry spent a substantial amount of money on ICT including desktop computers, accounting software packages and Internet sustainability.

Furthermore, the Tuvalu National Provident Fund, Development Bank of Tuvalu and Finance Ministry have all substituted capital for labour by installing flexible, user-friendly and advanced accounting platforms either as replacements to their existing systems or improvements to the old ones. The result from these investments is an increase in industry productivity in terms of being able to reduce staff and delivery costs, increase ability to service a larger and more diverse customer base and to handle significantly higher transaction volumes (Asian Development Bank, 2009). The introduction of new accounting software packages with advanced technologies is slowly overtaking the traditional ways of doing business, thus ensuring a more efficient and effective finance industry. As new IT products are utilised, customers become more sophisticated and demand even more from the industry, hence pushing the range of financial services to be offered.

Statistics show that TFSI has spent a considerable amount in capital budget for ICT-related expenses since 2005 (see Table 3). As telecommunications comprises the highest proportion of expenses on new technologies, the TFSI constitutes around 40% of the national total ICT-related spending on an annual basis compared to other sectors like health or education (Government of Tuvalu, 2011a).

Table 3: TFSI Capital Budget Spending on ICT (AUD$)

	DBT	NBT	TNPF/ Colonial	Ministry of Finance	Total TFSI
2005	250,000	208,940	185,621	104,200	748,761
2006	267,060	87,550	26,950	45,000	426,560
2007	63,800	28,560	69,500	59,210	221,070
2008	19,000	59,117	65,505	171,000	314,622
2009	8,700	61,805	18,830	169,341	258,676
2010	42,300	17,330	25,900	164,921	250,451
2011	24,500	29,025	16,400	50,000	119,925

Source: NBT, 2011b; DBT, 2011b; TNPF, 2011b; GOT, 2011b.

Capital investment started in 2005 on a very low base. After several years of increases, investment has declined in each of the last 3 years. Justifying these investments is increasingly becoming an issue that senior management has to deal with. Considering that many benefits may not be realised until well after the investment is implemented, the issue of being able to quantify and relate the contribution of ICT investments to organisational performance remains an unresolved mystery (Powell, 1992). Therefore, this study contributes to the over-arching topic of research into the relationship between ICT investment and organisational performance using the Tuvalu financial services industry as the focus of this research.

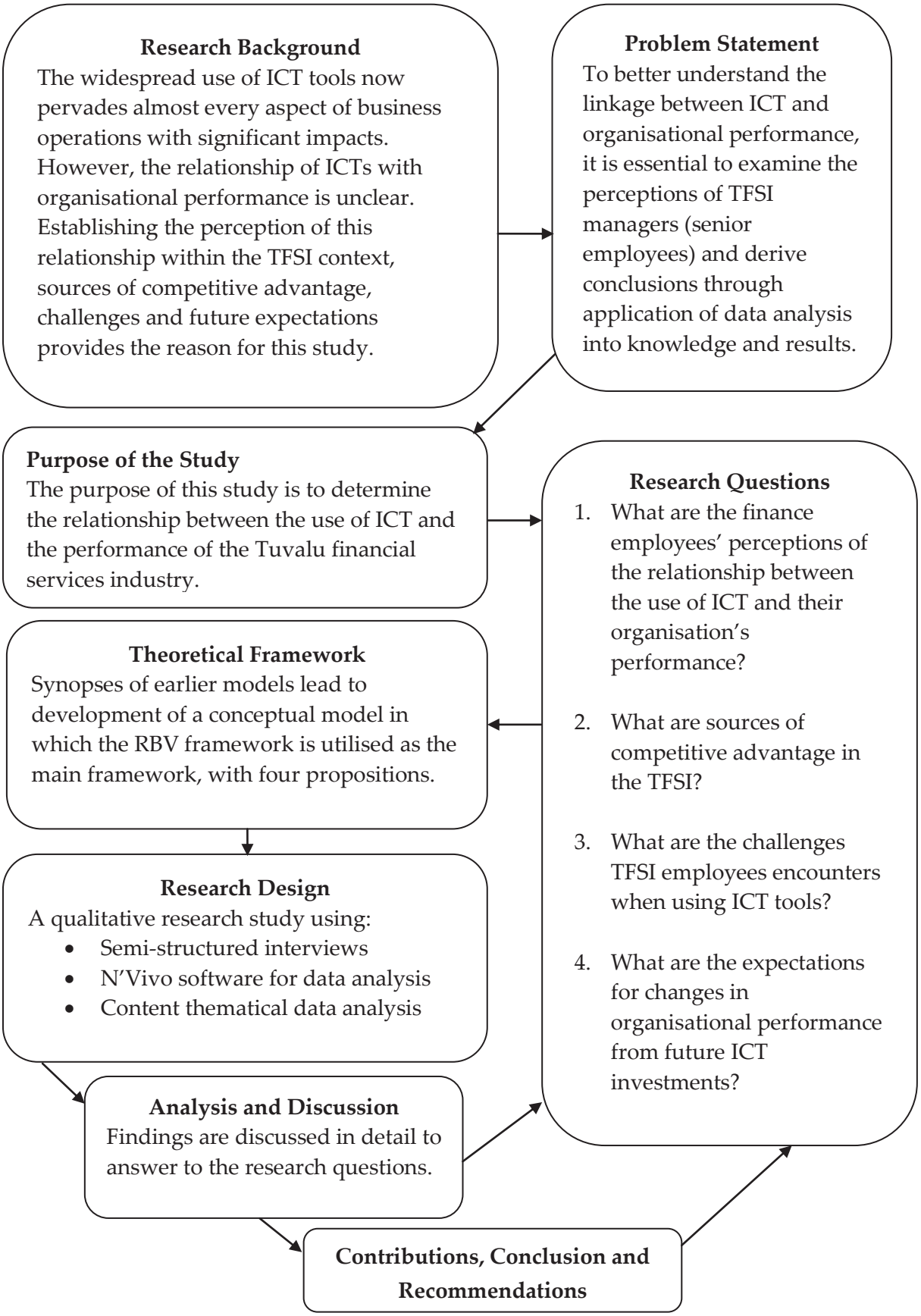
1.5 Thesis Outline

This thesis consists of seven chapters followed by a comprehensive list of references used in this study. Figure 2 depicts the outline of this research and describes how the chapters are linked.

1.5.1 Introduction

This first chapter has presented an overview of the research. It described the research in terms of the problem statement, objectives and background information on the country (Tuvalu) and the focus industry which is the Tuvalu financial services industry. The chapter concludes with a thesis outline and a summary of the sub-sequent chapters.

Figure 2: Outline of the Thesis



1.5.2 Literature Review

This chapter presents a review of the literature and discusses concepts underpinning the value of ICT investment and its relationship with organisational performance. The chapter begins with a thorough discussion of the background of the research problem and outlines the significant importance of the dependent (ICT) and independent (Organisational Performance) respective variables in this study. The productivity paradox is also discussed along with ICTs link to competitive advantage and a thorough empirical review of the literature in order to develop a clearer understanding of the literature on ICT and organisational performance. Furthermore, analyses of earlier models are discussed together with the RBV framework components in order to develop a conceptual model that better suits this study. This chapter also presents a review of the ICT level in developing countries, the importance of the study and a brief discussion on the existing gaps in current literature and how this study contributes to this particular field of research. The chapter concludes with a brief summary.

1.5.3 Conceptual Model

This chapter presents the proposed conceptual model. The model is strongly grounded in the literature and has five main components. The chapter begins with a discussion of the main components of the conceptual model along with the resource-based value framework. This is followed by synthesising the literature and the derivation of propositions to better address the research questions. The chapter ends with a brief summary.

1.5.4 Research Design

This chapter presents the research methodology employed in this research. The design builds on existing research literature and the chapter begins by describing different types of research paradigms and research questions. The method of data collection by semi-structured interviews is also outlined along with data analysis strategy. This is followed by a discussion of the issues around reliability and validity of the research design strategy and all its associated instruments. Furthermore, the ethical issues along

and strengths of the method are also discussed. The chapter concludes with a brief summary.

1.5.5 Results and Findings

This chapter presents the results and findings of this thesis in the sequential order denoted by the four research questions. The results are described and illustrated with quotes from the participants under each key themes emerged from the data.

1.5.6 Discussion of Findings

The chapter discusses the results in the context of the research questions in Chapter 1 through the application of the literature and the conceptual model developed in Chapter 3. The chapter begins with the testing of the conceptual model and the derivation of the extended model for TFSI. This is followed by a discussion of the findings in light of the key themes. Moreover, the research propositions are analysed and discussed in order to fully address the research questions. The chapter ends with a summary.

1.5.7 Conclusion

This chapter presents the contributions and conclusions of the research by providing summarised answers to the research questions. The chapter also outlines the limitations encountered when carrying out the research. The final section of this chapter provides recommendations for future research in this area of ICT and organisational performance.

CHAPTER 2 – LITERATURE REVIEW

2.1 Introduction

As ICT now permeates every segment of business, the challenge remains with business to fully maximise the opportunities created by these technologies to transform, generate and enhance their organisational performance. There is very little literature on this topic in the context of Tuvalu, undertaking this research will help fill this gap with respect to both Tuvalu and developing countries generally.

This chapter presents a review of the literature and guides the scope of this thesis on how managers perceive the relationship between ICT investments and their impact on organisational performance. The chapter begins with a thorough discussion of the background to the research problem and explains why this research is significant. As a result of the lack of consistent definitions in the literature, key definitions of words used for this study are also provided. The chapter then discusses the general concepts of ICT, the business value of ICT in general and the relationship between ICT and organisational performance. A theoretical framework including the chosen framework of resource-based value framework and its applicability to this study is also outlined. The penultimate section focuses on identifying and analysing the gaps in the field before the chapter concludes with a brief summary.

2.2 Research Background

The issue of understanding the business value of ICT continues to present a major challenge to senior management as well as to information system (IS) professionals. Mahmood and Mann (1993) concluded that given the general perception that ICT investment significantly improves a business' profit performance, senior managers are finding it difficult to determine the appropriate level of ICT expenditure in organisations.

There are two major classes of studies on the link between ICT and organisational performance. One class focuses on ICT business value but pays limited attention to

organisational context as a moderator while the other focuses on the impact of ICT on organisational structure, but does not analyse its implications for business value. Acknowledging these forms of study, this research builds on the existing research of ICT and aims at investigating the relationship between the use of ICTs and the performance of the Tuvalu financial services industry. As alluded to earlier, the TFSI was chosen as the focal industry because of the substantial investments in ICTs made by different organisations of the TFSI over the years. With such investment comes the expectation for the industry (TFSI) to improve its organisational performance, hence the significance of this study.

2.2.1 Information, Communication and Technologies

As a dependent variable of this study, information and communication technologies are a major factor contributing to the way businesses operate nowadays (Evans, 1999; Keen, 2000; Lin & Shao, 2006). Most organisations, regardless of industrial sector, are heavily dependent on their ICTs. Indeed, since 1990, ICTs have become inextricably intertwined with business as it is now considered an accepted way of conducting business transactions (Wooldridge & Floyd, 1990; Clemons & Row, 1991; Powell & Dent-Micallef, 1997). Despite its importance, there is no unambiguous worldwide agreement on the accepted definition of ICT as the concept, method and application surrounding ICTs continues to evolve at a constant pace. Arguably this inconsistency in definition may have contributed to some of the problems and weaknesses identified in previous studies (e.g., Hildebrand, 1994; Dewan & Kraemer, 2000; Mahmood & Mann, 2000) which are discussed later in this chapter. At face value, ICTs include various technologies and system applications which enable processing, storing and sharing information electronically to different users (UNESCO, 2001). However, in order to apply a measure of consistency in the use of the terminology, the following definition (Cohen-, et al., 2002, p. 35) is the one that is adopted and used throughout this thesis. Repeated here from Chapter 1:

> A family of electronic technologies and services used to process, store and disseminate information, facilitating the performance of information related

> human activities, provided by, and serving the institutional and business sectors as well as the public at large.

By common definition, ICT includes computer hardware, computing software and various technologies such as photocopiers, digital cameras, interactive whiteboards, mobile phones and facilities like the World Wide Web (WWW) and the Internet (UNESCO, 2001; Target, 2007). The speedy acceleration in telecommunications and computing since 1995 (Donath, 1999; Lin & Shao, 2006) has transformed business delivery mechanisms, the way managers think, interactions with suppliers and methods for managing employees. The invention of the central processing unit (CPU) in the late 1960s provoked technological innovations in terms of computers, system software, networking and the Internet which transformed the entire world of business (Carr, 2003). This intervention transformed business to a much deeper level and created an ever changing environment with new business opportunities in terms of cost reductions (Wooldridge & Floyd, 1990), transmitting information (Mata et al., 1995; Powell & Dent-Micallef, 1997), wide coverage (Fraser et al., 2000) and easy accessibility (Tech Target, 2007). Moreover, the increased use of ICT tools presents multiple opportunities for business to obtain, process and transform information at a reduced cost (Porter & Millar, 1985) and at the same time underpins the core operational links between businesses and customers (Carr, 2003).

The ICT sector is vitally important for economic development, employment and export growth (Oshikoya & Hussain, 2007) as its extensive use within the economy has positively affected services such as finance, business and resource distribution especially in countries with high and increasing levels of ICT penetration and diffusion (Pilat, 2003). However, the presence of other associated resources such as the regulatory framework environment, effective government policies supporting ICTs, availability of human resources, adequate foreign investment, schemes of innovation and level of awareness are also influential. Without these, even countries with high ICT penetration levels would not be able to experience the full impact of ICTs on their performance (Pilat, 2003; Oshikoya & Hussain, 2007). With ICTs acting as an impetus

for today's business success, the level of business expenditure on ICTs has also continues to grow at a very fast pace. Total capital expenditure on ICTs was less than 5% of the total American capital expenditure in the early 1960s. However, this figure increased dramatically to 15% in the 1980s, to 30% in the early 1990s and approximately over 50% by the late 1990s (Carr, 2003). The increase in capital expenditure was also experienced in the United Kingdom where it is estimated that capital expenditures on ICTs have increased almost ten-fold since the 1980s (Carrington et al., 1997). The purchase of information technologies such as computer hardware and software are among the fastest growing components. This accelerated ICT expenditure created an interest among scholars, practitioners and general managers to better understand the value derived by an organisation from such investments. This has led to numerous studies conducted to examine the value of such investment and its impact on organisational performance (e.g., Brynjolfsson & Hitt, 1996; Powell & Dent-Micallef, 1997; Bharadwaj, 2000; Devaraj & Kohli, 2000; Carr, 2003; Lin & Lin, 2006; Pavlou & El Sawy, 2006). Table 4 outlines key findings of these studies.

Although one could argue that increasing expenditure in ICTs would naturally lead to improved organisational performance, Harris and Katz (1991) proposed that was simply not the case. A study conducted by the management productivity technology group (1984), which was also cited in Weill and Olson (1989), argued that caution is required when making connections between ICT investment and organisational performance as increased ICT spending may only result in an improved organisational performance if the organisation has a superior market base. While some research has demonstrated that ICTs are valuable (e.g., Barua & Lee, 1997; Devaraj & Kohli, 2000), other empirical studies conclude that ICT impact on organisational performance has failed to live up to expectations (e.g., Harris & Katz, 1991; Brynjolfsson & Yang, 1996). It is on this subject that much of the ongoing debate of whether ICT influences organisational performance prevails. This is often known as the productivity paradox (e.g., Hildebrand, 1994; Dewan & Kraemer, 2000; Mahmood & Mann, 2000). The productivity paradox is discussed further in Section 2.5.

Table 4: Key Findings of Past Studies

Study	Key Finding
Paradox lost? Evidence on information systems spending returns (Brynjolfsson & Hitt, 1996)	Positive relationship between information technology and organisational performance.
Information technology as competitive advantage (Powell & Dent-Micallef, 1997)	ICT resources are used to leverage intangible complementary human and business resources. Overall, study finds a positive relationship.
RBV perspective on information technology capability and organisational performance (Bharadwaj, 2000)	Firms with ICT resources tend to outperform firms without ICT resources.
Influence of information technology on performance (Devaraj & Kohli, 2000)	ICT resources are valuable and influence organisational performance.
IT doesn't matter (Carr, 2003)	ICTs are so pervasive that advantage is hard to achieve and impossible to maintain.
International productivity paradox of IT in commercial banking (Lin & Lin, 2006)	ICT resources generate positive organisational performance.
Gaining competitive advantage in unstable condition from IT leverage competencies (Pavlou & El Sawy, 2006)	Unveiled contradictory results suggesting a proactive relationship between ICT and business competitive advantage.

2.2.2 Organisational Performance

Since organisational performance is the independent variable in this study, understanding its composition is vitally important. Organisational performance is usually measured via a set of performance indicators (Bazley et al, 1993; Smith & McKeen, 1993; Mahmood & Mann, 1993). In reference to the existing literature (e.g., Smith & Mckeen, 1993; Brown, 2005; Andrews et al., 2006), organisational performance is referred to as the organisation's ability to utilise its resources in order to create products more efficiently at a reasonable cost. This definition was derived from two related theories: organisation theory (Robbins, 1997) and stakeholder theory (Freeman, 1984). However, the growing number of organisational performance studies shows that this definition has been extended to incorporate other constituent factors such as

shareholders, customers and suppliers as opposed to earlier organisation and stakeholder theories (Freeman, 1984; Key, 1999).

Measuring or determining the value of organisational performance derived from ICT tools is highly problematic and many previous scholars and practitioners have raised this concern (e.g., Weill & Olson, 1989; Hawawini et al., 2003). This is due to the variety of social and economic indicators utilised, reflecting multiple challenge to studies in ICT and organisational performance. However, it is reasonable to assume that organisations in a similar industry will most likely utilise the same indicators (Barkos, 1987). This would create a set of consistent measures between different organisations within the same industry, which then could be used to compare different organisational performances for better generalisability of results (Palmer & Markus, 2000). Conversely, identifying such appropriate indicators may not be straightforward and this confirms the complexities of conducting research in this field. Further complicating and hindering this issue is the difference in timeframe of existing studies (Prattipati & Mensah, 1997). For example, while Cron and Sobol (1983) conducted their research over a five-year period, other more recent studies (OECD, 2002; Oshikoya & Hussain, 2007) were undertaken at a single point in time. Calls have been made for more longitudinal studies to accommodate the nature of ICT investment and organisational performance, as often ICT investments may impact organisation performance only after two to four years, (Weill, 1992; Brynjolfsson, 1993).

Within financial institutions, performance may be measured by a range of different key indicators including interest income, return on sales, return on investment, growth in revenue, sales growth, reduction in operating expenses and enhanced credit quality financial risks (Zucca & Campbell, 1992; Chan, 2000) to name just a few. Other recent empirical investigations confirmed that ICTs generate positive impact on organisational performance not only in terms of productivity, profitability, market value and shares, but also in intermediate performance measures such as communication, analysis, reporting, competitive advantage, staff training progress, efficiency, customer service quality, monitoring, collaboration, cost saving and

organisational flexibility (e.g., Bartelsman & Doms, 2000; Devaraj & Kohli, 2003; Melville et al., 2004). Nevertheless, the difficulty remains with determining how ICTs directly impact these indicators. To enhance the current knowledge on the relationship between ICT and finance organisational performance in this study is of vital importance.

2.3 Empirical Analysis of ICT Benefits

The literature on the relationship between ICT and organisational performance has grown in volume in the past two decades (e.g., Barua & Lee, 1997; Tallon et al., 2000; Ray et al., 2005). However, despite this increased volume, it is apparent that organisations have utilised ICTs in many different ways, and therefore the differences in the manner empirical research operationalised ICTs. For instance, ICTs have been employed for different purposes such as changing competitive positioning, logistics scheduling, accounting and providing services. These purposes have an impact on the content of ICTs present empirical studies (Computer Science and Telecommunications Board, 1994). Perhaps, the way in which ICTs are operationalised is the most significant difference as only a few empirical studies fully capture the proper use of ICTs in organisations (Devaraj and Kohli, 2003). With information and communication technologies supporting the way businesses operate and occurring at an increasing rate, previous studies conducted on this issue confirmed a number of benefits to organisations (Table 5) which are derived from ICT investment (e.g., Barua et al., 1995; DeSantics & Monge, 1999; Carr 2003; Poole & Van de Ven, 2004; Ray et al., 2005). A few key benefits are analysed in detail in the following subsections.

2.3.1 Links Employees for Communication and Collaboration

The use of ICT tools has increased the amount of communication in any organisation as opposed to face-to-face communication (Hiltz et al., 1986). This implies that ICTs have the ability to link employees and enable them to communicate effectively either within or between different functions and divisions of any organisation. ICTs allow a close collaboration link between any organisation and its clients, and therefore increase

Table 5: Benefits of ICT on Organisational Performance

Benefit(s)	Study
Link employees to increase communication and collaboration	Hiltz et al., 1986; Barua et al., 1995; Powell & Dent-Micallef, 1997; De Santics & Monge, 1999.
Codify knowledge base	Powell & Dent-Micallef, 1997; De Santics & Monge, 1999.
Increase boundary spanning	Powell & Dent-Micallef, 1997; De Santics & Monge, 1999.
Allow exploitation of new work mode structures	Davenport & Prusak, 1997.
Promote efficiency	Barua et al., 1995; De Santics & Monge, 1999; Powell & Dent-Micallef, 1997.
Increase a person's cognitive skills	Daft & Lewin, 1993; Pavlou & El Sawy, 2006.
Promote innovation	Ray et al., 2005
Increase data capturing, integrity, assimilating, storing and retrieving	Davenport & Prusak, 1997; Anand et al., 1998; Carr, 2003; Chowdury, 2003.
Reduce cost of communications	Brynjolfsson & Hitt, 1998; Chowdury, 2003.
Increase data analysis capability	Brynjolfsson & Hitt, 1998; Carr, 2003; Chowdury, 2003.
Allow faster external environment scanning and monitoring	Pettigrew et al., 2001; Poole & Van de Ven, 2004.

online interdependencies and information accessibility (Edmondson & Moingeon, 1998). Furthermore, the exploitation of new modes of structuring the workforce and improving employees' positive perceptions are also easily facilitated through the use of video and audio media in group settings (Davenport & Prusak, 1997). Through effective communication and collaboration, benefits such as increasing a person's self-esteem through experience sharing, feelings of commitment, feelings of organisational citizenship and shaping norms would be highly prominent (Hiltz et al, 1986; De Santics & Monge, 1999). Nevertheless, despite ICT serving as a link between an organisation and customers, it does not guarantee a positive impact on organisation communication and collaboration processes as some organisational members may lack the motivation, skills and commitment to take full advantage of system capabilities.

2.3.2 Codifies Knowledge Base

Acknowledging that memory has always been quite fallible, many organisational memories in terms of the ability to capture, codify, communicate, store and retrieve have been greatly facilitated by advance ICTs (Davenport & Prusak, 1997; Anand et al., 1998). The ability of ICT tools to improve the initial base knowledge from employees generates new skill and knowledge for staff, and hence reduces associated costs. However, the level of knowledge that employees gain from using ICT is not directly link to a competitive advantage in any organisation, but the velocity in which knowledge is circulated. On the downside, ICT tools could also lead to information overload within an organisation (Wood-Harber et al., 1990). Previous studies (e.g., DeSantics & Monge, 1999; Huber, 1999) have found that despite the vital importance of various ICT tools in codifying or enhancing the staff knowledge base, sorting through a large amount of data impede a manager's ability to make timely decisions. Although efforts have been made to mitigate this downside, research has called for further mitigating measures to negate the effect of information and data overload (Davenport & Prusak, 1997).

2.3.3 Promote Efficiency

The use of ICTs within an organisation addresses the efficiency issue by ICT's ability to offer high speed of communication and effectively handles movement of high volumes of data. ICTs reduce costs of communication, enhance information use, increase data analysis capability, enable faster scanning of external environment and allow effective monitoring of employees (Brynjolfsson & Hitt, 1998; Barringer & Harrison, 2000; Dewett & Jones, 2001; Chowdury, 2003). Similarly, Pickering and King (1995) advocate that the use of ICTs create effective personal ties and potential synergies for the organisation through obtaining relevant technologies, industry best practice and proficient work associations, hence promoting overall business efficiency (Dewett & Jones, 2001).

2.3.4 Promote Innovation and New Organisational Structures

The role of ICT tools in promoting innovation within organisations is highly recognisable (Ray et al., 2005). This is a result of the focus on enhancing ICTs properties for business efficiency. Associated with such innovation are the person's cognitive and intrinsic motivation skills which enable the potential for innovations to increase (Dewett & Jones, 2001). Furthermore, at a more macro level, ICTs are changing organisational forms and thus promoting innovation and creativity inside virtual organisational forms (e.g.-, Daft & Lewin, 1993; Pavlou & El Sawy, 2006). Moreover, unlike traditional rigid bureaucratic organisational forms, advanced ICT tools such as the Internet and mobile phones are more responsive to various pressures of business globalisation (Pettigrew et al., 2001) and increased uncertainty (Poole & Van de Ven, 2004). Consequently, as a result of ICTs being able to be more innovative and responsive, businesses gain tremendously in terms of their performance and market share (Dos Santos & Peffers, 1995), thereby negating doubts that a substantial amount of dollars invested in ICTs could have been better off invested elsewhere (Roach, 1987; Baily & Chakrabarti, 1998).

2.4 ICTs and Organisational Performance Analysis

There has been a dramatic shift in conceptualising and understanding improvements in organisational performance as a result of ICT interventions. These include modern perspectives on organisational processes, change management studies and interest in institutional context (Grant et al., 2002; Poole & Van de Ven, 2004). Resulting from these is a radical shift from a mechanistic conception of the organisation into a more entrenched and multifaceted process. Despite this radical shift, the literature fails to some extent in being able to engage systematically with these technological changes. This creates the danger of an increasingly social constructivist approach to change that endangers the material nature of technology. Orlikowski and Barley (2001) have been pressing this matter in their attempt to bring the issue of technology and organisational change together so that future research could embrace the essence of simultaneously understanding human roles embedded in institutional context.

Contrary to these arguments, studies conducted from the mid-1980s until the mid-1990s provide very little evidence of a positive relationship between ICT investment and organisational performance (Roach, 1987; Strassman, 1990; Weill, 1992; Loveman, 1994; Brynjolfsson & Hitt, 1996).

These early studies pose very decisive questions regarding the productivity of ICT investments: Does investment in ICT contribute to a firm's productivity or not? If so, to what degree do they actually contribute? If not, why not? Roach (1987) concluded that despite substantial ICT investments made between 1970 and 1980, the productivity of production workers increased by 16.9% whereas the productivity of information workers decreased by 6.9%. Strassman (1990) found no evidence of any relationship between ICT investment and organisational performance. Weill (1992) concluded that previous studies have failed to provide a clear picture of the relationship between ICT investment and organisational performance. This observation was also supported by later studies (e.g., Loveman, 1994; Brynjolfsson & Hitt, 1996) which found that the results of studies addressing the relationship between ICT and performance remain inconclusive and conflicting because of differing research designs and operationalisation.

In contrast, the second wave of studies which took place from the late 1990s and over the next decade provides empirical evidence of a significant positive relationship between ICT investment and organisational performance, most notably in business aspects such as output and labour productivity (Litchenberg, 1995; Gurbaxani et al., 1998; Gilchrist et al., 2001; Devaraj & Kohli, 2003). The overall conclusion that was drawn from this wave of studies is that combining ICTs with sound complimentary actions can significantly increase organisational performance targeting development of new work practises (Tallon et al., 2000; Ramirez, 2003), adequate business processes (Devaraj & Kholi, 2000), relevant skills (Brynjolfsson & Hitt, 2000; OECD, 2002) and effective organisational structure (Arvanitis, 2003). An examination of the literature reveals that studies by Lichtenberg (1995) and Brynjolfsson & Hitt (1996) were considered as the starting point of this second wave of research in this particular area.

Utilising an extensive set of data on ICT spending by large U.S. companies and a Cobb Douglas production framework, Brynjolfsson and Hitt (1996) found positive evidence of a statistical significant relationship. The study also concludes that the contribution of labour expenses and computer capital to firm output is much higher the non-computer and non-ICT labour expenses contributions. This statistically significant evidence reflects the substantial improvements in ICT management as well as the substantial restructuring undertaken at the firm level in the 1990s. Restructuring enables the organisation to gain a higher level of benefits from ICTs.

In support of the second wave, a number of Canadian studies (e.g., Baldwin et al., 1995; Baldwin & Sabourin, 2002; Baldwin et al., 2003) also found strong evidence of the relationship between ICT investment and organisational performance by linking technology surveys to longitudinal data of manufacturing plant performance. The studies concluded that the use of advanced technologies tends to generate productivity growth, hence gaining further market share, facilitating new organisational approaches, introducing significant organisational changes and enhancing performance (OECD, 2000). Nevertheless, despite this overall positive perception, Hartman (2002) remains concerned that ICT impact on organisational performance remains short of expectations.

Within this second period of research effort to better understand the contribution ICTs made to business performance, Black and Lynch (1997) argued that effective human resource management practices such as using ICTs by non-managers would undoubtedly contribute positively to organisational performance and overall productivity. In addition, Lee and Yang (2000) discovered that a combination of ICTs with decentralisation practises such as allocation of more resources, more flexibility in decision authority and self-managed teams have a disproportionately large positive effect on a firm's market value. However, it is necessary to further investigate this critical research issue in characteristics of other countries given that the results provided in these studies are conditional on the characteristics of the particular

contexts. Accordingly, the selection of Tuvalu and particularly its financial service industry as the setting for this study is very appropriate.

2.5 Review of the Productivity Paradox

Acknowledging that there is a substantial body of literature that discusses the relationship between ICT and organisational performance (e.g., Powell & Dent-Micallef, 1997; Tallon et al., 2000; Carr, 2003), the inconclusive findings have given rise to a long active debate within the arena of ICTs which is termed as "productivity paradox" (Brynjolfsson, 1993; Brynjolfsson & Hitt, 1998; Mahmood & Mann, 2000; Carr, 2003). The "productivity paradox" alleges that although there was no evidence to support an increase in productivity from investments in ICT, businesses continue to make ICT investments on that basis. In particular, a number of studies have argued that an explanation for the so-called "productivity paradox" can be attributed to an insufficient response of organisational changes to adapt the changing nature of business environment as a result of technology use (Sharpe, 1999: OECD, 2002). The methodological issues such as the increased quality of products, services, time lags and measurement problems captured the apparent problem of the productivity paradox (Triplett, 1999; Spithoven, 2003). Perhaps, the most typical illustration of this is automated teller machine (ATM) in banking where ICT investments did not increase the productivity of output (i.e., the number of transactions per banking employee). The benefits of the new automated banking service (i.e. more transactions without human intervention) were difficult to incorporate into both the corresponding productivity statistics as well as GDP growth calculations.

A growing number of quantitative studies also show that investments in ICT actually have a very positive effect on organisational performance (Brynjolfsson & Hitt, 2003; Lin & Lin, 2006). Since the 1990s, the discussion on whether ICT investments lead to improvements in business productivity remains debatable, despite different perceptions and findings of many studies (Brynjolfsson & Hitt, 1996; Mahmood & Mann, 2000; Carr, 2003). This dilemma was also recognised by Roach (1987) and was summarised by Solow (1987, p. 36) as "you can see the computer age everywhere but

in the productivity statistics". Markus and Soh (1993) further noted concerns that despite the efforts made by firms to invest heavily in ICTs, the productivity remained static.

In support of the productivity paradox issue, earlier studies have been inconclusive because of data collection problems, lack of generalisability and low and insignificant correlations. Van Nievelt (1999) investigated the productivity paradox and concluded that this concept had no foundation and that economic studies at the macro-economic level were not appropriate for analysing ICTs contribution. However, one of the weaknesses of the Van Nievelt study was the lack of effort to control for the effects of context in research design and analysis. This has a net effect on the overall context which could be a critical determinant for the ICT investment and performance relationship (Avgerou, 2001). Other literature also supports the proposition that the productivity paradox could have been created by mismeasuremet in effect, hence debunking the entire concept of the productivity paradox (Kauffman & Weill, 1989).

While earlier research noted the mismatch between increased ICT investment and productivity growth, later studies argued that the productivity paradox disappeared between the years 1987 – 1991 (Brynjolfsson & Hitt, 1996) as evidence emerged that ICT spending had indeed made substantial contributions to organisational outputs. The Secretariat of the Pacific Community (2001) and European Union studies (Goldrige & Clayton, 2005) demonstrate very strong evidence that ICT investments have produced positive effect. In addition, an OECD study (Colecchia & Schreyer, 2002) concluded that ICT investments in the USA, Australia, Finland and Canada contributed approximately 2-5% in the first half of the 1990s and reached 9% in second half. This is supported by another study conducted between 1995 – 2003 in which ICT capital investments contributes to the increase in productivity other than the combined effort of all non-ICT capital investments.

Furthermore, in the context of financial services, Frei et al., (2000) provide an excellent example of the falseness of the productivity paradox as it was demonstrated that

investments and use of ICT within financial services organisations increases quality, improves customer satisfaction and opens up new opportunities such as automated teller machines and Internet banking. In other research of direct interest to the current study, Dewan and Kraemer (2000) found that returns from ICTs are higher in developed countries while returns from non-ICT capital are higher in under-developed countries. These studies certainly provide an insight into the productivity paradox issue from an international perspective. Acknowledging the objectives of this research, it is evident that the question of the productivity paradox and other surrounding issues are extremely relevant in this study.

2.6 ICT Competitive Advantage

ICT competitive advantage and sustainability are critically important issues in ICT investment for increased productivity. As such, competitive advantage is defined as an "advantage over competitors gained by offering consumers greater value, either by means of lower prices or by providing greater benefits and services that justifies higher prices" (Porter, 1985, p. 21). There is no doubt that although ICT could provide sustainable business value, it rarely offers sustainable competitive advantage. This is because if a competitor already has, or soon will have captured the same ICT strategy, then the resulting competitive advantage would either be short-lived or non-existent (Mata et al., 1995). This is because ICT is so readily available and nearly a commodity or utility product like electricity (Carr, 2003).

As a result of ICTs being able to reduce costs and/or increase revenue, managers have different perceptions of ICTs competitive advantage. Despite the momentum that has been gained over the years on better understanding the ICTs impact on organisational performance, the literature offers conflicting results in terms of ICTs for competitive advantage. While some researchers (Turner & Lucas, 1985; Lin & Shao, 2006) or even practitioners (Banker et al., 1990) claim that ICTs does not act as a source of competitive advantage, others (Brynjolfsson & Yang, 1996; Santhanam & Hartono, 2003; Lin & Lin, 2006) have argued that the relationship between ICT and business competitive advantage is highly proactive. Table 6 summarises the major findings of

research studies on the question of the ICT investments and business competitive advantage that eventually affects organisational performance. The difference in these findings has somehow caused managers in different capacities to generate mixed perceptions of the issue.

Table 6: Relationship Between ICT Investment and Business Competitive Advantage in the Literature

Author(s)	Year	Major Findings
Turner & Lucas	1985	Negative result
Franke	1987	Negative result
Strassmann	1990	Negative result
Lin & Shao	2006	Negative result
Lucas	1975b	No result /effect
Cron & Sobol	1983	No result /effect
Banker & Kauffmann	1988	No result / effect
Lucas	1975b	Positive result
Harris & Katz	1988	Positive result
Banker, Kauffman & Morey	1990	Positive result
Harris & Katz	1991	Positive result
Weill	1992	Positive result
Brynjolfsson & Yang	1996	Positive result
Santhanam & Hartono	2003	Positive result
Lin & Lin	2006	Positive result

Table 6 clearly demonstrates that the findings of previous studies of the relationship between ICTs and business competitive advantage are contradictory, albeit being extensively researched. However, the results from most studies since 1990 provide empirical evidence of a positive and statistically significant relationship, as opposed to generally negative results from studies prior to 1990. Finally, other studies have found that combining ICT investments with complimentary actions targeting developing new work practises, business processes and organisational structures (Black & Lynch, 2000; Brynjolffson & Hitt, 2000; Tallon et al., 2000) can significantly increase business competitive advantage.

Based on the literature, there is a common perception and understanding that the combined value of ICTs with other organisational assets generates business competitiveness (Keen, 1993; Kettinger et al., 1994; Powell & Dent-Micallef, 1997; Ray

et al., 2005). For example, Keen (1993) found that combining ICT resources with existing organisational resources is the key to generating competitive success. Kettinger et al. (1994) concluded that building organisational infrastructure to enable innovative and adaptive strategies is an impetus to attaining sustained ICT competitive advantage. These findings were supported by Powell and Dent-Micallef (1997) who argued that information technologies that combined with sustainable resources tend to produce a robust and competitive business advantage. However, a main limitation of these studies is that most of them were conducted in the context of only a few countries, perhaps characterised by high levels of economic development and ICT diffusion, and therefore results could differ markedly across different countries.

As empirically concluded by Dehning and Stratopoulos (2003), only information system (IS) management skills are likely to be a source of sustained competitive advantage. Skills such as an information system manager's ability to understand and appreciate business needs, work with functional managers, co-ordinate IS activities and anticipate future needs are key fundamentals in generating sustainable business competitive advantage. This underpins the fact that what distinguishes organisations with high performance ICTs are not technical wizardry, but the way they manage their ICT activities in terms of organising and managing processes associated with ICTs. As a result, the concluding message that was derived from the literature is that technology on its own has little inherent value and is unlikely to be a source of sustainable competitive advantage. Through a combination of business changes and innovations, new business models and organisational changes, firms would be able to realise the real value derived from ICT investments, and hence the consequential focus on a combination of redesigning, rationalising and integrating internal processes using new software suites to increase connectivity with consumers, suppliers and trading partners. In addition, such rationalisation reduces business transaction costs and creates relationships via ICTs.

2.7 Resource-Based Value Framework (RBV)

The complex issue of linking the impact of ICT tools to organisational performance is informed by the insights of multiple theoretical paradigms. Nevertheless, the absence of a standard unified framework has led to a fragmented and fractured research stream with many simultaneous and non-overlapping discussions (Chan, 2000). To advance the field requires a more conceptual model that is not only based in theory but also considered to be theoretically suitable. With resources and capabilities considered essential to underpinning business performance and sources of competitive advantage (Rumelt et al., 1991), the resource-based value framework (RBV) has been viewed as a very useful framework to articulate which resources and firm capabilities can be combined to serve as competitive advantages (Barney, 1991). The RBV framework is grounded in the seminal work of economists concerned with firm heterogeneity and imperfect competition (Chamberlin, 1993; Robinson, 1993). These early theories emphasise the importance of firm heterogeneity as against market structure. Table 7 outlines some of the key early works of the RBV framework and their contributions.

Table 7: Early Works of the Resource-Based Value Framework (RBV)

Author(s)	Year	Major Contribution
Barney	1986a	Market characteristics determine possibilities for firm to earn rents.
Rumelt	1987	Essence of isolating mechanisms to earn rents. Firm's identity as rent-seekers.
Wernerfelt	1989	Strategic models with firm resources as central concept sustainable competitive advantage.
Prahalad & Hamel	1990	Core competencies as the key driver of corporate strategy. Important for business to exploit and leverage core competencies.
Collins & Montogomery	1995	Oriented review of the resource-based view framework.
Pisano, Shuen & Teece	1997	Dynamic capabilities as sources of competitive advantages.

Source: Adapted from Mahoney, 2004.

The resource-based view of the firm specifies that resources are vulnerable firm-specific assets. In the context of ICTs, an organisation must not only customise, deploy and maintain technological systems, but must also manage IT and non-IT resources

together to generate greater value instead of doing it alone (Brynjolfsson & Hitt, 2000). There are three main critical assumptions to the RBV framework. The first assumption is that there is an uneven distribution of resources and capabilities across firms within an industry (Barney, 1991). The second assumption relates to the relative immobility of resources and capabilities (Michalisin et al., 1997) while the final assumption is that not all resources are strategic resources and thus sources of competitive advantage (Pisano et al., 1997).

In the context of the RBV framework, resources can be broadly defined to incorporate assets, organisational processes, organisational attributes and information controlled by any organisation in order to conceive of and implement their strategies (Daft, 1983; Mata et al., 1995). Moreover, a RBV is useful in providing a vigorous framework for analysing whether and how ICTs associate with a firm's competitive advantage as well as empirically assessing the relationship between ICTs and other resources complementarities (Powell & Dent-Micallef, 1997). Although there are also other theories, such as the industrial organisational theory and contingent theory, which also contribute to the debate, the RBV framework has been viewed as the leading contributor to the firm level debate. So much so that some researchers have argued that the RBV framework is considered as one of the most influential works in the field of strategic management (Barney et al., 2001) and therefore its relevancy in this study. The integration of an economics perspective with a management perspective certainly provides the required balance for assessing ICTs' perceived impact in the TFSI.

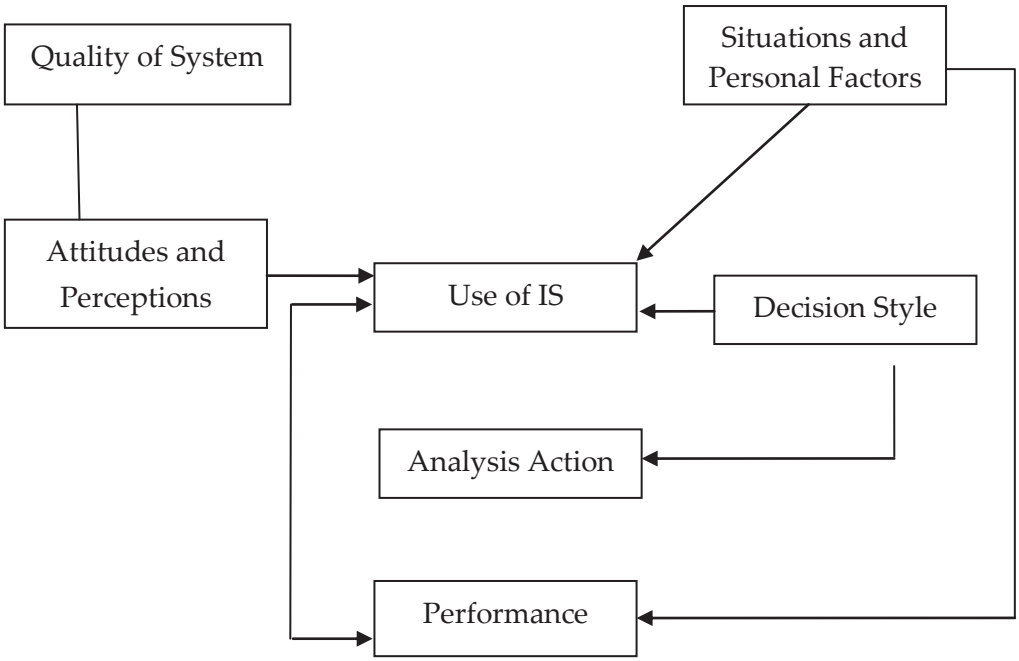
2.8 Synopsis of Earlier Models

With the amount of literature on ICTs and organisational performance over the years, there are a number of models that have been developed to better understand the relationship between these two components, ICTs and organisational performance. These include the Lucas Model (1975a & 1975b), the Trice and Treacy Model (1986), the Weill Model (1992), the Markus and Soh Model (1993) and the McKeen and Smith Model (1993b). This section provides an explanation of each model and their relevance to this study.

2.8.1 Lucas Model (1975 & 1993)

Arguably, the Lucas Model in Figure 3 was the first model developed in an attempt to better understand business value of ICTs. The model concluded that despite the overall results supporting the relationship between ICTs and organisational performance, the environment could have a major influence on specific aspects of the relationship, thus making it more difficult and complex.

Figure 3: A Descriptive Model of the Use of an Information System and Performance.



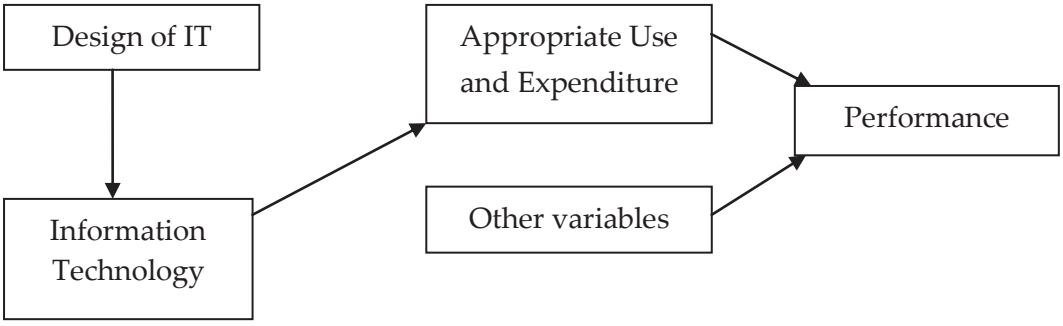
Source: Lucas, 1975a.

The Lucas Model from 1975a was refined in 1993, with an increased emphasis on ICT expenditure rather than its use. Figure 4 outlines a refined model with ICT use as an intermediary variable. In this revised model, Lucas (1993) argued that other variables included in the model cater for designing various research approaches. The model depicts the transition from IS emphasis towards IT. Additionally, the unit of analysis could be the economy, industry, groups or even individuals.

2.8.2 Trice and Treacy Model (1986)

Trice and Treacy (1986) presented a much wider perspective in their model in which IT budgets, IT personnel and IT efficiency were identified as key contextual variables

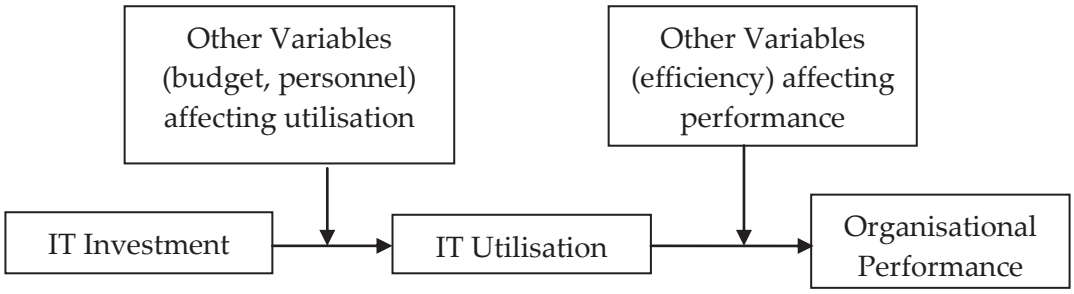
Figure 4: Refined Model of the Use of an Information Technology and Organisational Performance.



Source: Lucas, 1993.

influencing the relationship between ICT use and organisational performance. Including IT utilisation as the link component between the two main components of ICT investment and organisational performance would not be sufficient to determine performance. Figure 5 outlines this model with utilisation as an intervening variable.

Figure 5: Utilisation as an Intervening Variable



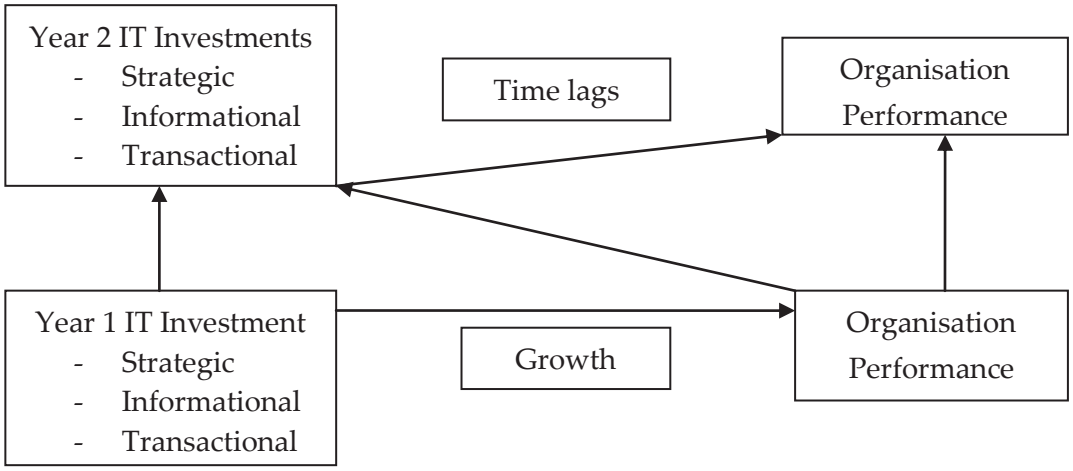
Source: Trice & Treacy, 1986.

Utilisation is partially determined by information technology variables and is one of the many variables which ultimately affect performance. Theoretically, the relationship between IT and utilisation is viewed as a backward linkage whereas the relationship between utilisation and performance is a forward linkage. However, neither backward nor forward linkages are necessarily direct as utilisation is not directly determined by the availability of technology, but by an individual's intention to utilise a system. Similarly, one could argue that utilisation affects a performance by means of organisational structural changes.

2.8.3 Weill Model (1992)

The Weill model (1992) depicts in Figure 6 focused on the manufacturing sector and concluded that due to the fact that organisations take time to learn new processes when implementing a new technology, the resulting benefits would not be realised immediately by the organisation. The study further argued that not all IS/IT investments are identical; when two different organisations invested in similar technologies, the likely results would never be identical (Weill, 1992). While there were earlier models, Weill concluded from his empirical work that the relationship between ICTs and organisational performance had not explicitly emerged from previous studies. Weill's findings were supported by sub-sequent studies (Brynjolfsson, 1993; Devaraj & Kohli, 2000) in which the effects of time lags and impact on growth were suggested for reconsideration.

Figure 6: IT Investment and Organisational Performance Model



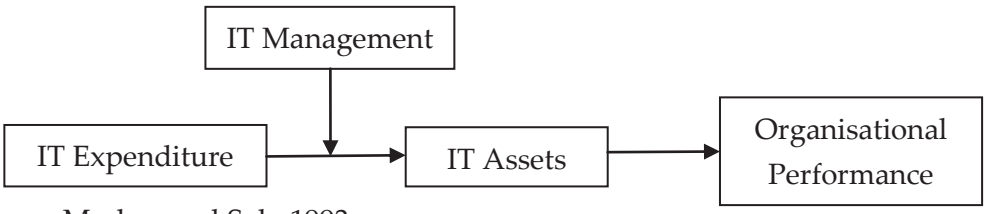
Source: Weill, 1992.

2.8.4 Markus and Soh Model (1993)

The inclusion of dependent and independent variables into Markus and Soh's model (1993) shown in Figure 7, suggested that not all financial organisations gained positive returns from ICT investments. This was due to the influence of structural variables which could affect the relationship between ICT investment and organisational performance. Markus and Soh emphasised the essential role of management in influencing how ICT is utilised and its subsequent impact on organisational performance. Despite this particular result not showing any positive relationship, it

obviously generated a new perspective on this issue, especially the importance of IT management.

Figure 7: IT Assets and Organisational Performance



Source: Markus and Soh, 1993.

Based on the Weill model (1992), this model argued that there cannot be a necessary and sufficient relationship between IT and organisational performance because some of the investment may be wasted through poor internal IT management processes. These include choosing the wrong IT people or failure to manage IT effectively. Markus and Furthermore, this model implicitly showed that IT assets directly reflect organisational performance and therefore a firm's size or industry information intensity may affect an organisation's ability to convert its IT assets into improved organisational value.

2.8.5 Mckeen and Smith Model (1993b)

A model by McKeen and Smith (1993b) argues that ICT investment and use leads to better organisational performance. This particular model was built from general systems theory. With the underlying assumption that all ICT investments and use are equal, it is how organisations invest and use different ICTs over time that constitutes their overall technological capability.

Based on the Trice and Treacy model (1986), McKeen and Smith (1993b) suggest that linking IT investment directly to organisational performance cannot be undertaken theoretically without considering its usage. With a comprehensive understanding on these two key components of IT investment and usage, the Trice and Treacy model was able to be fully investigated. McKeen and Smith argued that a key fundamental in the relationship between IT investment and organisational performance is its usage and the types of systems utilised. This requires a closer look at individual organisational systems, commitments of IT personnel and management processes. This model

observed that even when two organisations expend the same amount of dollars on IT, the resultant performances would never be identical. In addition, this model also discovered that more successful organisations tended to invest more in IT than organisations which were less successful.

2.9 Analysis of Earlier Models

Based on the foregoing discussion of the various models, it is evident that these models had distinct characteristics. Table 8 outlines a summary of the key findings from the five models.

The analysis of these models concludes that there are a few limitations with the models which overall foreshadowed their ability to effectively model the relationship between ICT and organisational performance. The most notable ones include but are not limited to:

- Lack of generalisability
- High emphasis on single linear open - ended relationship
- Limited comparability
- Lack of management role consideration
- Limited consideration of internal performance issues
- Most research being conducted primarily in one region, the United States of America.

While the earlier models have clarified or illuminated the topic, much work remains to be done in order to better understand the relationship between ICT investment and organisational performance, hence the development of the conceptual model for the TFSI as presented in Chapter 3.

2.10 ICT in Developing Countries - Tuvalu

Despite the fact that computers and the Internet have become fixtures of the global landscape over the years, the rate at which technology is utilised still differs markedly

Table 8: Key Findings of Earlier IT Models

	Lucas Model (1975)	**Trice & Treacy Model (1986)**	**Weill Model (1992)**	**Markus & Soh Model (1993)**	**McKeen & Smith Model (1993b)**	**Lucas Model (1993)**
Limited generalisability	Y	Y	Y	Y	Y	Y
Single linear open-ended relationship, no secondary relationship	Y	Y	N	Y	Y	Y
Lack of comparability	Y	Y	N	Y	N	Y
Sector studies	Financial	Multiple	Multiple	Multiple	Multiple	Financial
External or environmental influence	Y	Y	IMP	Y	N	Y
Explicit consideration of management role	N	IMP	Y	Y	N	N
Time lags effect consideration	IMP	N	Y	Y	N	Y
Consideration of research design	NM	Y	Y	Y	Y	Y

Notes: Y – Yes; N – No; IMP – Implicit; NM – Not mention.

across countries. The phenomenal growth of the Internet has not been uniform across the global international picture as developed countries have experienced a much higher growth rate than developing countries. Petrazzini and Kibati (1999) found that in 1997, around 97% of all Internet users were from developed countries as most developing countries lacked telephone infrastructure and adequate electric power. The International Statistical Institute (2011) estimates that in 2010 only 11.4% of the total population of India used the Internet. In contrast, 58% of the population in Europe and 78% of the population in North America had access to and used the Internet.

Although these studies concluded that developed countries showed a positive significant relationship between ICT and organisational performance in terms of income earned, there appears to be no such evidence for developing countries (Pohjola, 2001). The lack of completed infrastructure, the knowledge base to support ICT tools and the low level of investment have been identified as the causes of the gap between developed and developing countries (Chowdhury, 2003; Asian Development Bank, 2003). In Egypt, the total average annual percentage of GDP spent on ICT between 1993 and 2001 was only 2.25% as opposed to the 8.9% in the case of Sweden (Pohjola, 2001). In the case of Tuvalu, only 19.2% and 16% of the populations access telephone lines and mobile respectively. A mere 6% of the populations accessed fixed broadband while only 22% access and used Internet (refer Table 2). The data reflects the low use of ICT tools in Tuvalu in general. As ICT infrastructure has evolved to become a major driving force behind a country's productivity and growth, it is vitally important that developing countries are not isolating themselves from the changes occurring in the development of ICTs globally (Gholami et al., 2004). Increasing investment in ICT without the involvement of other socio-economic factors may not necessarily be improving growth in developing countries.

The utilisation of ICTs certainly improves economic growth in most developing countries. The use of high speed Internet, mobile broadband and effective software and hardware programs allow people to interact freely and enable them to be more competitive and productive. As the US President Barack Obama said in January 2009, "Increased broadband spending, electronic medical records, green energy investments, and new computers for schools and libraries are all smart ways to keep America competitive while also creating new jobs and spending (Hinsliff, 2009, p. 7). This philosophy has been supported by the former UK Prime Minister, Gordon Brown, when he stated that government requires extending the country's digital infrastructure to "the roads and the bridges and the railways that were built in previous times to stimulate the economy" (Hinsliff, 2009, p.8). These comments about ICT impact on economies of USA and UK apply equally well to economies of developing countries.

In the case of small developing countries like Tuvalu, the increase in technology diffusion may have important economic consequences as technology usually improves communication efficiency (Norris, 2001), increases productivity in terms of analysis and reporting (Brynjolfsson & Hitt, 2003), improves political and economic engagement (Dedrick et al., 2003) and allows developing countries to increase productivity (Steinmueller, 2003). Moreover, Chowdhury (2003) noted that technology diffusion and uses within developing countries do not follow a similar pattern, and therefore some countries have managed to position themselves more appropriately than others. While in some Pacific island countries the increase in availability and accessibility of mobile phones is certainly providing new social and economic opportunities, developmental potential offered by the Internet is still unattainable for most.

Considering the importance of investing in ICT, Tuvalu has initiated various ICT-related projects in recent years aiming to integrate Tuvalu with the world economies and, at the same time, reduce barriers created by time and distance. These ICT-related projects not only facilitate trading of goods and services, but also encourage investment, create new sectors of business enterprise and ultimately create new jobs. As ICTs offer huge potential for social and economic development in Tuvalu and the Pacific at large, both the Tuvalu government and other regional organisations are working on promoting the benefits of ICTs at a national level, regionally and also in the private sector. However, most of the recent converged applications such as e-health and commerce are either nonexistent or in their infancy. Recent information on progress in these areas is difficult to obtain readily, but the accessibility and cost of ICT represents a significant barrier. In many cases, governments and households with scarce resources struggle to meet very basic needs, with the result that ICT cannot be a priority.

2.11 Importance of the Study

Given that the financial industry in Tuvalu is the second largest spender or investor on ICT tools, behind the communication sectors in the country, these investments have

created innovations and generated changes in the way the banks and Finance Ministry operate. This includes a radical shift in transaction processing from paper-based to either semi-or fully-automated systems, thus reducing operating costs (Asian Development Bank, 2011). The increased investment of the industry in ICTs have created opportunities for competition amongst existing players, especially between the National Bank of Tuvalu, the Development Bank of Tuvalu and the Tuvalu Provident Fund in terms of their savings and lending portfolios. Furthermore, these investments have created a more dynamic platform for the Ministry departments to communicate more effectively and efficiently with different banking institutions.

The introduction of new technology also changes customer expectations as more customers are now demanding more sophisticated systems from the Tuvalu financial service industry such as ATMs and credit cards to enable them to access banking services 24 hours a day, 7 days a week. In recognition of customers' demands, the financial services industry is also mindful of the costs associated with such demands and thus has to be more innovative in choosing the appropriate system for Tuvalu. With the dynamism of the TFSI, managers have experienced different perceptions of the relationship between their ICT investment and use with their performance as some complained that they do not seem to realise the benefits despite their increased use of ICT tools (Pacific Island Forum Secretariat, 2004).

Considering the foregoing, it is evident that ICT tools play a significant role within the TFSI. The above discussions provide strong support for the use of ICT tools and the selection of the TFSI as an ideal industry for this study given its heavy investment in ICTs.

2.12 Literature Gap Analysis

Despite the numerous studies conducted on the relationship between ICT investment and organisational performance, the way in which ICTs are examined appears to be a consistent criticism in these studies (Lucas, 1999; Bresnahan, 1999). As a result, academics and practitioners have attempted to develop more comprehensive and

inclusive approaches in order to fully examine ICT potentials or contributions on organisational performance (e.g., Baldwin et al., 2003). Moreover, there have also been calls (e.g., Barney, 1991; McAfee, 2002) for inclusion of the complementary relationship of ICT with other firm assets, as ICTs alone would not have been able to make a significant influence unless combined with other resources. Developing a more comprehensive approach of ICT and organisational performance would certainly make a significant contribution to the ICT research. As alluded to earlier in this chapter, utilising a framework such as the RBV framework from another field would undoubtedly contribute more effectively to the issue at hand (Mata et al., 1995; Bharadwaj, 2000).

One of the major gaps in the literature is the issue of methodologies employed in past studies. The unavailability of a consistent method and the lack of qualitative research contributions are evident in earlier studies as most of the empirical studies were undertaken using quantitative methods (e.g., Rai et al., 1997; Dewan & Kraemer, 1998) instead of more diversified methods that could also incorporate qualitative research aspects (e.g., Powell & Dent-Micallef, 1997; Chan, 2000). Moreover, some of the problems in the literature were derived from using multiple quantitative research methods and thus more qualitative aspects such as field work should provide more in-depth analysis and knowledge on the topic. Such a methodology would allow further examination of more complex embedded resources and ICT capabilities in organisational performance.

Acknowledging that early studies (e.g., Wernerfelt, 1989; Barney et al., 2001) have employed a RBV approach, the lessons learned from these studies could be used to develop a new perception on the utilisation of the RBV framework within ICT research, hence adding to empirical information systems research in this area.

As evident in the literature, the support for the positive relationship between ICT and organisational performance has increased in recent years (see Table 6), and thus it is appropriate that more ICT research is undertaken at the business level process as work

in this area is still in its infancy. Undertaking further research using the RBV framework would undoubtedly provide a fruitful approach to better understanding the relationship between ICT tools and organisational performance in the TFSI, thus addressing the research questions.

2.13 Chapter Summary

The issues regarding the relationship between ICT investment and organisational performance play a significant role in the financial service industry in general, and therefore, provide strong support for the selection of the Tuvalu financial services industry as the focal industry given its investment in ICT over the years. The chapter begins with some research background followed by a thorough discussion of both the dependent variable (ICT) and independent variable (organisational performance) of the study. The discussion of these key variables ensures that variables are well understood.

Although the literature examining the relationship between ICT investment and organisational performance has grown in volume, there appears to be some inconsistency as previous studies produced conflicting results. While earlier research noted the mismatch between these key variables, later research studies appear to produce a better more positive relationship between ICT investment and organisational performance. An analysis of previous studies identified a number of benefits derived from ICT investment on organisations. Following on from these analyses, the productivity paradox concept was revisited in the context of this study given its importance and relevance. The chapter also looks into the issue of ICT competitive advantage and sustainability as being critical for increasing productivity. Together, these analyses facilitated a better understanding of the importance of ICT on organisational performance in which ICT investment does indeed play a key role in any organisation.

As this chapter has endeavoured to explain the relationship between ICT investment and organisational performance, the resource-based value framework (RBV) was thoroughly discussed. With the absence of a standard unified framework, the RBV framework provides a robust methodology for analysing whether ICT is associated with firm competitive advantage, leading to enhanced organisational performance or not. This is followed by an analysis of earlier models which were developed to explain the relationship between ICT and organisational performance. Although these models have clarified or illuminated the topic, the general perception is that more work is required in order to better understand this relationship, and hence the development of a conceptual model for this particular study in the next chapter.

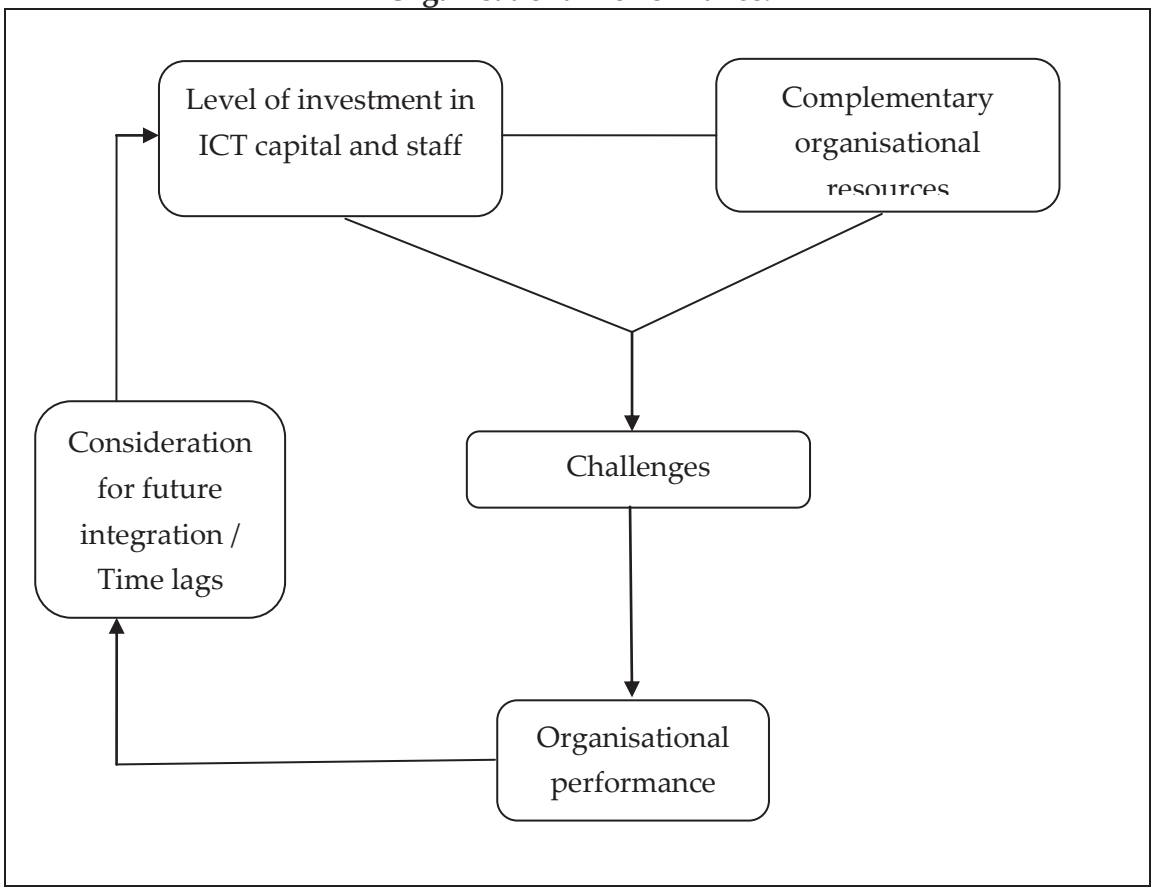
This chapter then discussed the level of ICT in developing countries like Tuvalu where the issue of technology diffusion and use were highlighted. This is followed by an analysis of the importance of the study and a review of the literature gap, where this study could contribute in providing a fruitful approach to better understanding the topic, and thus help fill existing gaps in the literature.

CHAPTER 3 – CONCEPTUAL MODEL

3.1 Introduction

Having thus set the background and context for this study, the discussion now turns to the conceptual model upon which this research is based. Based on the preceding discussions and using the resource-based value framework, a conceptual model that reflects the relationship between ICT investment and organisational performance is shown in Figure 8. The conceptual model is strongly grounded in the literature and has five main components: level of investment in ICT capital and staff, complementary organisational resources, challenges, consideration for future integration and organisational performance or outputs.

Figure 8: Conceptual Model of the Relationship between ICT Investment and Organisational Performance.



The components of the conceptual model are discussed in section 3.2 – 3.6.

3.2 Level of Investment in ICT Capital and Staff

The literature (e.g., Seddon et al., 2002) shows that a significant amount of dollars have been invested in ICT tools for better organisational performance. In attempting to better understand the effect individual technology has on performance, most studies argue that it is more appropriate and beneficial to consider the full impact of ICT on performance. This conceptual model incorporates both infrastructure and specific business applications. The infrastructure only requires a minimum level of ICT for any organisation to invest and thus lay the foundation for further technological architecture. On the other hand, business applications are systems that provide mechanisms for organisations to process, record, and store data based on a predefined set of rules. Typically, business applications are used to automate business processes and at times substitute capital for labour (Weill, 1992). However, the literature shows that the degree to which ICT investment or resources can be used effectively varies from one organisation to another, therefore affecting the net effect on performance in those organisations (Seddon et al., 2002).

The other key resource that is emphasised in this conceptual model is ICT staff, which refers to the level of knowledge or expertise of ICT staff employed by the organisation (Barney, 1991). According to the literature, this includes both technical and managerial knowledge which is not only intertwined with ICT, but also determines the level of ICT accessibility and usability. This highlights the need for human resources involvement in order for ICT investments to produce the required value in terms of organisational performance. As argued through empirical evidence, organisations that encourage and practice good management of ICT resources accessibility and usability tend to exhibit better performance compared to their counterparts (Harris & Katz, 1991). Arguably, conceptualisation of these constructs is highly important for deciding ICT investment impacts as the human element is often associated with the entire technological infrastructure.

This conceptual model recognises the importance of the level of ICT resources may have on an organisational performance. Including level of ICT investment in capital

and staff makes the conceptual model stronger in its ability to deduce the relationship between ICT and the performance of the Tuvalu financial services industry (TFSI).

3.3 Complementary Organisational Resources

The second component of the conceptual model is complementary organisational resources. Barney (1991) concluded that complementary organisational resources include both non-IT capital and non-IT employees such as policies or frameworks, suppliers, senior management commitment, organisational structure and users' satisfaction. Although applying ICT tools with few additional resources for improved organisational performance is possible (McAfee, 2002), the reality is that successful application of ICT for maximum gains is often accompanied by other significant organisational resources. The synergies between these resources and ICT could ultimately influence organisational performance. The intensity of these resource interactions is very much dependent on the organisational culture, policies and the stakeholders that make up the organisation. Naturally, it is expected that organisations with greater complementary organisational resources are better able to deal with ICT issues to improve organisational performance.

The presence of other complementary resources within the context of the resource-based value framework provides a platform for examining the locus of resource exploitation. For example, a single firm performing multiple tasks with the application of ICT tools to improve processes and organisational performance (Devaraj & Kholi, 2002). From the micro-economic production theory perspective, business processes are the activities that convert inputs into outputs. In the context of a net-enabled organisation, ICTs enhances process synthesis, integrate disparate physical boundaries and improve individual processes (Basu & Blanning, 2003). This can change the manner in which an organisation competes by broadening their product/service base, thus creating a competitive advantage in terms of better linkages between different stakeholders, better delivery of new products and improvements in knowledge retention or transfer (Narayanan, 2001).

Moreover, the increasing ability of ICTs to permeate organisational boundaries, link multiple firms via electronic networks and meld business processes through adequate software applications is critically important (Hammer, 2001; Basu & Blanning, 2003). However, trading out-dated technology with inefficient business processes could potentially inhibit an organisation from the attainment of ICT business value. Consequently, the trading of ICT tools influences the impact of ICT investment on business value generation for a firm (Chatfield & Yetton, 2000). In some cases, firms tend to team up with partners or suppliers in order to gain business improvement, and therefore, the adaptation of non-ICT complementary resources provide the basis for understanding their role and impact on the TFSI business value.

Given that the financial services industry is a major employer in any country and one which spends a considerable amount of its annual budget on ICT investments, the need to better understand the impact of the relationship between these investments and its performance is critically important. This conceptual model therefore allows the researcher to examine the context of the Tuvalu financial service industry, hence generating a better understanding of how ICT investment in Tuvalu influences the performance of the TFSI and building a strong theoretical and practical base for this particular field of research.

3.4 Organisational Performance

The third component of the conceptual model is organisational performance. Santos (1991) argued that modeling organisational performance is not easy as often ICTs performance impact on organisation tends to be long term, indirect, subtle and complex. As revealed in the literature, ICT is not the only item that affects organisational performance, there are many other factors or complimentary resources that could also impact performance (Brynjolfsson & Hitt, 1996). Although it is generally accepted that most businesses have commonly accepted sets of performance indicators, it is clear that businesses from different countries have diverse performance indicators, depending on their operation, market and size. Such diversifications could be problematic for research in this field as it makes benchmarking and comparison of

organisational performance between similar institutions difficult. Consequently, guided by the resource-based value framework, this conceptual model aims to identify the performance indicators or the positive perceived benefits that may be best related to the TFSI, thus engendering a better understanding of the relationship between ICT and performance of the industry. However, as a starting point, this research study identifies five positive outcomes of ICTs and organisational performances based on the current literature: links employees, improves communication, promotes efficiency, improves staff training, and promotes organisational innovations (Davenport & Prusak, 1997).

3.5 Challenges

While the earlier models (Lucas, 1975a; Weill, 1992) have clarified or illuminated the topic, much work remains to be done in order to better understand the relationship between ICT investment and organisational performance. As a result of ICTs permeating almost every segment of business operations, a number of challenges have emerged which drive changes within organisations such as financial institutions. Challenges such as lack of IT personnel and high costs of technologies are common to many organisations (Weill, 1992). This model component will help illustrate the challenges that are encountered by the Tuvalu financial services industry in incorporating ICTs to facilitate the delivery of its services. Furthermore, this component will also identify measures for addressing existing shortcomings for future services.

3.6 Consideration for Future Integration

In keeping with facets of the resource-based value framework, this component depicts a feedback loop that forms a secondary relationship which completes the level of ICT influence on the organisation's performance. In the context of this conceptual model, this component is comprised of factors that are considered relevant and appropriate for improved performance of the TFSI. This accounts for some of the issues such as time lags and impact of previous investments (Weill, 1992). The effect of time lags is an interesting aspect that is well accepted in the literature, and therefore its feature in this

conceptual model significantly enhances the model's chances of further explaining the relationship between ICT and the TFSI performance in the future.

Over the years, it has been recognised that an ICT system to be fully utilised with success must have the confidence in users. With this come a number of considerations that must be integrated along the way for future success, acceptability and improved performance. Thus, to ensure that future ICT investment of the Tuvalu financial services industry is worthwhile, it is important that not only appropriate decisions are made, but ICT documents or frameworks are provided to guide future directions.

3.7 Model Flow

As revealed in Figure 8, the level of ICT investment in capital and staff is joined by complementary organisational resources. These components are fundamentals important in ensuring that the organisation enhanced its performance. The two separate components are combined for better organisational performance. However, compounding their full potentials are challenges which impacted on the TFSI ability to fully maximise ICT's potentials, hence its component between the organisational performance and ICT investment and complimentary resources. Managing the challenges lead the organisation to better performance before eyeing technologies which requires to be integrated. This component completes the model as it considered integration of technologies in the years ahead for better results.

3.8 Literature Synthesis and Derivation of Propositions

In the literature, there are a number of studies emphasising the conceptual model components (e.g., Banker & Kauffman, 1988; Brynjolfsson & Hitt, 1995; Lin & Lin, 2006). These studies incorporate larger organisational impact from the use of ICT, the role of ICTs in generating competitive advantage, challenges and associated considerations that should be taken into considerations when making ICT investment decisions, thus addressing the four research questions. Table 9 outlines the model propositions.

Table 9: Conceptual Model Propositions

Component	Denote	Proposition
Level of ICT investment in capital and staff	1	ICT investment in capital and staff has a positive effect on organisational performance.
Complementary organisational resources	2	Non-ICT complementary resources, organisational resources and partners, when combined with ICT, can generate competitive advantage and capture improved organisational performance.
Challenges	3	Increased use of ICT presents challenges for organisational performance.
Considerations for future integration	4	Consideration of future ICT integration shapes the degree to which the organisation can improve its performance.

3.8.1 Proposition 1

ICT investment in capital and staff has a positive effect on organisational performance.

Many empirical studies find support for a positive relationship between the use of ICT and organisational performance. This shows that organisations gained benefits from the use of ICTs whether in the context of cost reduction, use productivity, effective financial metrics and other measures of operational performance (Bharadwaj et al., 1999; Brynjolfsson et al., 2002). Considering recent empirical evidence supporting claims of a positive relationship in quantitative studies, the application of this proposition in this particular study is of significant importance as it seeks to clarify this contribution on a qualitative study.

3.8.2 Proposition 2

Non-ICT complementary resources, organisational resources and partners, when combined with ICT, can generate competitive advantage and capture improved organisational performance.

The fact that previous studies on ICTs competitive advantage has generate conflicting results (e.g., Brown et al., 1995; Powell & Dent-Micallef, 1997), this proposition examines such synergies. The increased maturity and institutionalisation of ICTs together with complementary resources has a higher tendency to achieve increased

capabilities and competitive advantage. In addition, these studies also confirmed that trading partners, resources and business processes are all considered as essential elements in implementing new technologies, thus achieving competitive advantage. The interconnections level of utilisation between knowledge and information sharing are all precious facets of the relationship between ICT and organisational performance. Therefore, this proposition considers these findings and examines how complementary resources impact the relationship between ICT and performance.

3.8.3 Proposition 3

Increased use of ICT presents challenges for organisational performance.

Proponents of an ICT relationship with organisational performance have also maintained that there are also challenges, costs or negative implications associated with the use of ICT. Depending on demographic variations, empirical evidence has shown that unless it is carefully managed, the use of ICT is likely to create challenges or implications as well as the many positives, therefore its applicability in the context of research question 3.

3.8.4 Proposition 4

Consideration of future ICT integration shapes the degree to which the organisation can improve its performance.

Utilising technologies which offers significant benefit requires organisation's lasting ability to fully understand how ICT's enhance its performance. Through sustained strategies development, organisations would be in a much better position the ability to fully exploit available technologies. The literature confirms that strategic management is all about sound and informed decision makings based on different technologies relatively benefits (e.g., Collins & Montgomery, 1995; Birch & Young, 1997). For instance, online financial transactions and tax subsidies are considered as key elements in promoting future integrations of efficient and highly competitive technologies. The use of the RBV framework has certainly informed a greater understanding of ICT and therefore assists with examining the performance implications of future ICT integrations.

3.9 Chapter Summary

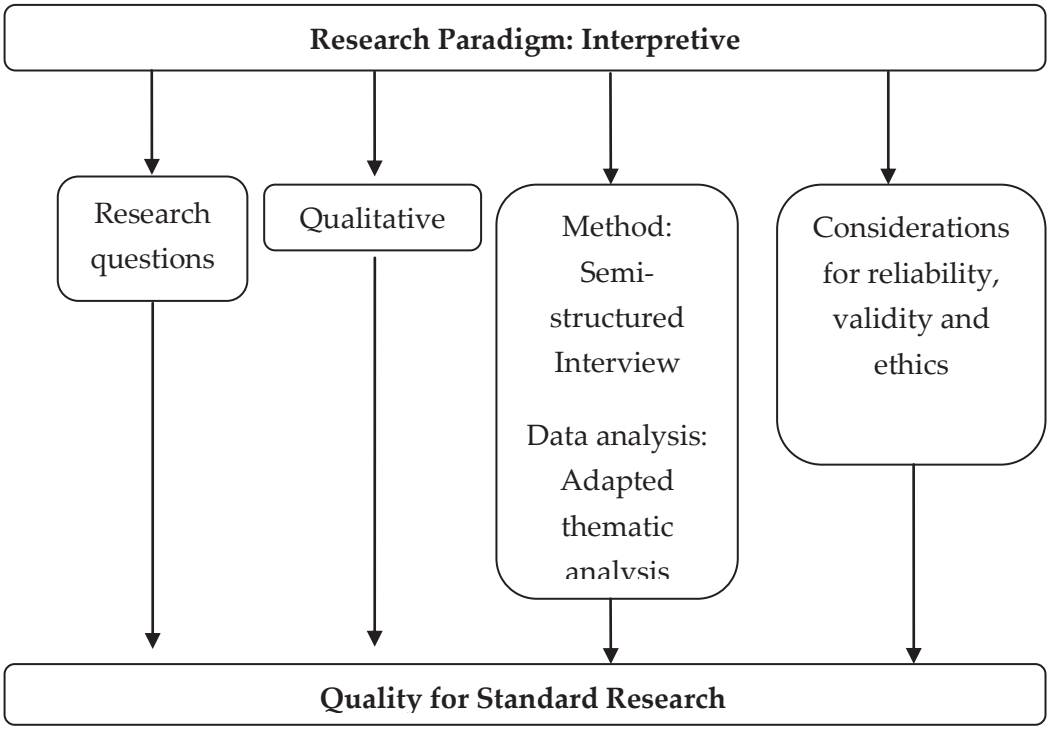
This chapter presents the conceptual model upon which the research reported in this thesis is based. The resource-based view framework is utilised in the development of this conceptual model. The five components of the conceptual model are presented and discussed following a review of the literature. The review presented an analysis of the five components in earlier studies and thus provided a clear description of the context in which the proposed conceptual model was developed. From this analysis, a number of propositions are then developed for testing in this study in order to better understand on how ICT investment influences the performance of the Tuvalu financial services industry (TFSI).

CHAPTER 4 – RESEARCH DESIGN

4.1 Introduction

The research methodology employed in this study is presented in this chapter. It defines the methods and techniques used to test the conceptual framework empirically and, as a result, provide answers to the research problem and questions. Figure 9 is a schematic presentation of this chapter.

Figure 9: Schematic Overview of Research Design



Adapted from Foster (1998).

The chapter begins by describing the research questions and the research paradigm. The research method is described next, followed by the process for data collection and analysis. This is followed by a discussion of the issues concerning reliability and validity of the research design strategy and ethical considerations in the research. Finally, the strengths of the method are discussed before the chapter concludes with a brief summary.

4.2 Research Questions

From Chapter One, the research questions that this study addresses are:

1. What are the finance employees' perceptions of the relationship between the use of ICT and their organisation's performance?
2. What are sources of ICT competitive advantage in the TFSI?
3. What are the challenges TFSI employees encounters when using ICT tools?
4. What are the expectations for changes in organisational performance from future ICT investments?

4.3 Research Paradigm: Interpretive

A research paradigm is an organisation of carefully constructed assumptions and concepts or considerations that form a research philosophy (Bogdan & Biklen, 1998). Over the past few decades, a number of research paradigms have emerged as a result of the growth in educational research including positivist, anti-positivist or interpretive, transformative, pragmatic and critical theory (Mackenzie & Knipe, 2006). Many authors have presented the applicability of various research paradigms used in ICT research such as positivist approaches (e.g., Cantwell & Santangelo, 2002) and interpretive approaches (e.g., Gregor & Hart, 2002). Acknowledging that there are two main research paradigms at opposite ends of the continuum, researchers tend to use either a positivist or interpretive paradigm (Collins & Hussey, 2003). These two paradigms are not considered mutually exclusive, and so there is a growing call for the adoption of research designs that incorporate both positivist and interpretive aspects (Lee, 1991; Phillips & Gilding, 2003).

Positivism is the approach used in natural science and stipulates that the goal of knowledge is to describe a phenomenon as it is manifested regardless of whether it exists or not (Donaldson, 1997; Shanks, 2002). This approach is considered the more common research paradigm, and methods that utilise a positivist approach tend to depend predominantly on quantitative data (Collis & Hussey, 2003). Briefly, the characteristics of positivism are: formal propositions, hypothesis testing, quantification of variables and a broad population.

On the other hand, the interpretive paradigm is defined as the analysis of peoples meaningful action in natural settings through direct observations to enable the researcher to arrive at an understanding of the phenomenon being investigated (Giorgi, 1997; Neuman, 2000). This is also known as the phenomenological paradigm (Lincoln & Guba, 1985). This paradigm stems from three ontological positions - external realism, internal realism and subjective realism (Nandhakumar & Jones, 1997). Interpretivism accepts that the resultant interpretations are subjective, does not assume field relationships and depend entirely on the observer, thus making it a theory building paradigm. In addition, this paradigm involves ideographic research methods such as assessing the meaning the participants assign to it in an attempt to better understands the phenomenon (Doolin, 1994). For this reason, research studies that adopt interpretive approaches tend to use qualitative data.

Since this research aims to address the context of ICT and its influence on the performance of the Tuvalu financial service industry, the interpretative paradigm was chosen as it allows managers to express their views based on their understanding, knowledge and experience rather than using some enforced ideology from the outside world. In addition, this research paradigm enables the researcher to continuously probe for further explanations by the participants if issues were not clearly explained (Cohen et al., 2007). This paradigm signifies the high recognition empowered to the participants given the fact that they are key contributors to gaining the required knowledge.

4.4 Research Approach: Qualitative

The qualitative method tends to focus its data collection and analysis in the form of words or pictures whereas quantitative focuses on numerical data (Chan, 2000). The qualitative method is chosen for this study as it allows finance managers to explain their perceptions of the relationship between the use of ICT and organisational performance. Qualitative research allows the researcher to gain insight into people's perceptions, motivations, concerns and aspirations of lifestyle (Burns, 2000; Mangan, et

al., 2004) and so is ideal for this study. The main distinguishing features between the qualitative and quantitative approaches are shown in Table 10.

Table 10: A Comparison of Qualitative and Quantitative Approaches

Feature	Qualitative	Quantitative
Timing	Measurement occurs during the data collection process	Prior determination of variables
Data Format	Multi-format – word, picture	Pure numerical
Logic	Partial conceptualisation of ideas with full development during data collection process	Full conceptualisation of ideas ex ante data collection
Types of Questions	How, Why?	How many? When? Where?

Source: Chan, 2000.

This research investigates "why" and "how" finance managers within the Tuvalu financial services industry perceive the link between investment in ICT and organisational performance, rather than quantitative questions such as "how many" or "when". Therefore it is appropriate that this study utilises a qualitative approach.

4.5 Research Method: Interview

The main research methods used in a qualitative approach are participation in the setting, direct observation, interview, and document analysis (Mutch, 2005; Best & Kahn, 2006). The interview is a form of investigative dialogue between the researcher and participants in search of answers to various questions. Through interviews, a new set of knowledge could be unearthed and existing knowledge could be further developed. One of the major advantages of the interview method is its adaptability as it encourages participants to express their own opinions and views openly, as well as allowing the researcher to cordially interact with the participants, especially in face-to-face interviews. The use of an interview method also marks a radical shift away from seeing human subjects as simply manipulatory (Neuman, 2000).

This research has adopted the interview method as it allows some degree of flexibility within the overall research process for in-depth analysis of the issues. Specifically, it is

essential that finance managers be given the opportunity in interview sessions for the researcher to gain adequate knowledge about their perceptions. Utilising an interview process also allows participants the opportunity for participants to express their responses in their own words. In order to get in-depth knowledge and gather credible data on the views of the finance managers on the relationship between ICT use and organisational performance, a face-to-face interview is selected as the most appropriate form of interview for this study. A face-to-face interview has the distinct advantage of providing the highest response rate and also provides the opportunity to ask complex questions that would be difficult to ask in any other method. Furthermore, a face-to-face interview allows the researcher to observe the respondents in their own environment and note their reactions to the questions asked (Neuman, 2000).

It is important that this research explore participant's views with equal degrees of guidance and flexibility, and thus a semi-structured approach to the interview was adopted. A semi-structured interview provides an opportunity to create an understanding of the participants' views regarding the relationship between ICT use and organisational performance in Tuvalu. The semi-structured interview enables the use of probing questions, as opposed to a structured interview which does not. The semi-structured interview also uses an interview worksheet to ensure that all questions are asked and to give some structure to the format of the interview, as opposed to an unstructured interview.

The semi-structured interview allows participants to be able to share their thoughts and therefore considered as an essential element in the data collection process. A major advantage of this method over a structured interview is that it retains the richness of interviewee's interpretations (Walsham, 1995), which is central to this study. Other advantages of this method include allowing participants to build rapport and trust, encourage participant's confidence in revealing historical information and allowing the researcher to observe natural settings as well as controlling the line of questioning (Creswell, 2003). Through controlling the line of questioning, it enables the researcher

to ask additional questions in order to gain insight and understanding of essential key points if needed (Gay & Diehl, 1992).

4.6 Research Participants

The selection of participants in any study is a very important step that requires careful analysis and thought. Indeed, selecting research participants is a compulsory element of any study and one that is required early in the process to ensure that not only are participants accessible, but also that they offer relevance (Cohen et al., 2007).

A random purposeful sampling strategy was used in this study. In such a strategy, the participants are selected randomly, somewhat dependent on their availability and demographic profile, from a larger sample to ensure credibility in the results, but not necessarily for generalisation or representation (Coyne, 1997; Morrow, 2005). The sampling frame in this research was all participants from various departments which make up the financial service industry in Tuvalu. The survey participants were mostly confined to current managers or senior employees in the industry who were available for interviewing during the data collection period and are listed in Table 11. Most were not actively engaged in providing ICT services, but a few were in order to achieve different perspectives of the research questions. The participants are ranked alphabetically in the order of their surnames.

4.7 Data Collection and Transcribing

The data collection process commenced in late April 2011 for a five week period. The interviews were conducted in offices and other work locations on Funafuti, the main island of Tuvalu. The interviews were conducted in both English and Tuvaluan. "A tape recorder provides a full description of what was said, whereas note taking is necessarily partial" (Walsham, 1995, p. 78) and so all interviews were tape-recorded.

The interviews ranged in length with the average interview being approximately one and a half hours in duration. At the beginning of the interview, each participant was provided with an information sheet that introduced the researcher, described the

purpose of the study and provided the participant with assurances of anonymity in reporting the results. Additionally, the participants were advised why he/she had been selected as a participant and given the opportunity to ask any questions.

Table 11: Description of Research Participants

Name	Job Title	Organisation
Steve Boland	Budget Adviser	Ministry of Finance, Government
Vavau Fatuuga	Finance Manager	Development Bank of Tuvalu
Belinda Malaefou	Manager Lending	Development Bank of Tuvalu
Semu Malona	Statistician	Ministry of Finance, Government
Tekafa Niko	Chief Supervisor	National Bank of Tuvalu
Siale Paueli	Senior Enforcement Manager	Tuvalu National Provident Fund
Taukave Poolo	General Manager	Development Bank of Tuvalu
Charles Safega	Director of Customs	Ministry of Finance,
Makatala Sapakuka	Senior Supervisor	National Bank of Tuvalu
Lomaloma Saula	IT Manager	Tuvalu National Provident Fund
Peteli Tauati	General Manager (Acting)	National Bank of Tuvalu
Fakatoafe Teikauea	International Business Manager	National Bank of Tuvalu
Sania Teisini	Director Inland Revenue	Ministry of Finance, Government
Siava Tekafa	General Manager (Acting)	Tuvalu National Provident Fund
Penitala Teo	IT Supervisor	National Bank of Tuvalu
Kiatoa Ulika	Corporate Services Manager	Tuvalu National Provident Fund
Solofa Uota	Retired Finance Secretary	N/A
Lototasi Vaguna	Senior Economic / Aid Adviser	Ministry of Finance, Government

As described earlier, a semi-structured interview approach was used, following the questions on the Interview Worksheet which is provided in Appendix B. The questions were focused on gaining a comprehensive understanding of the participants' perceptions of the relationship between ICT use and organisational performance. While there were some differences in the order of questions asked, depending on the probing questions, the interviews were tailored to capture all of the required data. The questions were developed in line with the literature review where critical information

from other studies such as Yeoh and Roth's (1999) resource-based were utilised as discussion points.

Following each interview, the parts of the interview that were in the Tuvaluan language were translated by the researcher into English for data analysis purposes. Post-interview notes were written up almost immediately after the interview to support all the interviews. As a precautionary measure to check the accuracy of the information, all participants were also provided with a transcript in Tuvaluan within a few days after the interview. Although some of the participants took longer than expected to check their transcribed versions, all were returned to the researcher in time for use in data analysis.

4.8 Data Analysis

Data analysis is a very important step in any research study as it allows the researcher to analyse, understand and report the research outcomes using the two main approaches of quantifying and non-quantifying methods (Collis & Hussey, 2003) to analyse qualitative data. The quantifying approach utilised numbers to convert qualitative data into quantitative data, hence seen as more of a positivist approach. A non-quantifying approach is when a researcher employs one of the many non-quantifying methods such as pattern matching, grounded theory or cognitive mapping (Strauss & Corbin, 1998; Collis & Hussey, 2003; Yin, 2003). The selection of the data analysis strategy must be consistent with the research questions and the research approach.

The adaptation of the thematic analysis is used as the data analysis technique in this study. The thematic analysis was developed and adapted out of the grounded theory literature (Glaser & Strauss, 1967; Strauss, 1986) and other sources of qualitative data analysis (e.g., Bryman, 1988). Thematic analysis is an approach to dealing with data that attempts to represent a view of reality via systematically working through text to identify topics that are progressively integrated into higher themes (Creswell, 1994). This method was made easier by coding the data according to themes, areas of

similarities and contradictions. The coding of data provides a sense of systemic approach to data analysis, thus allowing for ease of referencing when writing the results up. The participant's responses were coded in accordance with the research questions, sub-questions as well as probing questions.

The selection of this method is suitable for this research as data were collected through a semi-structured interview and were recorded and transcribed. Using this method allows the researcher to categorise and codify the interview scripts through a multiple layer process in an attempt to discover the reality, where the participants and the financial institutions are both identified by the use of acronyms. Given that this method is less similar to the grounded method where theory is developed through systematically gathering and analysing data (Creswell, 1994), there are two significant advantages for using adapted thematic analysis.

Firstly, this approach is unstructured and therefore allows a greater degree of flexibility and accessibility. While other approaches seem more difficult to researchers with little or no experience of qualitative research, this approach is considered to be more flexible and accessible given its ability to generate unanticipated insights due to its unassuming nature towards the information (Braun & Clarke, 2006), which is central to this study. This unassuming nature allows this approach to be used for social as well as psychological interpretations. Secondly, the adapted thematic analysis method enables complex human issues to be thoroughly examined by developing their research protocol along the journey. This allows discovery or emergence of social and psychological relevant organisations in their own perspectives (Glaser, 1992).

On the flipside, this data analysis method also has some distinct disadvantages. Principally, the researcher gains adequate knowledge of the topic from the literature, so there is a danger of bias as the researcher enters the topic with background knowledge. In addition, the poor conduct of this approach may also allow for a wide range of possibilities to be generated, thus making it difficult to develop specific guidelines or themes for higher analysis (Braun & Clarke, 2006).

The software selected for executing the data analysis strategy was NVivo by QSR. NVivo is a qualitative research data analysis software package that has been used extensively by academic, government and commercial researchers across a diverse range of fields. This analysis package was used in the initial stages of coding the data to help the researcher organise and analyse non-numerical, unstructured data through classifying, coding, sorting and analysis. This enables the researcher to guide the research questions and data into final outcomes, effectively managing data and ideas, querying data, graphically modelling and producing the final report. The coding of the data into sub-sections via NVivo provides a systematic approach to data analysis as it allows NVivo to suggest final results. When the responses to the interview questions are coded, the final data would be represented in a descriptive and narrative format. This format allows the researcher to fully present what the data illustrate in terms of the relationship between the use of ICT and organisational performance.

4.9 Data Reliability and Validity

Within the Information Systems discipline, quality in the conduct of ICT research has long been an issue of concern (Galliers, 1990; Chau, 1999). Central to this idea of quality in any research undertaking are the underlying concepts of reliability and validity.

4.9.1 Reliability

Reliability is defined as "the dependability or consistency of the measure of a variable" (Neuman, 2000, p. 518). This definition suggests that a reliable instrument should be able to produce similar results when applied repeatedly. In relation to qualitative data, reliability refers to the measure in which the data are consistent with what has been said of similar research in a different environment with different participants (Twinn, 1997; Pope et al., 2000). Neuman (2000) identified the three main constituents of reliability as stability, representative and equivalence. The stability element allows both the researcher and reader to understand a concept that may not be easily understood. The representative element enables the researcher to select the right sub-population of the targeted group while the equivalence aspect emphasises the importance of using consistent multiple indicators. A quantitative approach perceives

reliability as a concept that evaluates data whereas a qualitative method views reliability as the ability of data to generate understanding, thus allowing the researcher to fully interpret and provide clear and unequivocal results.

The reliability of data in this research was achieved through the effective utilisation of various processes. These include the semi-structured interviews, audio recording of the interviews, transcribing of data and the willingness of the participants to verify their transcribed versions. Without the full cooperation of the participants, the data would not have achieved the same degree of reliability. Providing the participants with copies of the research requirements and objectives in advance of the interview allows the participants to provide reliable responses during their interview sessions. Lastly, the researcher's use of his knowledge of the Tuvalu financial services industry also helps ensure that the research data achieve a high degree of reliability, hence producing credible results.

4.9.2 Validity

Neuman (2000) depicts validity as the truthfulness of a research instrument and this includes both internal and external validity. In the context of a qualitative study, validity refers to the credibility and trustworthiness of the data presented (Johnson & Christensen, 2008). Neuman (2000) further states that there are four main components of validity - content, criterion, concurrent and predictive validity. Addressing these components would lead to an instrument that closely approximates a true measure.

In relation to this research study, the level of thinking, designing, constructing and reviewing of the whole research process is intended to enhance the validity of the data. This includes designing the research questions to match the objectives of the study, developing interview questions closely linked to the research questions, adhering to ethical considerations, and selecting the right participants to answer the questions in their own words. The utilisation of a semi-structured interview also encourages the participants to respond in line with the intention of the question, thus enhancing the overall research validity. Furthermore, providing transcribed copies of the interviews

to the participants for verification also contributes to validity as it allows participants to add, delete or amend data which are not appropriate or are incorrect. The selection of a relatively large representative sample of participants from the Tuvalu financial services industry also established a good base for data validity, as opposed to a small sample representing a minor proportion of the targeted sector.

4.10 Ethical Considerations and Access to Participants

The research was organised and undertaken in compliance with the Massey University Code of Ethical Conduct. Prior to the commencement of the data collection, the conduct of the study was reviewed and determined to be of low risk to the researcher and all participants. Participants were informed of this through an information sheet which was provided at the start of each interview (see Appendix A).

Given the role of the researcher as a government employee, approval was sought from the Secretary of Tuvalu's Ministry of Finance prior to the four weeks of data collection in the country. To avoid potential confusion by the participants, the research information sheet declared the status of the researcher as an employee of the Ministry of Finance and that data were being collected for research purposes, not government use. Participants were fully informed as to the intent of the study and the use of the data and participants were given the right to decline to participate in this study and/or to refuse to answer any question. The implications of this study were also thoroughly explained to the participants before they signed the consent form.

To ensure that the confidentiality of participants was protected, the researcher initiated a number of measures to ensure the responses cannot be attributed to specific individuals. The measures included the coding of interviews and scripts and the use of passwords for different individual interview scripts. These ensured that issues such as data confidentiality and privacy were maintained.

A token of appreciation for all participants was considered appropriate to show the researcher's appreciation for their time and their willingness to participate. Sulu/ sarongs with a Maori design were presented as gifts to the participants. In the Tuvalu

culture, a sulu/sarong is a traditional garment that people use as a daily outfit, hence their selection as a token of appreciation. A sulu/sarong was presented to each participant at the completion of the interview.

4.11 Strengths of the Methodology

Flexibility is the main advantage of the face-to-face semi-structured interview method utilised in this study. This allows participants to reveal their own experiences and knowledge on the topic. Although this process is demanding and labour intensive, this method ensures that the participants reveal their own stories on the issue at hand. The use of both audio recording and video recording instruments ensures a high degree of accuracy as the participants responses are in their own words and cannot be modified by the researcher. In addition, using a semi-structured interview provides a catalyst for the researcher to gain insight and knowledge as it is a very effective strategy for this.

The qualitative approach, in which data are gathered by words and face-to-face interview, is consistent with the Tuvaluan way of life as the traditional mode of passing knowledge from one generation to another is through storytelling rather than the written word, which is the case with the western cultures. Furthermore, with the interview conducted mostly in the Tuvaluan native language, any problem of a language barrier between the researcher and the participants was precluded in this study. There were few or no opportunities for misunderstanding or misinterpreting the data.

4.12 Chapter Summary

This chapter outlined the research paradigm and also explained the methodology, data collection process, data analysis strategy and the selection of the participants for the research. The utilisation of the semi-structured interview and an adapted thematic content data analysis strategy seeks to gather the perceptions of finance managers in the use of ICT and its impact on the Tuvalu financial service industry. The NVivo software is utilised to analyse data collected from interviews. The chapter also outlines

ethical issues involved in this research. The validity and reliability issues are also discussed with reference to the data collection process. These are important key issues as they establish the credibility and trustworthiness of the data used in the study. The next chapter presents the results of this study from the data collected using this research design.

CHAPTER 5 – RESULTS AND FINDINGS

5.1 Introduction

This chapter is devoted to the presentation of the empirical data collected during the five weeks of fieldwork in Tuvalu. The data are presented in the sequential order denoted by the four research questions of the study. In analysing the interview scripts, four key themes emerged from the data that best represent the participants' beliefs, views and perceptions on the relationship between the use of ICT and the performance of the Tuvalu financial service industry (TFSI). These themes are as follows:

- Benefits of ICT use and access - voices of the TFSI employees.
- Level of support and sources of ICT competitive advantage within the TFSI.
- Challenges of ICT - voices of the TFSI employees.
- The way forward - future integration of advanced ICT infrastructure and resources in the TFSI.

The chapter begins with a demographic profile of the participants for gender, age, position and work experience before presenting the responses for each of the four main research questions as represented by each theme. The use of a semi-structured interview with analysis supported by the NVivo software enables the data to be presented in a way that represents the participants' responses within each theme, supported by relevant quotes from participants. Overall, the level of responses from the participants during the interview was outstanding, which forms an excellent base for judgement. The chapter concludes with a brief summary.

5.2 TFSI Participant Profile

The first part of the questionnaire was designed to collect socio-demographic information about the selected participants. This information includes gender, age, position, work experience and qualification of each participant, as shown in Table 12.

The gender mix (61% males and 39% females) is inconsistent with the Tuvalu total population who have more females than males. However, the sample appears to be

representative and consistent with the gender mix in the TFSI in which 66% are males and 34% are females. In terms of age, 11 participants (61%) were aged 40 and above. Again, this is not representative of the Tuvaluan population and probably not of the TFSI industry, but it does reflect the fact that 13 participants (72%) hold top senior management positions within different financial institutions of Tuvalu. In terms of qualification, 15 participants (82%) possess tertiary qualifications, consistent with the senior management profile. An equitable distribution of working experiences suggests that a wide range of working experiences are captured in the data.

Table 12: Profile of Participants

Variable	Number	Percentage
Gender (n = 18)		
Male	11	61.1%
Female	7	38.9%
Age (n =18)		
25 - 29	2	11.1%
30 – 34	2	11.1%
35 – 39	3	16.7%
40 – 44	3	16.7%
45 – 49	5	27.8%
50+	3	16.7%
Position (n = 18)		
Top management level	13	72.2%
Middle management level	4	22.2%
Retired employee	1	5.6%
Work experience (n=18)		
0 – 5 years	3	16.7%
6 – 10 years	5	27.8%
11 – 15 years	2	11.1%
16 – 20 years	4	22.2%
20+ years	4	22.2%
Highest qualification (n = 18)		
Secondary school	3	16.7%
Undergraduate	12	66.6%
Postgraduate	3	16.7%

5.3 Benefits of ICT Use and Access – Voices of the TFSI Employees

This section presents the findings when participants were asked about their perceptions of the benefits or the positive impact ICT has had on the performance of

the Tuvalu financial service industry, hence addressing research question 1. As emphasised in the research design, the interview script constitutes the data source. In order to find the definitive answers, three sub-questions were developed and were asked of the participants for their responses. The first question was about the perceived benefits of the use ICTs have had on the performance of the TFSI and these results are discussed in subsection 5.3.1. The second question related to the degree that these positive impacts have had on the organisational needs, as reported in section 5.3.2. Question three of this theme focused on the level of ICT investments, use and access that participants experienced in order to give a fair representation of their involvement with various ICT tools, as per section 5.3.3. These questions were developed in line with the literature findings as well as propositions 1 and 5 of the conceptual model (Figure 8).

5.3.1 Perceived Positive Benefit of ICT

Based on the evidence gathered in the interview scripts and the corresponding analysis, it was discovered that participants believe ICTs have had a major positive influence on the performance of the Tuvalu financial services industry (TFSI). When asked if ICT contributed to the performance of the TFSI, the overall response was very clear that the impact of ICT on performance is positive. For example, P12[1] had this to say about the impact of ICT on the performance of his/her organisation:

> "I think ICT is fundamental to our performance because if we do not have it, then performance would not have been possible."

P9 also concurred as follows:

> "Absolutely, I mean ICT is the vehicle for the improved performance of our organisation."

It was therefore evident that the use and impact of ICT on the performance of the TFSI was positive and comments were solicited to determine the areas in which ICT

[1] In this discussion, the participant numbers are assigned randomly and bear no relationship to the list of participants in Table 11 or elsewhere. This was done to preserve participant confidentiality.

positively influences organisational performance. ICT has had an especially positive impact on increased collaboration level amongst different entities, increased efficiency and better monitoring of data and information (see Table 13). The responses from participants were consistent across all institutions of the TFSI (i.e., NBT, DBT, TNPF and Ministry of Finance).

Table 13: Participants Perceived Benefits of ICT

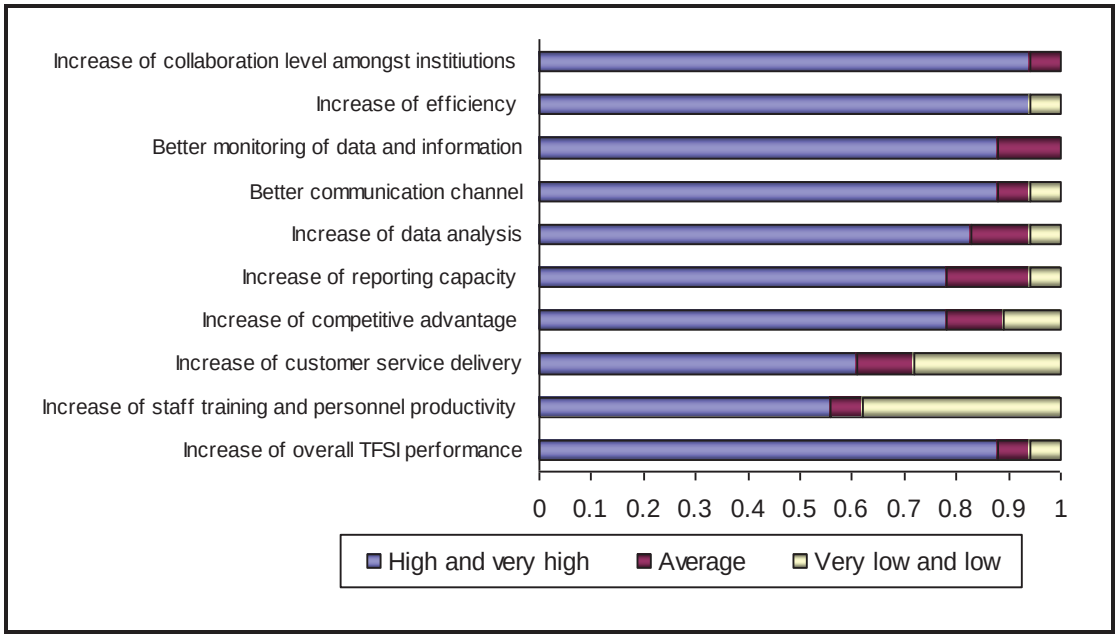
Very Low and Low	Average	High and Very High	Perceived Benefit of ICT
-	1	17	Increase of collaboration level amongst institutions
1	-	17	Increase in efficiency
-	2	16	Better monitoring of data and information
1	1	16	Better communication channel
1	2	15	Increase in data analysis capacity
1	3	14	Increase in reporting capacity
2	2	14	Increase in competitive advantage for TFSI
5	2	11	Increase in customer service delivery
7	1	10	Increase in staff training and personnel productivity
1	1	16	Increase of the overall TFSI performance

The results in Table 13 are shown in ranked order based on a five-point Likert scale, with the labels very low, low, average, high and very high for the points 1 to 5 respectively. Due to the low numbers in some of the response categories, the very low and low groups were reported as one group while the high and very high labels were put together as one group. The use of a Likert scale is a quantitative aspect of the interview. However, the verbal responses to the questions are qualitative, which is central to this study.

The emergent of the perceived benefits of ICT was deemed to be very important as they form the essential link between ICT and organisational performance in the conceptual model. However, it was also clear that although the TFSI may have benefited from a higher proportionate spend over time, the entire ICTs portfolio impact may still be considered to be understated primarily due to the lack of full

awareness and understanding of the true cost of ICT tools. Nevertheless, the participants were clearly satisfied by the improved organisational performance as a result of ICT. Figure 10 graphically represents the data in Table 13 and again, these variables are ranked according to the intensity of the participants' responses regarding their relative impact on the performance of the TFSI.

Figure 10: Benefits of ICT in the TFSI



Although participants generally rated the perceived benefits of ICT highly – 56% and above in all categories - additional insight is gained from the comments provided by the participants, as reported in each subsection below.

5.3.1.1 Increase of Collaboration Level amongst Institutions

By any measure, the use of ICT to increase collaboration was assessed as the top benefit. Not only did 17 of the 18 participants rate it as very important, none of the participants rated it as either very low or low. The data analysis reveals that ICTs have strongly and positively influenced the level of collaboration amongst different financial entities of the TFSI. Participants stated that prior to the introduction of computers with financial accounting software packages, the Internet and mobile phone; it was very difficult for different financial institutions in Tuvalu to share data and ideas amongst themselves. P8 highlighted this as follows:

"To be frank, we could not collaborate effectively with other financial service providers without ICTs. If there were no ICTs, there would be no collaboration amongst different financial institutions."

Further, representatives from the TFSI agreed that ICT tools have created a more enhanced team-work environment between different financial institutions. In addition, most of the participants feel that the Internet allows various banks in Tuvalu to collaborate more effectively with their overseas counterparts in issues pertaining to their operations, systems or other related financial matters. This is echoed by P3:

"The use of the Internet has enabled me to constantly collaborate with other overseas companies who are also using the same accounting package for backstopping issues as opposed to the past when we did not have an Internet connection."

In summary, it was evident that ICTs provide and deliver a collaborative platform for the TFSI to be able to effectively collaborate across different financial institutions.

5.3.1.2 Increase in Efficiency

Another perceived benefit of ICT tools expressed by the participants is the increase in the level of efficiency within the financial industry's overall operations. Table 14 provides examples of operational efficiency stated by the participants.

Table 14: Examples of Operational Efficiency

Participant	Types of Analysis
P1, P8 and P15	Automation of branch office functions Bank office functions Prepare efficient work plans

Participants agreed that as a result of using ICT tools, employees of the industry are able to execute tasks and deliver final outcomes at a much higher level of efficiency in terms of costs, quality and timeliness that, in turn, influences performance. This is highlighted by P15 saying that:

> "Since the introduction of computers and Internet into our office, I have produced my daily, weekly and monthly work plan using the computer, and thus have impacted on the efficiency of my work within this institution."

P1 concurred with this view as follows:

> "ICT has greatly influenced my work because I can now use tools such as a PowerPoint presentation to deliver training for staffs instead of printing multiple copies. Moreover, with technology such as an external drive or memory stick, I am now able to incorporate amendments or new policies into our existing manual electronically without any cost, this signifies more efficiency in terms of cost saving mechanisms."

The foregoing comments lead to the conclusion that ICTs enhance the level of efficiency within the TFSI. With computers, staffs are able to prepare work plans, deliver training exercises for other staff and track transactions with ease. Arguably, the results indicate that ICTs are critical to the performance of the TFSI in streamlining the industry's processes for speed and accuracy. Such a situation is ideal and convenient in addressing customer's questions and concerns with efficient expert knowledge. P8 concurred and further added that many of the TFSI client's transactions were processed electronically and without the automation that ICTs offer, the high volume of transactions could not possibly be handled as efficiently. Therefore, it is evident from the analysis that ICTs are viewed as more than a tool for operational efficiency. They are viewed as an integral part of the TFSI, which have made a significant contribution to its efficiency performance.

5.3.1.3 Better Monitoring of Data and Information

According to the representatives from the TFSI, the use of ICTs has influenced the way financial institutions monitor their data or information in a positive way. Participants believe that with new advanced computerised systems, financial institutions are able to monitor multiple data streams more effectively and accurately, as opposed to the old manual file system. Participants feel that better monitoring of data translates directly into more accurate reports for various stakeholders. According to P11:

> "I'd say by and large, the use of computers and the Internet by our office have improved the level of data monitoring and has eventually translated into more accurate, complete and timely delivery of financial statements."

Both finance employees and ICT personnel agreed that ICTs have had a positive impact on the TFSI's ability to monitor data and information, continuing to positively influence on performance. The representatives agreed that the TFSI simply could not afford to monitor its data without the automation services provided by ICT tools. Similarly, the use of ICT tools allows TFSI managers to better monitor employee performances by accessing daily information on the system, thereby gauging individual staff performances. As commented by P10:

> "Ultimately, it's the line managers who use ICTs to monitor individual employee's performance. The responsibility for monitoring individual officers' performance is with the management team and IT personnel."

In summary, the discussions and analysis suggest that senior management were directly utilising ICTs for actually monitoring data and employees' performances, hence enforcing internal management controls. Better data monitoring is perceived to be an important variable that could ultimately have a significant positive impact on organisation performance.

5.3.1.4 Better Communication Level

The participants expressed their views that the uses of ICT tools such as the Internet and mobile phones have positively influenced the way the TFSI communicates with all of its customers, both domestic and overseas. According to P18, the current ICT portfolio meets his organisation's communication needs with regards to customers with outstanding debts. The results from discussions and analysis suggest that a better communication channel appears to lead to a significant reduction in the number of clients with unpaid loans as they are constantly reminded and traced by financial institutions. Thus, participants agreed that better communication access does impact performance and that this impact was generally positive. Specifically, P13 stated that:

> "Obviously, the number of customers with outstanding loans has reduced significantly since the installation of our office Internet on the outer islands. I personally think that the constant communication with customers has obviously paid dividends in terms of their repayments being honored on a continuous basis."

This is a good example of a financial institution using ICT for a communication channel that not only enhances delivery of services and products, but also maximises the economies of scale and scope offered by its technologies. Participants also agreed that the use of these tools enables service providers to effectively communicate with their partners. P4 highlighted this as follows:

> "Without a doubt, our bank is now able to communicate instantly with overseas fund managers and suppliers through email or mobile phone. In the old days, we used manual air-mail system and I must admit that it does take quite a considerable amount of time for responses to be received."

In reference to the above foregoing discussions, these perspectives typify the consensus mood of the participants in arguing that there is greater value in ICT primarily to enhance communication access, hence establishing a direct link between ICT and improved organisational performance.

5.3.1.5 Increase in Data Analysis Capability

Another perceived benefit of ICT tools expressed by the participants is the increase in data analysis capability. Table 15 provides a summary of different financial analyses influenced positively by the use of ICT automatic functions.

Table 15: Different Level of Data Analysis

Participant	Types of Analysis
P3, P5, P7 and P17	Return on investment Return on equity Statement of financial performance Statement of financial position Cashflow and budgeting Cost to income ratio analysis

When asked if ICT improved data analysis capability, the responses were very clear in that the use of ICT has benefited the industry in performing multiple forms of financial data analysis. Thus according to P5:

> "Well, I honestly think that the accuracy, relevance and timeliness of data analysis presented to the management and Board of Directors has improved significantly since the installation of our office computerised accounting software package."

Support for this view was also expressed by P7:

> "I am now able to use Excel for conducting data analysis in a more organised and easy to understand manner as opposed to the old manual paper based system."

Further discussions with P3 and P17 indicated that ICTs deserve to be given greater credit due to the fact that they form a solid foundation upon which many other organisational benefits were generated. Thus, not only did the participants confirm the benefits of ICT in analysing financial data sets, they also recognised their suitability and practicality as a mechanism for identifying the value of ICT investment in an organisation. In essence, the results clearly support the conclusion that ICTs have enhanced the organisational level of data analysis, translating to improved organisational performance.

5.3.1.6 Increase in Reporting Capability

In analysing the scripts, it is noted that ICTs have positively influenced the level of reporting capability within the TFSI. According to the data, financial institutions are now able to easily print out timely and accurate financial reports from computerised systems. The TFSI representatives said that prior to the introduction of computers, and in particular the computerised accounting software packages, all reports were prepared manually and often resulted in delayed, incomplete and inaccurate reports. Thus, according to P14:

> "I noted that the use of a computerised system within our office has allowed us to prepare and submit an accurate and complete end-of-year financial

statement to the office of the Auditor General on time, as opposed to ten years ago when we had no computerised financial system in place."

P18 concurred and added that:

"I suppose the way our accounting software package is set up allows senior managers to provide different financial report instantly."

Consequently, the results support the suggestion that ICT has had a huge and positive influence in areas relating to compiling and presenting financial reports. When asked how reporting capability contributed to organisational performance, P7 indicated that management used software accounting packages as their primary tool for generating reports. From an IT perspective, P2 argued that the TFSI also uses ICT to monitor numerical data such as call centre statistics, downtime reports and more ad-hoc reports. These observations led to the conclusion that there appears to be a consistent link between better ICT tools and improved reporting capabilities, hence better organisational performance.

5.3.1.7 Increase in Competitive Advantage for TFSI

One of the key perceived benefits recognised by the participants is the increase in the competitiveness of the industry as a result of using ICT tools. The participants acknowledge that ICTs have certainly raised the competitiveness of the industry to such an extent that it is not only more competitive domestically but also regionally. Such competitiveness allows the TFSI to be recognised by other regional financial industries, hence improving the reputation of the TFSI. As noted by P4:

"Absolutely, I think we could not be more competitive without the SWIFT and Money Gram systems respectively."

P9 agreed and further suggested that ICT also impacted on staff competitiveness and hence their ability to be competitive over employees in other sectors.

"Ultimately, it's the people who access and use sophisticated ICT tools to gain a competitive edge over others. I would say the use of ICT had a big impact on TFSI employees."

In summary, it is clear that ICT tools are critical to the competitive performance of the TFSI. Furthermore, some participants felt that the use of current ICT tools for competitive advantage is an aspect that is still under-utilised. As P3 beautifully expressed:

> "To be frank, I think most of ICTs within the TFSI remain under-utilised to their full potential and therefore have not fully impacted on the competitiveness of the industry. As much as we love to say how ICTs have created a level of competitiveness within the industry, the fact remains that creating competitiveness from ICTs requires more time and effort."

In general, it is difficult to ascribe exact reasons as to why existing tools have not been able to maximise competitive advantage to its full potential. Of note was the fact that despite ICT makes an obvious contribution to enhancing competitive advantage, hence organisational performance, there appears to linger an element of ICTs under-utilisation. Perhaps, this could be a contributing factor to its relatively low scoring and ranking in comparison with the other perceived benefits (see Table 13).

5.3.1.8 Increase in Customer Service Delivery

When asked about customer service delivery, participants agreed that the availability of ICT tools has positively influenced the way the Tuvalu financial service industry delivered its services to customers, thereby improving the level of customer satisfaction. Table 16 provides examples of services that may be affected by this variable of customer service delivery.

Table 16: Services Affected by the Increase of Customer Service Delivery

Participant	Services
P3, P9 and P13	Customer statements Account enquiries Customer relationship management

P3 stated that:

> "Absolutely, the use of ICT has enhanced my ability to answer customers' queries immediately, thus delivering a more effective level of customer service."

P9 agreed and further suggested that ICTs have also positively impacted on staff ability to deliver different loan products:

> "Obviously, it's the officers who deal with customers who have the confidence and relationship to promote and deliver financial products in a more positive, accurate and accessibility channel."

The general consensus is that ICT tools have generated a positive impact on the industry by delivering required services to its customers in terms of informing them of their loan balances, marketing new loan products, as well as extending banking services to the outer islands. The findings not only confirm the positive impact of ICTs on customer service delivery, but also confirm its suitability in the conceptual model. The participants feel that without ICTs, the Tuvalu financial industry would not have been able to deliver a satisfactory level of service expected by clients. Accordingly, P16 expressed that:

> "Yeah, I think the use of ICT tools has enhanced the level of service outreach to the outer island customers. These services would not have been possible without an Internet connection."

However, this general consensus of a positive impact was not universal. For the first time, a large number of participants rated a perceived benefit as very low (5 participants; 28%). Indeed, whereas 14 – 17 participants (78-94%) had rated the previous benefits as high and very high, for customer service delivery only 11 participants (61%) did so. The analysis of comments indicated that although ICTs have the potential to enhance delivery of service, the unreliable connection of the Internet and phone lines to the outer islands disrupted the flow of service, hence the large number of TFSI representatives allocating a very low score. This was highlighted by P8 saying that:

> "It's a pity that the Internet and phone line connections to the outer islands are not sustained in order for the TFSI to deliver undisrupted level of customer service."

5.3.1.9 Increase in Staff Training and Personnel Productivity

Enhancement of staff training through the use of ICT was positive, but only ten participants (56%) rated it highly and it was the least valued benefit (7 participants – 39%) rated it as very low. It was evident from the data and analysis that the lack of sustained formal ICT training programs for employees contributed to the low score. Although the TFSI employees access random in-house and short term training overseas, there did not appear to be any key significant improvement in this particular area. As P12 stated:

> "Well, I think the inexistence of on-going long-term training plan for staff prevents them from improving their level of productivity. We have been relying on government to provide formal training opportunities for staff but these have proved unsuccessful as some of the staffs have not been exposed to formal training since leaving secondary school."

P1 concurred and added that despite the TFSI accessing and using computerised accounting software packages, staff may not necessarily always have had a comprehensive training on core job skills, thereby limiting their productivity:

> "Although staffs are accessing short-term attachment or in-house training opportunities, I honestly could not recall a time when a real training is actually conducted for staff. We tend more to have general ICT training instead of proper staff training on core job skills via tutorials on DVD or Webinars over the Internet."

Consequently, it may be noted that ICTs were considered to have only a modest positive impact on staff training opportunities. Of note was the fact that, despite the increase in staff accessing training opportunities, there did not appear to be any key

enhancement in training core job skills for staff, thus impacting on productivity and organisational performance.

5.3.1.10 Increase of the Overall TFSI Industry Performance

Based on the responses and analysis, representatives from the TFSI agreed that had the TFSI failed to utilise available ICTs, the industry would not have been able to improve its performance. According to P4:

> "I totally agree that ICTs have been the catalyst for the improved performances of the financial industry over the past ten to twenty years. I would say, ICTs coupled with additional capital injections were obviously key factors for the industry to improve performance."

This was supported by P15:

> "I think the introduction of various ICT tools into the Tuvalu financial services industry has indeed fully revolutionised the whole industry mandates, morale and, of course, raised dramatically the performance of the financial industry."

In summary, it is clear that ICTs are critical to the performance of TFSI. The above discussions and analysis indicate a number of positive outcomes for TFSI due to the use of ICTs. Despite a few low scoring benefits, the data clearly confirmed the presence of a positive relationship between ICT and the performance of the Tuvalu financial services industry.

5.3.2 Impacts of ICT on the TFSI Needs

In terms of whether the existing ICTs met the needs of the organisation, 12 (67%) participants agreed that existing tools met needs of their organisation needs while one-third (6) suggested that there was room for improvement. Therefore, a general consensus appeared to be that although ICTs generally met the needs of the individual organisations, there was plenty of opportunity for further improvement. Participants from different banks indicated that apart from their system being utilised to deliver banking requirements, there was a perception that most systems were not comprehensive, and as a result, tasks such as online banking and credit card services

did not exist, and hence had major consequential implications on meeting organisational needs.

Moreover, it was interesting to note that although two-thirds of the participants rated the existing systems of the TFSI as fulfilling their intended purposes, a cautionary note was raised by the participants who said that, when the TFSI systems were compared to other larger financial institutions within the Pacific region, the TFSI appeared to deliver much less functionality. As a result, participants felt that TFSI should not dwell on past achievements if ICTs are to succeed in further implementing the appropriate system that best delivers and meets future organisational needs. According to P2:

> "Without a doubt, it is important that our bank continue innovating new ideas for future organisational success.

5.3.3 Access and Use of ICT in the TFSI

Given the importance of ICT benefits within the TFSI, it was surmised that there was a need for participants to state the type of ICT tools that they access and use. According to the analysis, the general accessibility and use of ICTs by TFSI employees is very satisfactory and highly adequate. This is a reflection of the level of ICT investment made by the industry over the years (refer Section 1.4.4). When asked which ICT tools were used, the responses varied and suggest a variety of ICT tools are used by TFSI representatives. Table 17 shows the type of ICT tools and the number of participants who accessed and used different ICT tools.

Table 17: Type of ICT Tools Used by the Participants

Number of Participants	Type of ICT
18	Computers, printers, Internet, telephone, photocopier, fax machine, word processing, e-mail, spreadsheet
17	Mobile phone
16	Accounting software packages
15	Scanner, overhead projector

Observations and analysis led to the conclusion that there does not appear to be any consistency in the use and access of ICTs by the TFSI representatives. Although all 18

participants use computers, printers, photocopier, Internet, telephone, word processing e-mail and spreadsheets, not all accessed and used mobile phones, accounting software packages, scanners and overhead projectors. This may be attributed in part to their position within the organisation, as P1 stated that:

> "And I will be honest to say that as the General Manager, I would not have the chance to use a mobile phone if it wasn't for this position. The Board has convinced me to adopt accessing mobile phone for convenient purposes."

Thus, it was evident that P1 was actively encouraged to use and access the technology due to his position within the organisation. Further enquiries revealed that sixteen (89%) and fifteen (83%) of the participants access and use accounting software packages, scanners and overhead projectors respectively. The participants revealed that a range of different databases are used by financial institutions in Tuvalu. These include loan management system (LMS), revenue management system (RMS), accounting packages (ACCPAC, MYOB and QuickBook), client base system (CBS), society for worldwide interbank financial telecommunication (SWIFT) and production customs trade (PC trade) system. The variety of accounting related databases used in the TFSI may be attributed to the lack of a centralised database system that facilitates different institution's financial requirements and undertakings. However, this may have important ramifications for the TFSI going forward particularly when it comes to determining ICT for future integrations. As P13 added:

> "If only there is a single centralised accounting database network for different financial service providers in the country, we would have been most reluctant to purchase our own system and hence saving costs."

Clearly, the above findings indicate the different level of access to ICT tools by the participants. In fact, it appears that the lack of knowledge, unavailability of tools and lack of motivation amongst the representatives of TFSI contribute to varying degrees of access, and thus negates opportunities for participants to access and use all available ICT. According to P10:

> "I suppose the unavailability of a scanner within my jurisdiction has a direct bearing on my ability to access and use ICTs. So, I'd say it is more a question of what is available for employees more than anything else."

As for the lack of motivation, P7 added that:

> "From my perspective, the lack of staff motivation to learn new ICT tools has inhibited them from accessing and using those tools. When I first started, I had very limited knowledge of the accounting software database, but through self-motivation, I am now able to fully utilise the system."

The above perspectives not only confirm the inconsistency in the level of ICT access and use by the participants, they also demonstrate the importance of learning on the job through the process of observation. According to the responses from representatives of the TFSI, more than three-quarters (14) participants agreed that most of their knowledge on using ICT particularly with regards to an accounting software database was obtained when they were initially employed. After initial observations, they have now mastered skills in using their respective databases. This indicates an adequate level of self-belief and confidence amongst TFSI representatives to access and use ICTs to improve organisational performance.

5.4 Level of Support and Sources of ICT Competitive Advantage within the TFSI

The second theme, and second research question, relates to the level of support and the competitive advantages ICTs provide to the Tuvalu financial services industry. The level of ICTs support, in particular, is a very important aspect of this study as it relates directly to the quality of decision making, and hence the performance of the organisation. To find the definitive answers to this question, two sub-questions were asked of the participants. Question one focused on the level of support rendered towards ICT projects by different groups of people and the second question looked at the competitive advantages for the financial industry as a result of using ICTs. These questions were developed in line with proposition 2 of the conceptual model. The non-ICTs complementary resources, organisational resources and partners, when combined with ICTs, can generate competitive advantage and provide improved organisational

performance. The data are presented in the following subsections with supporting quotes from various participants.

5.4.1 Level of Support for ICT Projects in the TFSI Context

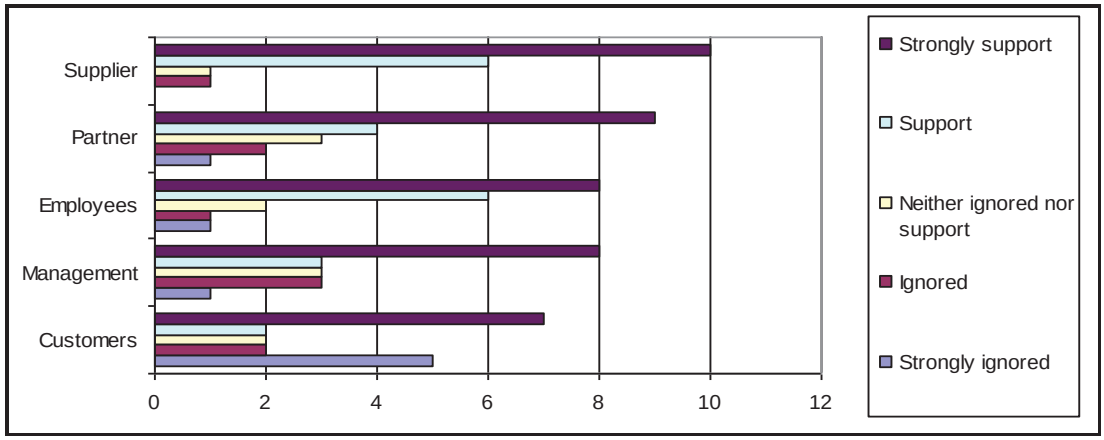
The level of support rendered towards ICT-related projects by different groups of people within the TFSI is shown in Table 18).

Table 18: Level of Support Rendered Towards ICT Projects in the TFSI

Strongly Ignored	Ignored	Neither Ignored Nor Support	Support	Strongly Support	Variable
-	1	1	6	10	Suppliers
1	2	3	4	9	Partners
1	1	2	6	8	Employees
1	3	3	3	8	Management
5	2	2	2	7	Customers

The data in Table 18 and Figure 11 are using a five-point Likert scale with labels strongly ignored, ignored, neither ignored nor support, support and strongly support as points 1 to 5 respectively. The results are ranked according to the intensity of responses from the TFSI participants, from strongly support to least support.

Figure 11: Support Level for TFSI Projects



When analysing the interview scripts, it was noted that representatives from the TFSI perceived that management, employees, customers, partners and suppliers supported ICT projects differently. The participants believe the majority of suppliers, partners, employees and management strongly support or support TFSI ICTs undertakings.

Although perceptions of customer support was average at 50% (i.e., combined score of support and strongly support), this was the least valued score and, by far, the highest number of participants (28%) rated ICT as strongly ignored by customers of the TFSI.

While the participants generally rated the level of support as strong – 61% (i.e., combined score of strongly support and support) in the first four categories, the comments provided by the representatives add more insight and meaning to the raw data.

5.4.1.1 Suppliers

For the purpose of this study, suppliers are domestic and international ICT companies supplying ICT products (e.g., hardware equipment) for the TFSI as opposed to contractors or vendors who actually add specialised input into organisation deliverables. The perception of the representatives from the TFSI is that suppliers offer the highest level of support of all groups surveyed here – 10 (56%) say suppliers strongly support ICT projects. This result should not be surprising because of the nature of the relationship. According to P16:

> "I honestly think that due to the nature of businesses where money is central, I cannot recall a time when we asked our suppliers for new equipment and not being honoured."

The data not only confirm the level of support received by the TFSI from its suppliers, it also indicates the substantial amount of dollars involved in the industry ICT-related projects. As P1 said:

> "With our management team and directors being mindful of the many benefits of ICT to our organisation, they have agreed to allocate substantial portions of annual capital budget for ICT-related tools".

Clearly, the majority of the participants view the level of ICT supplies as a pivotal element to the success and failure of the TFSI. However, it was evident that the TFSI

would only be able to fully utilise supplier's products if significant budgetary allocations are accorded to acquiring ICTs.

5.4.1.2 Partners

In the context of this study, partners are organisations who have on-going, long-term support relationships with financial institutions in the Tuvalu financial services industry. Most of the TFSI partners include offshore financial software companies and fund managers. The general consensus is that the TFSI representatives perceive partners as either fully support (9 participants; 50%) or support (4; 22%) ICT projects to a certain degree. According to P16:

> "I must admit that the support we get from our system offshore partner (i.e., Fiji Software Limited Company) has been tremendous. Therefore, I couldn't imagine the status of our financial system if we have not had the support from our current partner."

This comment, and others, indicates that participants appreciate the support level offered by their partners. This is an indication that financial institutions in Tuvalu are not only using offshore companies accounting software systems exceptionally well, but are also receiving adequate support from service providers. Furthermore, not only does this support create a strong relationship between the TFSI and offshore partners, it also results in new training opportunities for employees. P8 highlighted this as follows:

> "Obviously, there's a lot of money to be spent on staff trainings, but with our institution using offshore accounting financial software, we are now able to access short-term training opportunities."

5.4.1.3 Employees

Of the 18 participants, one (6%) agreed that employees of the Tuvalu financial services industry perceived ICT projects as either "strongly ignored" or "ignored". A couple of participants (11%) stated that employees seem "neither to support nor ignore", while

six (33%) and eight (44%) say that TFSI employees "support" or "strongly support" ICT projects. Despite the apparent differences in the participant's responses, three-quarters (77%) of participants favour the view that employees support ICT projects. Comments indicate that the main reason employees support ICT is because of the benefits that they have witnessed from the availability of ICT tools within their organisation. As expressed by P3:

> "Without a doubt, our employees are highly appreciative of existing ICT tools due to their ability to produce multiple benefits for the organisation. In doing so, they have also given their support and assurances of adopting future technologies for better improvement."

P3 concurred by saying that:

> "Once the employees realised how beneficial the accounting systems are for the organisation, they have been quite proactive in reporting system failure, adapting new technologies as well as back-stopping system discrepancies at times."

5.4.1.4 Management

In terms of management support level, there appears to be mixed views on the level of financial institution management team support for ICT-related tools or projects. Of the total participants, eight (44%) say that the TFSI management team "strongly support" ICT projects while three (17%) participants in each category stated that management support level is in the "support", "neither support nor ignored" and "ignored" categories. On the extreme end, a single participant (6%) stated that the TFSI management team "fully ignored" projects. The results indicate that TFSI representatives perceive the TFSI management team as the least supportive group for ICT projects. This may be attributed to the fact that most of the management team, including board members, are not ICT literacy experts, and therefore may not be fully aware of benefits from various ICT-related projects. P2 highlighted this as:

> "Although the management team seems to accept ICT-related projects, it usually takes a long time for them to make final decisions despite the benefits derived from such investment."

5.4.1.5 Customers

The overall perception of TFSI representatives is that customers are not supporting the industry's ICT projects. Although seven (39%) participants agreed that customers "strongly support" ICT projects undertaken by the industry, five participants (28%) rated customer's support level as strongly ignored, the highest for any group in this study. According to P1:

> "Absolutely. I mean there are some areas or groups that I can very specifically point that have supported us with our ICT projects. However, I am 100% confident that our customers did not support us at all given the level of criticisms that we received from them on the status of our system."

Further analysis shows that customers may not always be supportive during the initial stage of the industry ICT projects, but support grows when the systems are actually delivering the anticipated benefits. Unsurprisingly, this is a characteristic that might be common in any other decision-making process due to the high level of anxiety and lack of confidence. As P7 expressed:

> "I suppose, customers at times always ask – why do you need to change your system? Is it because your current system is not working or is it because other institutions have probably something more advanced and competitive? As a normal customer, I'd rather stick with one system instead of changing every now and then."

It appears from these perspectives that the TFSI representatives perceive customers as the least supportive group when it comes to ICT undertakings. However, the results also show that seven (39%) participants perceive the level of customers support as "very strongly". According to P9:

> "I don't know how the majority of TFSI employees viewed this, but to me personally, I think our customers are very supportive of any ICT projects undertaken by the industry for reasons related to effective and efficient facilitation of their demands."

On average, the above discussion leads to the conclusion that the level of support for ICT projects within the TFSI context is highly supportive as perceived by representatives from TFSI. This not only confirmed the high commitment level shown by these stakeholders (suppliers, partners, employees, management and customers), but also demonstrated their input in identifying appropriate technologies for the industry in order to gain improved organisational performance.

5.4.2 Sources of ICT Competitive Advantage in the TFSI

The concept of competitive advantage aims to ensure a firm's success relative to competitors in terms of economic value. Accordingly, the participants were asked what sources of competitive advantage the TFSI is receiving from using ICT tools. Leading on from the literature in which the resource-based value framework was viewed as a very useful framework to articulate resources and firm capabilities, a question was developed primarily to gather the participant's responses from this perspective. Specifically, the question (what are sources of ICT competitive advantage in the TFSI) was aimed at identifying sources of value within the TFSI which could be further exploited to generate capabilities and competitive advantage.

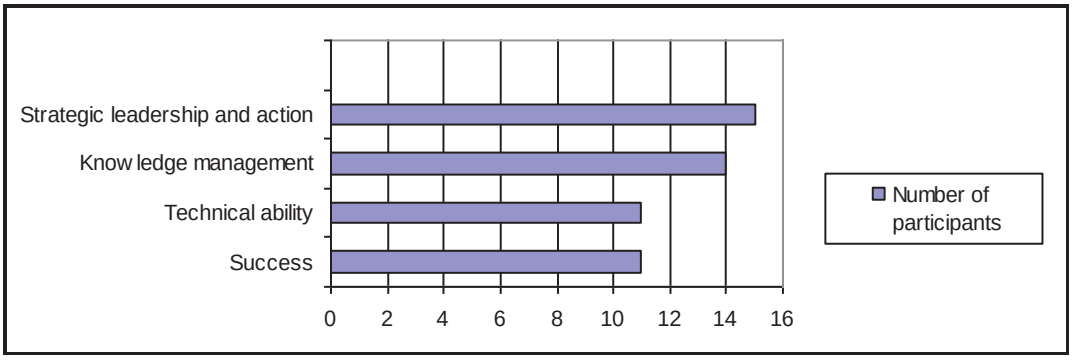
According to the data analysis, a number of resources have been identified as key links between ICTs and competitive advantage in the TFSI and consequently has impacted on the presentation of the final results. The first part (section 5.4.2.1) focuses on the resources that combine with ICTs to generate competitive advantage and the second part (section 5.4.2.2) focuses on the actual sources of competitive advantages.

5.4.2.1 Complementary Resources that Combine with ICTs to Generate Competitive Advantage

Given that this research follows a qualitative approach, the use of coding ensures that similar responses from the TFSI representatives are represented accordingly. Under closer examination and analysis, it became clear that the resources within the TFSI are not there in isolation, but exist in a myriad of complex inter-relationships with the presence of ICT tools. Thus, despite the general consensus echoed by the participants

that the TFSI is now able to compete with other sectors within Tuvalu and other regional financial industries due to the use of ICT tools, it was ideal that this research identify the types of resources that, in combination with ICT tools, generate capabilities and competitive advantage for the TFSI. Consequently, the 18 participants of the TFSI interviewed for this research identified four key types of resources within the TFSI. These include strategic leadership and action (15 participants), technical knowledge management (14 participants), technical ability and success (11 participants each) (see Figure 12).

Figure 12: Resources That Combine with ICT to Generate Competitive Advantage



According to the participants, these resources are related to one another and together form sustained competitive advantage for the Tuvalu financial services industry. In the context of this study, strategic leadership and action involves initiation and leadership in ICT investment decision making by high level management. It was evident from the analysis that this resource encompasses the overall strategic direction of the TFSI in terms of ICT investment as well as coordinating plans with other business divisions.

This certainly provides the TFSI with a clear top management level ownership and supportive process for realisation of change. P11 described the process as:

> "I believe that the TFSI has a good strategic leadership and action process. What I mean by this is that all our financial institutions have the ability to make sound and informed decisions when it comes to their ICT investment either through reengineering existing systems or implementing a completely new system."

The second key resource identified by the participants is knowledge management. This involves active management and promotion of knowledge within the industry which then creates a codified body of knowledge for further improvement. The analysis revealed that more than three-quarters (14) of the participants agreed that knowledge management is a key resource component within the TFSI that ultimately generates capabilities and perhaps competitive advantage. Specifically, with respect to this, P7 expressed that:

> "With the TFSI now using ICT tools, it is very important that resources such as knowledge management are enforced and maintained within the industry. The way the financial accounting system works, it is critical for TFSI to have an adequate level of knowledge management if it is to be successful and competitive against other sectors or other Pacific Island financial industries."

The other two key resources identified by the representatives of the TFSI were technical ability and success. In terms of technical ability, participants noted the essence of possessing adequate technical knowledge within the TFSI is to accommodate particular areas of technology. Success reflects the actual and perceived role success has in reinforcing ICT decision making. The results revealed that 11 (61%) participants agreed that these resources are fundamental in generating competitive advantage for the TFSI. For example, P18 stated that successful implementation of various ICT projects goes a long way towards restoring efficient, effective and competitive TFSI services as:

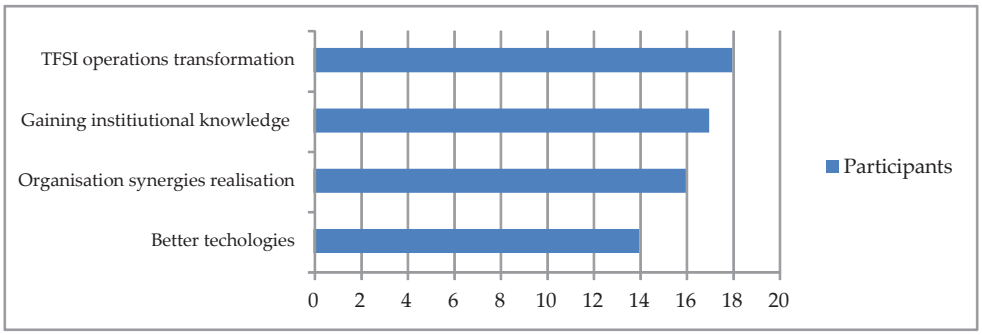
> "Every time we change our system, I feel that it brings more benefits and success for our organisation. The way the bank works, we run our system on a daily basis and essentially the more success we get from our system, the more competitive we are against other institutions in the country."

The data confirm that these resources (strategic leadership and action, knowledge management, technical ability and success) are essential in generating competitive advantage from the use of ICTs.

5.4.2.2 Competitive Advantages

In the context of this study, the 18 TFSI representatives identified four main sources of competitive advantage that the TFSI obtains from using various ICT tools. These include the transformation of the entire TFSI operations (18 participants), gaining institutional knowledge (17 participants), organisational synergies realisation (16 participants) and better technologies (14 participants) (see Figure 13).

Figure 13: TFSI Competitive Advantage



5.4.2.2.1 Entire TFSI Transformation

The main source of competitive advantage for the TFSI from using ICT is the entire transformation of financial institutions operations. According to the data, all 18 participants agreed that as a result of using ICT tools such as computers, the Internet and the telephone, financial institutions operations have been transformed from a manual basis to a computerised system. This enables banks with more advanced ICT tools (i.e., National Bank of Tuvalu) to increase its competitiveness over other banks by being able to improve its operational processes, guide managerial decisions and enable rapid, reliable and efficient exchange of large amount of data between different entities. As P11 stated:

> "Without a doubt, the use of ICTs has enabled our bank to achieve a competitive advantage over other banks in Tuvalu in terms of enhanced operational processes and translating information into invaluable assets for effective managerial decisions."

P12 concurred by saying that:

> "It would be silly if we did not implement computerised financial systems to enhance our competitiveness over other institutions. We understand that the more competitive we are, the better it would be for our customers, and therefore ICT tools are fundamentals to achieving competitive advantage."

In addition, P9 added that the adoption of automated computerised systems in all financial institutions enables them to communicate and deliver a high volume of information to customers.

5.4.2.2.2 Gaining Institutional Knowledge

One of the main sources of competitive advantage that the TFSI possesses from using ICT tools is the capture and use of institutional knowledge. Of the 18 participants, 17 (94%) agreed that gaining institutional knowledge via the use of ICT is another important part of competitive advantage for the TFSI. Such knowledge was built over time due to the long-term employment of employees and the high rate of internal transfer. Two representatives (P9 and P13) from the TFSI described how the length of service in their respective financial institutions made it easier for them to contribute positively to their organisational processes. Participants also agreed that a large number of TFSI employees have, over time, transferred internally between divisions. This has resulted in employees gaining institutional knowledge as experienced staff in other divisions of the organisation could demonstrate a far better understanding of different stakeholders within the organisational jurisdictions. The foregoing comments support the view that long-serving members of staff and the high rate of internal transfer help create and capture institutional knowledge within the TFSI, and thus create a competitive advantage over other working environments.

P4 added that one of the critical decisions that the TFSI has made since the adoption of automated financial computerised systems is to promote and retain potential knowledge of fundamental parts of their ICT. This provides competitive advantages for the industry as promoting and retaining knowledge of their ICT system indicates

that the TFSI has a pool of collective knowledge that can become a potential competitive advantage. As P4 stated:

> "Well, principally, our competitive advantage is really in promoting and retaining ICT knowledge within the industry and, over time, I think that is borne out in terms of the level of service that we managed to deliver customers from using ICT."

The same view is echoed by P17:

> "To me, the collaborative approach to ICT system upgrading has obviously paid dividends as experienced employees are able to give the TFSI a large potential advantage over other sectors that lack ICT knowledge on employees."

These comments demonstrate the advantage that the TFSI possesses from using ICT tools. However, promoting and retaining knowledge alone only gives the industry potential advantage without any guarantee of realisation. Thus, the participants further agreed that the TFSI's ability to share knowledge allows knowledge to transfer from individual employees to the management team, hence improving the competitive performance of the financial industry.

5.4.2.2.3 Organisation Synergies Realisation

A third source of competitive advantage for the TFSI as a result of using ICTs is the synergy gained from interlinked capabilities. Sixteen (89%) participants stated that the adoption and use of ICT allows the TFSI to interlink the organisation's important capabilities in a more integrated manner. This interlinking enables the TFSI to realise the benefits gained from ICTs. Further, the data revealed that systems such as the telephone and the Internet allow the TFSI to internally communicate and share knowledge, allowing the institutional knowledge to grow within the industry. According to P3:

> "I'd have to say that had the TFSI not utilised ICTs, the organisation synergies will absolutely have no chance of realisation, let alone the performance and competitiveness of the industry."

The above observations highlight the fact that TFSI engagement in ICTs has resulted in the organisation synergies needs being met and at the same time created a competitive advantage for the industry. The results indicate that the use of ICTs has not only built organisational synergies within the TFSI financial institutions but also allowed employees to fully engage in a more complete manner.

5.4.2.2.4 Better Technologies

The last source of competitive advantage for the TFSI is better technologies. The data revealed that 12 (67%) participants agreed that the use of various computerised financial systems and the introduction of a plastic identification card by the Tuvalu Provident Fund for members certainly created a competitive edge for the industry over other sectors in terms of the quality of services offered to customers. In addition, the use of more advanced technologies allows the TFSI to be recognised as a competitor within the financial industries in the South Pacific countries. For example, the loan management system (LMS) that is used by the Tuvalu Provident Fund was adopted by other regional countries who recognised its user friendliness and able capabilities. According to P5:

> "Absolutely, from the use of ICT tools our organisation is now able to compete with other regional financial industries in terms of knowledge, skills and expertise on certain systems."

Similarly, P18 stated that:

> "And I will be honest to say that as a senior employee, our organisation and even the TFSI in general would not have had competition with other regional financial industries if it wasn't for ICT."

Thus, it is evident that the general consensus echoed by the representatives from the TFSI is that the TFSI is able to compete with other South Pacific regional financial industries as a result of using better technologies such as international banking of SWIFT and Money Gram. The results confirm that the use of ICTs within the TFSI generates competitive advantage for the industry in terms of individual financial institutions and in competition with financial industries in other South Pacific countries. The analysis showed that the four main competitive advantages constitute a

very important aspect of ICT impact on the overall performance of the Tuvalu financial services industry.

5.5 Challenges of ICTs – Voices of the TFSI Employees

The third theme, and third research question, relates to the challenges experienced by the TFSI employees from deploying and using ICTs. The literature review identified several challenges or common obstacles faced by any business that uses ICTs. The Tuvalu financial services industry is no exception. As theme one focused on the benefits, this theme explores the challenges the Tuvalu financial services industry faces in deploying ICTs, as expressed by the participants. In order to find comprehensive answers to this research question, three sub-questions were asked of the participants. Question one focused on the challenges, question two examined mechanisms used by the TFSI to monitor ICT contributions and sub-question three focused on the measures to address the challenges. The questions were developed in line with proposition 3 of the conceptual model (increased use of ICT can present challenges for organisational performance) and the data collected are presented in this section.

5.5.1 Challenges of ICTs

Based on the quantitative analysis of the interview scripts and the subsequent coding of responses, the various challenges faced by the TFSI from using ICTs could be grouped into financial, technical, managerial and security challenges (see Table 19). The challenges are ranked in accordance to the number of participant responses under each respective group.

Based on the results in Table 19, it is clear that the number of participants agreeing with each challenge varied. This suggests a lack of consistency as to which was the most challenging aspect. However, despite this inconsistency, the data clearly show that the TFSI is a facing numerous key challenges as a result of deploying ICTs. The following is a discussion of the results under the four main groups.

Table 19: Challenges From the Use of ICTs

Group	Challenge	Frequency (Yes)	Percentage
Financial	Limited financial resources	15	83%
	Expensive initial investment cost	12	67%
	High personnel cost	12	67%
	High cost of implementation	12	67%
	High annual maintenance fees	9	50%
	Heavy reliance on external consultants	4	22%
Technical	Unreliable Internet connectivity	17	94%
	Lack of in-house core IT skill trainings	12	67%
	Frequent breakdowns of hardware	9	50%
	Limited working computers	5	28%
	Rapid pace of change in technology	2	11%
Managerial	Mismanagement of equipment	13	72%
	Lack of IT knowledge for management	11	61%
	Ineffective staff training programs	10	56%
	Staff turnover	4	22%
Security	Danger of virus attacks	13	72%
	Threat of hackers	6	33%

5.5.1.1 Financial Challenges

The six financial challenges identified by the TFSI representatives had a significant impact on the TFSI employees. Of the 18 participants, 15 (83%) participants agreed that limited financial resources is the main financial challenge confronting the TFSI. This is followed by the expensive initial cost (67%), high personnel cost (67%), expensive cost of implementation (67%), high annual maintenance fees (50%) and heavy reliance on external consultants (22%). Thus, it appears that the participants generally perceive financial challenges as major obstacles in their ability to fully utilise available ICT tools. P1 was explicit in saying that:

> "As much as we would love to maximise current ICT tools to their full potential, the reality is that the lack of financial resources prohibits us from doing that. Therefore, I would probably argue that financial constraint is our main bottleneck."

P9 agreed and suggested that the high cost of system implementation also impacted on the TFSI employees and their ability to service customers:

> "Ultimately, it's the cost of new system implementation that is really affecting our organisation's ability to acquire new systems to help our customer services. For instance, we were interested in installing a new internal phone system but due to its high implementation cost, the management decided otherwise."

In addition, the analysis indicated that the level of the TFSI expenditure on ICT is actually the result of demand and supply factors, political decisions and overall economic conditions. The analysis indicated that ageing and physical conditions of ICT tools were considered important factors on the demand side as both could contribute to decreasing the life expectancies of existing ICT tools. In fact, TFSI expenditure on ICT tools primarily depends on the age and condition of current available tools. In regards to the supply side, it is obvious from the analysis that providing the TFSI with ICT tools incurs costs. Consequently, requests for more advanced technologies could be an indicator of technological progress, which is a cost driven factor for the industry.

The other financial challenge that clearly emerged out of the analysis is the high cost of personnel. For example, P7 argued that due to the use of ICT, their organisation had, over time, incurred high personnel cost as a result of employees working beyond normal working hours. This occurred because of system failures which forced employees to work in access of normal working hours in order to complete tasks. Ultimately, it has a bearing on high personnel costs which is seen as a definite challenge for TFSI employees.

In conclusion, the analysis confirmed the presence of financial challenges within the TFSI from the use of ICT. The results clearly showed that ageing and physical condition of existing tools could influence TFSI expenditure on ICT, and perhaps influence other challenges encountered by representatives from the TFSI.

5.5.1.2 Technical Challenges

The second set of challenges which may impede the ability of ICT to improve the performance of the Tuvalu financial service industry are technical challenges. These

include the unreliability of Internet connections, lack of in-house core IT training, frequent breakdowns of hardware, limited working computers and the very rapid pace of change in technology. Based on the data and analysis, 17 (94%) out of the 18 participants agreed that the unreliability of the Internet connectivity is the key obstacle currently encountered by TFSI employees in this category and overall. This highlighted the fact that the level of Internet connectivity in the TFSI was relatively new, and that in the past most financial institutions used a manual paper-based system. Thus P10 stated that:

> "I think we have come a long way whereby ICTs, in particular the Internet, is now leading the business changes in terms of executing overseas payments. To me personally, we've transformed a lot since the introduction of ICTs and had slowly pushed the old manual paper base system out of our organisation."

Although they emerged from the responses as challenges, it is obvious that the issues of limited working computers and rapid pace of change in technology were in a much lower scale than the other challenges. For example, only two (11%) of the participants suggested that the pace of technology evolution is a challenge. This indicates that the TFSI is generally coping very well with the pace of technology evolution. According to P17:

> "Although we are mindful of the very fast pace of technology evolutions especially with financial accounting software, our organisation remains positive that we have the capacities to continue growing in par with such changes."

The foregoing analysis suggests a mixed perception of technical challenges with the data highlighting the fact that the first four challenges were perceived as definite technical challenges. However, much more could still needs to be done to ensure that the bottom two ranked issues are dealt with for the benefit of TFSI employees and the industry.

5.5.1.3 Managerial Challenges

In terms of managerial challenges, the representatives from the TFSI suggested that mismanagement of office equipment, lack of IT knowledge for management, ineffective staff training programs and staff turnover were considered to be managerial challenges hindering the relationship between ICT use and TFSI performance. The data revealed that 13 (72%) of the participants agreed that the mismanagement of office equipment is a major obstacle. The general consensus amongst the respondents was that TFSI employees were using office equipment for personal use. This could result in the ICT system being overused, hence reducing its lifespan and productivity for executing the industry mandates. According to P3:

> "I don't believe in system under-utilisation, but what I do believe is that mismanagement of equipment will obviously put more constraint on organisation tight budgets. So, I have a fundamental problem with this sort of challenge."

Furthermore, more than half of the total respondents stated that other managerial challenges faced by the TFSI include the lack of IT skills by management personnel (61%) and ineffective staff training programs (56%). Clearly, this situation could have a profound implication for the entire TFSI management of ICT investments. On the contrary, a small number (4) of the participants suggested that staff turnover is a managerial challenge. This low number of responses may be attributed to the small size of the TFSI and the lack of employment opportunities elsewhere in the country.

In summary, the respondents viewed three main managerial challenges with staff turnover being a more minor challenge. This does not mean that it should be left unattended, but would be addressed more appropriately should it became a real nuisance for TFSI management in the future.

5.5.1.4 Security Challenges

The final set of challenges which may impede ICT use and TFSI performance are security challenges. Based on the interview results and analysis, the two forms of

security challenges identified by the participants include the danger of virus attacks and the threat of hackers. A large proportion (72%) of the respondents agreed that the danger of virus attacks is a key challenge for TFSI employees. This clearly signifies the vulnerabilities of TFSI computerised network systems to virus attacks because of the risk that they could be infected via the use of the Internet. Consequently, the more intrusive an attack is, the more likely it will have a significant consequence on the financial position of the industry. The above observation was reinforced by a participant saying that their IT officer was primarily perceived to be more of a watch keeper than a system operator:

> "I think a lot of emerging issues related with chunks of virus attacks on our network system was as a result of employees surfing the Internet. Consequently, it has taken up most of our IT officer time cleaning viruses from desktops."

Furthermore, although the threat of theft or destruction of secure information through hackers was raised, the low proportion (33%) of respondents agreeing on this challenge failed to qualify this as a genuine obstacle. Despite this low score, it is important to note that this kind of security challenge tends to have long-lasting effects on any organisation. At least a minority of the participants were aware of the severe consequences of this type of challenge.

The data and analysis confirmed the presence of various challenges encountered by the TFSI employees from using ICT. The diverse views of the relative challenges echoed by the participants reflect the many challenges surrounding ICTs and the TFSI performance. Consequently, this may lead to appropriate attention being accorded to ICT components when management decisions are made.

5.5.2 Mechanisms Used to Monitor ICT Benefits and Costs in the TFSI

The second question in this theme asked respondents "What mechanisms do you have in place to monitor ICT investments contributions to the overall performance of your organisation?" and the responses from the participants are reported in this section.

Sixteen of the 18 participants agreed that although they recognised the benefits or the positive impact of using ICT tools, there are no existing mechanisms within the Tuvalu financial service industry to actually monitor and measure the benefits these tools contribute towards organisational performance. This clearly indicates that despite the number of benefits derived from ICTs as per section 5.3, the general consensus is that the TFSI currently has no proper mechanisms for monitoring the benefits from ICT. According to P5:

> "Honestly, I must admit that although I have witnessed the many benefits as a result of using ICT, I am 100% sure that we do not have any proper mechanism in place to actually monitor the tool's contribution."

On the other hand, more than half (10) of the participants agreed that the Tuvalu financial services industry has no mechanisms to monitor the cost of ICT tools while the other eight (44%) stated that the industry does have mechanisms in the form of effective, prudent annual capital budgeting and sound procurement policies. This analysis shows that the participants generally agreed that the TFSI has cost mechanisms to monitor ICTs cost. P9 suggested that although annual capital budgeting reflects the organisational ICT needs, it appeared that it could serve as a cost mechanism for any organisation.

5.5.3 Measures to Address ICT Challenges

Having analysed the challenges, in the final question in this theme, the participants were asked to identify measures which could be used to eliminate or reduce those challenges and the findings are presented in Table 20. The measures are ranked in accordance to the total number of respondents and further divided into their respective groups of financial, technical, managerial and security challenges.

Of these challenges, almost every participant agreed that establishment of an internal satellite dish for the TFSI (16 participants) and increases in financial budget allocation (14) are the two key measures of addressing various ICT challenges. Although these two were considered to be key measures, the results confirmed seven additional

Table 20: Measures Used to Address the Challenges

Financial	Technical	Managerial	Security
Increase financial budget allocation for ICT-related tools (14 participants)	Establish internal satellite dish for the financial industry (16 participants)	Enhance management of office equipment (12 participants)	Enhance management of the Internet use by staff (10 employees)
Negotiate with current system provider to lower annual maintenance fees (9 participants)	Enhance in-house core IT training for staff (12 participants)	Employ staff with IT qualifications (10 participants)	Ban using private USB drives in office (9 participants)
	Acquire new or upgrade existing hardware (9 participants)		
	Create a centralised financial system for the TFSI (8 participants)		

measures received support from at least half (9-12) of the participants and one (centralised financial system) being the only measure agreed to by less than half (8) of the total participants. These measures are financial and people-related concerns, reinforcing the view that technological improvements in ICT sometimes are limited by non-technical challenges with people-based solutions.

In an analysis of the interview transcripts, the participants emphasised the importance of revitalising the industry through promoting the importance of hardware tools and building IT capacity training. Both P7 and P16 suggested that enhancing IT knowledge could be seen as a catalyst for minimising ICT challenges. This emphasises the importance of employing staff with adequate IT knowledge to better cope with ICTs vulnerabilities. Moreover, recognising the challenge regarding virus attack, half (9) of the participants suggested that banning private USB drives on office computers would certainly go a long way towards minimising or addressing the challenges. Although this could be argued as not a comprehensive measure of securing information and

computers, the reality remains that this measure could contribute to addressing existing ICT challenges encountered by TFSI employees.

5.6 Future Integration of ICT Infrastructure and Resources in the TFSI

The final theme of the study relates to the future development and integration of ICT resources within the Tuvalu financial services industry. This theme has two sub-sections. The first one looks at the effectiveness and efficiency of current financial services as a result of ICT while the second part focuses on the future development and integration of advanced ICT tools. This is in line with proposition 4 of the conceptual model.

5.6.1 Effectiveness and Efficiency of Financial Services

Without a doubt, ICTs have played a key role in the recent development of the Tuvalu financial services industry. When participants were asked to assess the effectiveness and efficiency of current financial services in Tuvalu as a result of using various ICT tools, two-thirds (12) of the participants agreed that current services are effective and efficient. However, the other six participants said that existing services are not as effective as they should be, and these participants called for more ICT resource development and integration. Therefore, the general consensus is that the availability of ICTs enables the TFSI to offer a wide range of products and services to its customers, both domestic and international. Table 21 provides a summary of products and services currently offered by various financial institutions in Tuvalu.

Table 21: Products and Services Offered by the TFSI

Financial Products	**Financial Services**
Savings	Financial planning
Term deposits	Budgetary
Personal loans	Inland and customs services
Superannuation retirement funds	Money transfers
Mortgage loans	Financial advisory services
Business loans	Economic services
Investments	
Interest bearing accounts	
Bills and payments	

The analysis further suggests that the TFSI not only prides itself in providing competitive products through technology, ICTs also ensure that the industry delivers these products in a personalised and friendly manner. Based on the responses, it appears that the Tuvalu financial industry relies heavily on its computerised system for many of its activities and services such as daily processing of large volumes of data. As P5 stated:

> "Absolutely. We rely enormously on IT computerised systems for data processing because if it doesn't work, we have people sitting there all day with manual calculators which are not only time consuming but bound for lots of errors."

The above comment was supported by two-thirds (12) of the participants agreeing that without existing ICT tools, the financial industry would not have been in its current position where its core financial products and services are executed and delivered much effectively and efficiently.

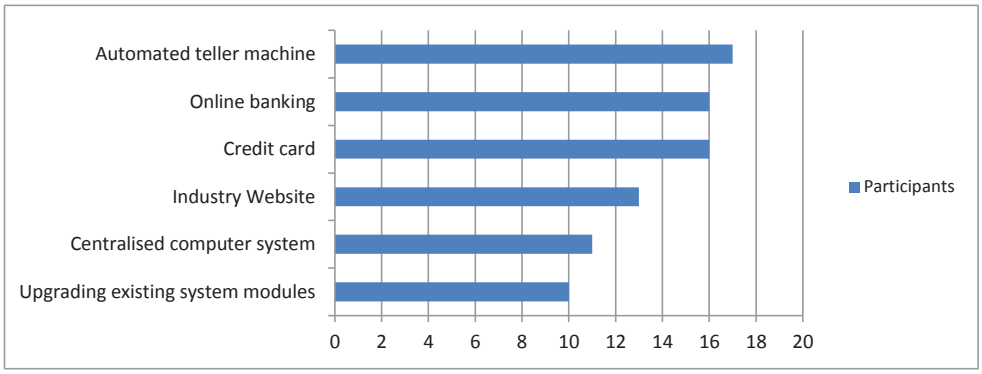
5.6.2 Integration of Future ICT Development in the TFSI

Following on from the preceding section on the level of effectiveness and efficiency, participants further agreed that the future integration of more advanced technologies or resource development is the way forward for the industry. The participants believe that in order to improve the level of financial services in the country, the industry, in collaboration with the Tuvalu government, must be engaged in resourcing the industry with appropriate ICT tools. Figure 14 presents the various technologies that participants viewed as critical for the industry's future development. The responses are sorted in accordance with the total number of respondents in each suggestion.

The data show that out of the total respondents, 17 (94%) participants agreed that the integration of automated teller machines in Tuvalu would certainly enhance the effectiveness and efficiency level of financial services in the country. This is followed by online banking and the use of credit card (16 participants each), establishment of an

industry Web site (13), setting up a centralised computer system for the entire industry (11) and upgrading the current system modules (10 participants).

Figure 14: Technologies that Require Integration into the TFSI



It is evident from the data that TFSI representatives have a very strong focus and desire to integrate these technologies into the TFSI environment. The participants generally agree that the lack of services, particularly the ATMs, credit cards and online banking, has lowered the effectiveness level of financial service delivery in the country. As P16 expressed:

> "The way banks work in other countries especially with online banking, credit card and ATM is absolutely brilliant. Obviously, I'd say if only we have those technologies, the level of financial services here in Tuvalu would have been right up there with other Pacific countries' financial industries."

With regards to the options of setting up an industry Web site, creating a centralised computer system and upgrading existing system modules, half to two-thirds of total respondents considered these as must haves for the industry. Although the upgrading of current system modules was perceived as the least important aspect, the analysis confirmed that more than half of the total respondents felt that it is important for the TFSI to consider upgrading its system modules given the dynamic nature of technology and the amount of dollars that have been invested in the existing systems. However, the lower ranking of these technologies in comparison with online banking,

ATMs and credit cards could be due to either the possible lack of a full appreciation of the role that ICT plays in the organisation or the lack of IT knowledge.

In summary, TFSI representatives perceived the above six technologies as key areas for future integration. Such integration would undoubtedly eliminate some of the existing challenges or issues, and raise the overall effectiveness and efficiency level of financial services for better organisational performance.

Having thus analysed the technological aspects of areas for further integration, another key area that emerged from the response of the participants is the need for an ICT policy for the entire TFSI operation. In fact, more than 80% (15) of the total participants suggested this option. According to the data, participants recognised that given the importance of ICT as a major facilitator and driver for growth and prosperity, it is considered highly appropriate for the financial industry to develop its own ICT policy. As P1 stated:

> "I personally think that it is a must and a high priority for our organisation to collaborate with other financial service providers in formulating and developing an ICT policy document for the industry".

Such a policy would increase the availability of financial services for consumer choices, exert all required efforts for attaining effective electronic commerce (e-commerce) as well as establish a solid ICT base for the industry that is not only locally vibrant but internationally competitive as well.

5.7 Chapter Summary

This chapter presented the empirical data collected during the fieldwork process in accordance with the four research questions. The findings include the positive impacts that ICT has on the Tuvalu financial services industry, its sources of competitive advantage, its challenges and measures as well as areas for future integration and development. Discussions of these findings as well as the implications that ICT has had on the Tuvalu financial services industry are discussed in the next chapter.

CHAPTER 6 – DISCUSSION OF FINDINGS

6.1 Introduction

This chapter discusses the research findings from the interviews with the selected participants of the Tuvalu financial services industry (TFSI) with the specific aim of demonstrating how the research questions were addressed through the application of the conceptual framework in Chapter 3 and the literature in Chapter 2. The results in Chapter 5 gave a general picture of the participant's responses, but this is not sufficient to draw out meaningful conclusions. To achieve this, the chapter is divided into six main sections that cover the following areas:

- Testing the conceptual model and derivation of the extended model for the TFSI
- The benefits of ICT access and use
- ICT level of support and competitive advantage within the TFSI
- ICT challenges and measures to address the challenges
- Future ICT integration
- Addressing the propositions and research questions

6.2 Testing the Conceptual Model and Derivation of the Extended Model for the TFSI

With respect to testing the conceptual model developed in Chapter 3 (Figure 8), the data gathered from the participants were used to examine the model in the real-life context of the TFSI. Full participation by the participants from a variety of financial service organisations (see Table 11) was an indication that the data are considered adequate for testing the conceptual model.

6.2.1 Level of Investments in ICT Capital and Staff

The first key component of the conceptual model is the level of ICT investment in ICT capital and staff. As revealed in the results from Chapter 1 (Table 3), the capital budget for ICT in the TFSI varied between the years 2005 – 2011. Despite this variance, there has been some investment each year in hardware, software and annual licensing or

maintenance fees. Overall, the existence of the ICT portfolio within the TFSI indicates the level of commitment made by the industry. This portfolio increases the availability of ICT resources within the industry and has transformed some of the industry's operations into automation mode, in a typical case of substituting capital for labour, as described by Weill (1992). Furthermore, an increase in the ability of employees to access and use ICT tools is associated with ICT investment. The results in Chapter 5 confirmed a high proportion of the 18 TFSI managers accessing and using various ICT tools. Table 22 provides a summary of the findings related to this component.

Table 22: Types of ICT Investments/ Resources

Type of ICT Investment/Resources	Status in the TFSI
Hardware	Present
Software	Present
Licensing / System annual fees	Present
Level of ICT accessibility	High
Level of ICT use	High

Therefore, the results gathered from data presented in Chapters 1 and 5 confirm the presence of ICT investment in the Tuvalu financial services industry and quantify the high level of employee access and use of ICT resources currently available in the TFSI.

6.2.2 Complementary Organisational Resources

The second component in the conceptual model focuses on complementary resources The results in section 5.4.1 demonstrated that different stakeholders including suppliers, partners, employees, management and customers are supportive of ICT undertakings within the TFSI, with degrees of support from strong to mild (see top portion of Table 23). This signifies that these stakeholders recognise the impact that ICTs has on the performance of individual organisations and the industry as a whole. The results also reveal that there were other complementary resources that could also positively influence the real impact of ICT on the industry performance (section 5.4.2.1). These include strategic leadership and action, knowledge management, the level of staff's ICT technical ability and success (see bottom portion of Table 23).

Table 23: Types of Complementary Organisational Resources

Type of Complementary Organisational Resources	Status in the TFSI
Suppliers	Strong support
Partners	Strong support
Employees	Moderate support
Management	Moderate support
Customers	Mild support
Strategic leadership and action	Strong support
Knowledge management	Strong support
ICT technical ability	Moderate support
Success	Moderate support

Closer inspection showed that there was a general acceptance of ICTs within the TFSI environment as reflected in the commitment and support level shown by different stakeholders. Without such acceptance, the TFSI would not have been able to invest in ICT tools. Similarly, respondents also believe that the level of ICT technical ability within TFSI is above average, thus indicating the ability of the industry to fully utilise available ICT tools.

The results from section 5.4.2.2 show that the presence of ICTs has created a high to moderate competitive advantage for the Tuvalu financial services industry. The respondents identified four competitive advantages for TFSI from the use of ICT tools as shown in Table 24. These results support the application of the resource-based value framework (Barney, 1986; Bharadwaj, 2000) in the development of the conceptual model and are consistent with the literature (Chapter 2). These results are important as they form the basis upon which future qualitative analyses may be undertaken to further refine or extend the conceptual model as recommended by Harris and Katz (1989).

Table 24: Types of Competitive Advantages for the TFSI from the Use of ICTs

Type of Competitive Advantages	Status in the TFSI
TFSI operations transformation	Strong support
Gaining institutional knowledge	Strong support
Organisation synergies realisation	Strong support
Better technologies	Strong support

In summary, the results not only highlight the different types of complementary resources, but also support the resource-based value framework by identifying areas in which ICTs influence the competitiveness of the industry. Consequently, this research concludes that the complementary organisational resources component does exist and it has influenced the positive relationship between ICT and improved organisational performance.

6.2.3 Organisational Performance

As part of the testing of the conceptual model, the participants were asked to identify the perceived benefits of ICT for improving organisational performance (see Section 5.3.1). The results show that there are nine perceived benefits of ICT within the TFSI. Close examination of the results confirm that the use of ICT has had a major positive influence on the TFSI performance, as revealed in the number of perceived ICT benefits and strong support for most of them (see Table 25).

Table 25: Types of Perceive ICT Positive Benefit in the TFSI

Type of ICT Benefit	Status in the TFSI
Increase of collaboration level amongst institutions	Strong support
Increase in efficiency	Strong support
Better monitoring of data and information	Strong support
Better communication channel	Strong support
Increase in data analysis capacity	Strong support
Increase in reporting capacity	Strong support
Increase in competitive advantage for TFSI	Strong support
Increase in customer service	Moderate support
Increase in staff training and productivity	Moderate support

The results are consistent with the literature in that organisations in a similar industry tend to use the same indicators (Nemati & Barko, 2002). Having a set of consistent measures between different organisations is very important as it could facilitate the comparison of organisation performance (Palmer & Markus, 2000). Although the results failed to explicitly generate any quantitative data on key financial measures such as profitability, market value and shares, the qualitative and intermediate performance measures given by the participants such as enhanced collaboration level

amongst institutions, increase in efficiency, better monitoring of data and others indicate improved organisational performance.

Not only did the use of ICT tools positively affect the performance of the financial services industry in terms of the identified set of benefits, the results also show that participants agreed that ICT investments positively affected the overall performance of the TFSI. Sixteen (16) of the eighteen (18) participants strongly supports this statement (see Table 13).

6.2.4 Challenges

According to the conceptual model, the influence of the level of ICT investment and complementary organisational resources can be moderated by challenges in the deployment of ICT for organisational improvement. To examine the existence of the challenges component of the conceptual model, participants were asked questions relating to challenges encountered by them as a result of using ICTs. The results show that there are 17 challenges faced by managers of the Tuvalu financial industry which can be grouped into four major categories: financial, technical, managerial and security (see Tables 19 and 26). Closer examination shows that although the key challenges that make up this component are much wider than financial or technical obstacles revealed in the literature, the overall findings are consistent and supported observations in the literature (e.g., Weill, 1992).

Clearly, the inclusion of this component in the conceptual model is important as it provides substantial support of the existing challenges encountered by employees. As identify in previous studies (DeSantics & Monge, 1999; Carr 2003), the challenges would undoubtedly enable the TFSI to initiate the appropriate measures to reduce or alleviate the challenges if the financial organisations are to fully realise the potential of their ICT investments.

Table 26: Challenges From the Use of ICT

Challenge	Group	Percentage
Unreliable Internet connectivity	Technical	Strong support
Limited financial resources	Financial	Strong support
Mismanagement of equipment	Managerial	Strong support
Danger of virus attacks	Security	Strong support
Expensive initial investment cost	Financial	Strong support
High personnel cost	Financial	Strong support
High cost of implementation	Financial	Strong support
Lack of in-house core IT skill trainings	Technical	Strong support
Lack of IT knowledge for management	Managerial	Moderate support
Ineffective staff training programs	Managerial	Moderate support
High annual maintenance fees	Financial	Moderate support
Frequent breakdowns of hardware	Technical	Moderate support
Threat of hackers	Security	Mild support
Limited working computers	Technical	Mild support
Heavy reliance on external consultants	Technical	Minimal support
Staff turnover	Managerial	Minimal support
Rapid pace of change in technology	Technical	Minimal support

6.2.5 Consideration for Future Integration

The final major component in the conceptual model is consideration for future integration. This is a very important component as it links the performance of the organisation back to the ICT investment and resources component where decisions are made. In doing so, it allows the TFSI to consider past experiences when making future ICT investment decisions. This is supported by the literature because the effect of time lags is considered an important factor in the ICT decision making process (Weill, 1992). The results show that although most participants agreed that existing ICT tools are effective and efficient, there were calls for the TFSI to further integrate more advanced technologies of ATMs, on-line banking, credit cards and an industry Website in order to broaden its functionality and competitiveness. In this way, the results confirm the existence and qualify the presence of this component in the conceptual model.

In summary, the conceptual model was found to be practical and suitable to explain the relationship between the use of ICTs and the performance of the Tuvalu financial services industry. The results are significant as they confirm the presence of the

conceptual model components in the TFSI. The most notable differences between the conceptual model and the extended model are the high number of challenges encountered by the TFSI and areas for future considerations. An extended model representing the conceptual model as applied to the TFSI was developed with all variables or findings presented under each component and is shown in Figure 15.

6.3 The Benefits of ICT Access and Use

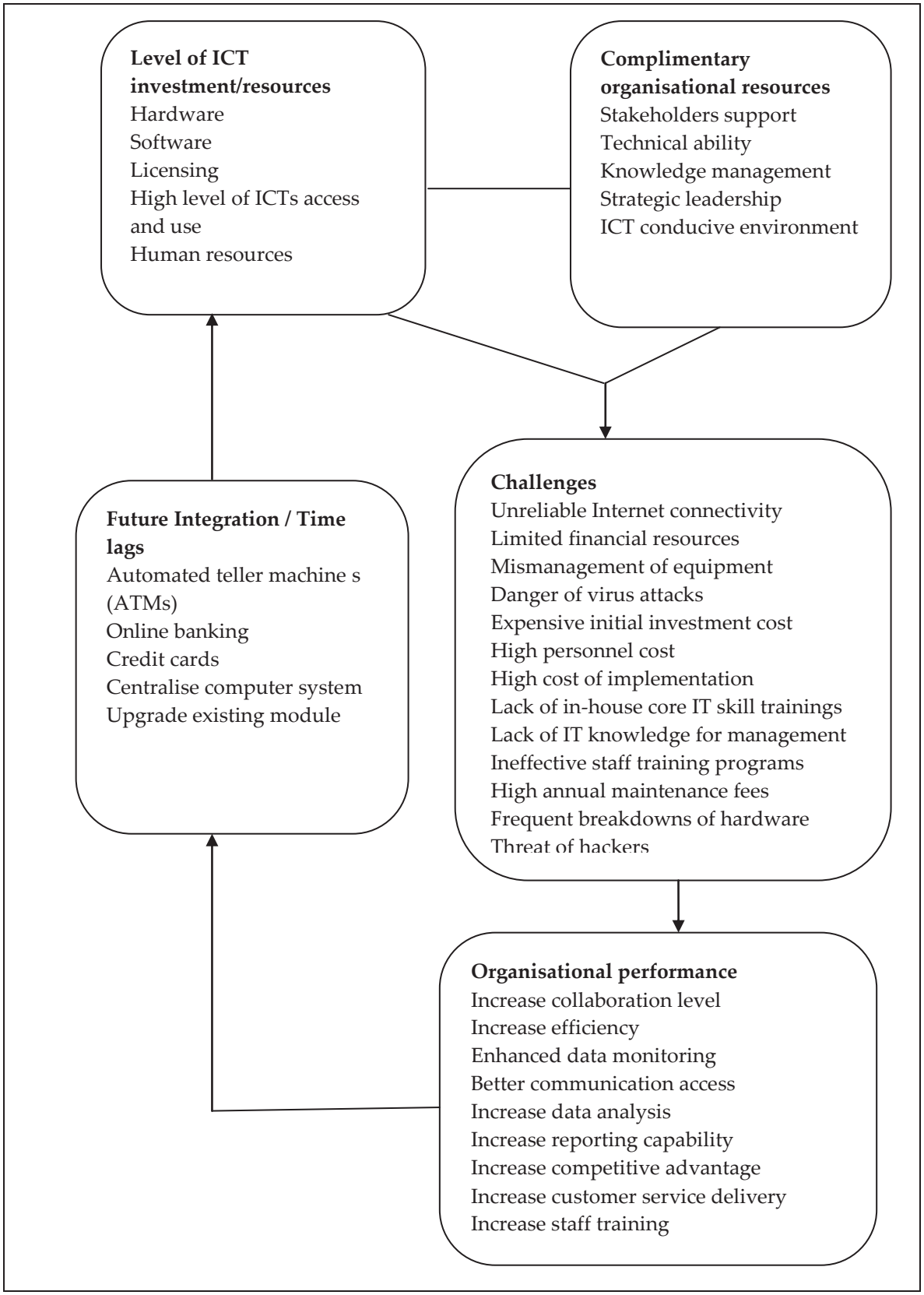
This section focuses on the TFSI managers' perceptions of the access, use and the perceived benefits of ICT within the TFSI context as reported in Section 5.3. The findings are discussed in separate sections that highlight the level of TFSI employee's access and use of ICTs and the perceived benefits.

6.3.1 TFSI Employees Access to ICT Tools

The information gathered from the interviews showed that the ICT tools that TSFI employees access are diverse (see Table 17). This indicates that the TFSI has recognised the importance of ICT tools as an opportunity to enhance its overall performance, thus equipping its employees with various ICT tools in their offices. All participants reported that they have access to computers, photocopiers, printers, telephone, fax machines, email, word-processing and spreadsheet programmes. Additionally, most of them have access to scanners, overhead projectors, mobile phones and accounting software packages. The high level of access to the Internet by the participants indicates the importance of this business tool to TFSI operations as most of their tasks are executed through the Internet.

An issue that influences employee access to ICT tools is the employee's position within the financial institution. Tools such as mobile phones, scanners and overhead projectors are not accessed by all participants. This shows that these tools are only provided to senior officers of various institutions instead of all employees. According to P6, although the employees of the Tuvalu financial services industry have access to new technology tools, some of its junior officers have limited or restricted access for reasons related to information confidentiality and effective system maintenance. This is

Figure 15: Extended Model of the Relationship between ICTs and TFSI Performance



not seen as a necessary restriction on employee accessibility, but a reflection on the proper and effective use of existing tools for maximum benefit.

Overall, the findings show that at the managerial level of the TFSI, these employees have sufficient access to various ICT tools to enable them to do their work. The 18 participants in this study are only a small fraction of all TFSI employees, but as managers doing knowledge work, they mostly have access to the ICT tools they need to do their job.

6.3.2 TFSI Employees Use of ICT Tools

In addition to assessing the level of employee access to ICTs, the research also investigated how employees of the Tuvalu financial services industry use ICT tools for performing various tasks. According to the data presented in section 5.3, TFSI employees use ICTs to enhance collaboration, increase efficiency, monitor data and information, enhance communication, perform data analysis, and report financial data. These are the tasks that financial employees normally undertake in executing and delivering their daily service. When ICT tools are made available, employees begin learning their skills through the process of observation, in-house training or vendor training programmes. Employees with sufficient skill levels tend to use more sophisticated ICT tools for solving more complex issues. For example, the introduction of various accounting software computer programs into the Tuvalu financial services industry has enabled employees to use these tools for data analysis, report compilation and data monitoring. These findings are consistent with the literature in which the use of ICT tools influence employee's interactions with various ICT tools (Weill, 1992).

The introduction of ICT tools such as the Internet has been a major boost for the TFSI. As described by the participants, the Internet has been embraced by the industry as it allows the Tuvalu financial services industry to perform and execute its core tasks much more effectively, especially in executing financial transactions, liaising with clients and facilitating delivery of timely information for decision makers. The participants who access the Internet on a daily basis argue that it has helped them find

appropriate information, make effective forecasts and offer sound financial analysis that provides deeper understanding of various financial matters for not only their institution, but for the general public as well. This clearly signifies the importance of the use of such tools within the context of the TFSI.

It is also clear from the findings that employees of the TFSI fully understand the effect ICT tools have on the performance of the financial industry. Based on the interview transcripts, it was evident that participants are fully aware of the importance of ICT tools to deliver sound and effective financial services in the country. The use of computers, the Internet and sophisticated accounting packages allow TFSI employees to produce timely financial reports, analyse multiple financial data, deliver improved customer service delivery and many other similar activities. However, the extent to which employees use these tools depends entirely on the level of each employee's skill and knowledge of the tool.

Another measure reflecting the use of ICT tools by employees of the TFSI is the quality of services delivered by financial institutions. As described in Section 5.3.1.10, participants believe that the skills and knowledge gained from using various ICT tools has raised the level and the quality of financial services delivered, thus improving overall organisational performance. This perception emerges as a result of managers who achieve milestones and targets more effectively as a result of using ICT tools, as opposed to the former manual paper-based system. The level of accomplishment or achievement that the employees have witnessed in their respective organisations varies according to reporting, analysis, communication and clients relations.

6.3.3 The Benefits of Accessing and Using ICT

Despite concerns about ICT productivity paradox raised in the late 1980's, a number of studies (e.g., Brynjolfsson & Hitt, 2000; Black & Lynch, 2001) have emerged and substantially improved our understanding of the relationship between ICT and organisational performance. The results of this study confirm that ICTs are valuable and provide multiple benefits for the TFSI. The TFSI has been most significantly

impacted by the use of ICT in areas such as collaboration, efficiency, data monitoring, communication, analysis, reporting, competitiveness, customer service delivery and staff training. Although the role and impact of ICT differ between organisations and sectors, the overall positive impact of ICTs on the TFSI is apparent, thus indicating that ICTs are vital for materialising the benefits through coordination and synergies among available resources. The research findings in terms of the perceived benefits are broadly consistent with the literature, especially the second wave of studies from the mid 1990's onwards in which the use of ICTs are strongly associated with improved organisational performance (e.g., Brynjolfsson & Hitt, 1998; Carr, 2003).

In particular, the findings of this research reveal that the availability of ICT provides processing and telecommunications capabilities that further enhance the TFSI's ability to handle high volumes of data and transactions. In terms of communication capabilities, Hiltz, Johnson and Turoff (1986) explored the contribution that ICTs make to business communication and found that ICTs facilitate enhanced communications amongst business partners and customers and enable participation in a communication event. The results of this study show that TFSI employees believe that ICTs not only enhance, but also increase the speed of communication between the TFSI and customers, leading to fast delivery of information. In addition, the use of the Internet and telephone also make the management of TFSI resources more efficient, a result supported by the literature (e.g., Davenport & Prusak, 1997).

Furthermore, the TFSI employees believe that the benefits of using ICT tools within the Tuvalu financial services industry is significant. ICTs allow employees to deliver more productive outcomes for various stakeholders. The participants believe that ICT tools make their work more efficient in terms of being more organised and systematic in the way they conduct their tasks. The participants also believe that the use of ICT tools enables them to accomplish tasks easier especially when delivering and facilitating financial transactions. The use of ICTs benefits the TFSI employees in the development of their daily routines, meeting organisational annual milestones and improving financial literacy within the country.

This study also found that product and customer service delivery were positively impacted by the use of ICT tools. The use of ICTs not only presented the TFSI with an opportunity to deliver existing financial services more efficiently and effectively, but also facilitate the provision of new services. Such services provide customers with more choices how they interact with their financial service providers. The results are consistent and in support the findings of Llewellyn (1996) and Powell and Dent-Micallef (1997). In general, it is evident that through ICTs, financial institutions have a greater ability to compete and honour their obligations.

While the results show a number of benefits from ICTs, it is important to note that ICTs on their own would not have been able to generate significant impact unless accompanied by other organisational resources. Thus, the ability of the TFSI to invest and implement ICT is seen as part of a system of mutually reinforced organisational changes that generate a significant impact on the productivity and performance of the industry. Again, these results are consistent with the literature on ICT impact on productivity (e.g., Brynjolfsson & Hitt, 2000; Baldwin et al., 2003). It is apparent from the results that ICT and human capital within the TFSI context are complements, thus creating a higher incidence of better organisational productivity and innovation.

Overall, the analysis confirmed that the use and access of ICTs within the TFSI leads to enhanced organisational performance, suggesting a significant positive relationship between ICT use and the TFSI performance. The results suggest that in order to be successful, an organisation typically needs to adopt ICT as part of a system or cluster of mutually reinforcing organisational changes. The findings of this study provide additional evidence of elements that contribute to the topic of ICT and organisational performance.

6.4 ICT Level of Support and Competitive Advantages within the TFSI

Concurrent with the deployment of ICT, it is important that organisations understand the mechanisms and processes that lead to the situation where ICT repeatedly and continually realises outcomes that produce competitive advantage in the market place.

Guided by the resource-based value framework, competitive advantage can be achieved and sustained by investing in valuable resources and competencies (Barney, 1991). According to the analysis in this research, it is apparent that a number of key resources enable the development of competitive advantage for the TFSI. The resources include strategic leadership and action, knowledge management, technical ability and success. While ICT on its own is valuable, combining ICTs with key resources tend to produce a more robust and competitive business advantage for an organisation (Powell & Dent-Micallef, 1997). Analysis of the data in this research shows that the TFSI has begun the process of enhancing its competitiveness by fully utilising its existing ICT tools and key resources. Significantly, the results show that the TFSI has gained competitive advantage that may not have been present in the absence of ICTs, and this supports the findings in the literature (e.g., Keen, 1993; Ray et al., 2005).

The results of this study show that strategic leadership is a very critical resource as it underpins the ownership of the ICT project in the industry. Strategic leadership also enables the industry to retain ownership and knowledge of its existing ICT systems, thus creating a pool of collective knowledge which has the potential to generate competitive advantage. Moreover, the presence of the knowledge management resource within the TFSI enables employees to transfer knowledge and experiences that are largely tacit in nature. This reinforces the knowledge base within the industry in a more collaborative way so that it gives the TFSI a larger advantage over other organisations. These findings are consistent with earlier research which also signalled the vital importance of ICTs in generating organisational competitive advantage (e.g., Ray et al., 2004; Lin & Lin, 2006).

A review of the literature (e.g., OECD, 2003) shows that the increasing competition in today's market is an important factor that impacts decisions made on the adoption and use of technologies. Through adoption of ICTs, organisations are able to achieve and maintain competitive advantage as competition amongst different organisations increases. The use of ICT tools in the Tuvalu financial services industry offers a wide range of possibilities for improving the competitiveness of the TFSI in terms of

transformation of the industry, sharing institutional knowledge, realising organisation synergies and utilising better technologies (see Section 5.4.2.2). The presence of competitive advantage confirms the importance of ICT within the TFSI and supports earlier works that show ICT and business competitive advantage have a positive and statistically significant relationship (e.g., Brynjolfsson & Yang, 1996; Santhanam & Hartono, 2003; Lin & Lin, 2006).

Firstly, with respect to transformation of the entire industry, the use of ICTs enables the TFSI to completely transform its operations from a paper-based system to a computerised system, thus achieving a competitive edge over other industries. For instance, the change in processing overseas payments from using travellers cheques, which is a manual paper-based system, to advanced technologies of Internet transfer using either MoneyGram or SWIFT payment systems indicates the level of competitiveness that the industry is getting from using ICTs. Significantly, the results show that all 18 participants rate industry transformation as the single most important competitive advantage the TFSI has achieved from using ICT tools. It is obvious that without ICTs, TFSI would not have been able to computerise some of its functions and operations.

Another important competitive advantage is the level of institutional knowledge gained by the TFSI from ICTs. Increasing institutional knowledge by transferring knowledge between teams enables awareness and greater understanding of the industry. Seventeen participants rated this aspect as contributing to competitive advantage and thus provide support for the role and importance of institutional knowledge for the TFSI. This finding is consistent with earlier studies in which institutional knowledge is widely accepted as a key ingredient for creating and sustaining competitive advantage (e.g., Grant 1996; Spender, 1996). Therefore it is anticipated that through this advantage, the TFSI would be able to transform knowledge into economically rewarding products and services, achieving higher performance for the organisation.

In terms of synergy gained from interlinking resources and capabilities, the results clearly demonstrate that ICT enables individual resources and capabilities to be interlinked, realising benefits would not have been possible as the literature suggests the sum of different resources and capabilities has far greater value and impact on organisational performance than individual capabilities (e.g., Harris & Katz, 1991). The results clearly demonstrate that the use of ICTs by the Tuvalu financial services industry is considered to be a key factor that constitutes the organisation's synergies for competitive advantage, supporting the findings in the literature (e.g., Banker et al., 1990).

In summary, the use of ICT in combination with other key resources was found to be practical, suitable and appropriate to explain the sources of competitive advantage for the industry. The results and observations clearly demonstrated that combining ICT tools with other key resources generates different sources of competitive advantage for the organisation. The consistency of the results confirms the reliability of data gathered from different participants.

6.5 ICT Challenges and Measures to Address the Challenges

This section discusses the managers' perceptions of the challenges encountered by the TFSI from using ICT tools as well as the measures suggested to counter the challenges, as reported in Section 5.5. Using qualitative analytical techniques, a number of challenges were deduced from the participants' responses that are deemed to influence the relationship between the use of ICT and the performance of the organisation. The different types of challenges – financial, technical, managerial and security – suggests that employees are facing difficulties that ultimately could negatively affect the performance of the industry.

6.5.1 Financial Challenges and Measures

One of the types of challenges encountered by the industry is financial challenges. The six barriers listed here include the limited financial resources, high initial cost of technology, high cost of system implementation, high personnel costs, expensive

annual maintenance fees and heavy reliance on consultants. The adoption of new technologies usually requires substantial investments initially to purchase hardware, software, equipment and highly capable ICT staffs. Given the small size of the TFSI, there are limited financial resources and this impedes financial institutions from investing in or adopting new technologies. Thus, access to sufficient financial resources is considered to be a major challenge for the industry. These findings support previous studies in which limited financial resources are cited as a key challenge that affect an organisation's ability to invest in ICT (e.g., Hadjimonolis, 1999; OECD, 2003). Given the severity of this challenge, it may not be solved within a short period of time, and it is appropriate that the TFSI make a concerted effort in both planning for and making a commitment to allocate more funding towards ICT undertakings. Through adequate financial resources, the TFSI would be in a much stronger position to take full advantage of ICTs for better performance.

The high implementation cost, high maintenance costs, high personnel costs, expensive annual system fees and expensive consultant fees also restrict the TFSI from adopting new technologies. With costs being considered as major obstacle in acquiring new equipment, it limits the opportunity for employees to use new tools. The participants agreed that the use of ICTs lead to more cost effective operations, but the high initial cost of equipment personnel, implementation and annual costs are major concerns. The impacts of these challenges were evident and could lead the industry into an ineffective state of operations if adequate funding is not provided. The results obtained in this study are similar to those in other studies (e.g., Copell, 2000; Turban & King, 2003) and thus provide strong support for the existence of these challenges in the ICT decision making process. The results lead to the conclusion that increasing financial resources and negotiating with service providers on annual system fees were the key measures for addressing these challenges. Providing adequate funding with discounted annual system fees would encourage effective use and integration of ICT tools into the TFSI. That, in turn, would positively influence its organisational performance, according to the results found in this study.

6.5.2 Technical Challenges and Measures

Akkeren and Cavaye (2000) explored the types of barriers affecting the use of ICT in organisations and noted that technical challenges include the lack of IT training and the unreliability of equipment. This observation is consistent with findings of this research where the unreliability of the Internet connection, lack of in-house IT training and breakdowns of hardware are the top three technical challenges confronts the TFSI (see Table 19). Most significantly, the unreliable Internet service is a serious problem for the industry as it incurs extra costs for employees to execute the transactions once the connection is up and running, often outside normal working hours. Although the Internet resource is available to the TFSI, the frequent breakdown of service does not allow the TFSI employees to access Internet at a sustained pace. This disrupts the ability of the TFSI to fully discharge its core roles effectively and, at times, delays fulfilment of customers' demands. To address this challenge, the participants suggested that the industry needs to establish an internal separate satellite dish. This will alleviate the problem with the Internet connection and increase the level of transactions processed. However, the provision of a satellite dish is dependent on available financial resources which, as discussed in the previous paragraphs, are scarce.

Collation of the participants' responses and subsequent data analysis indicates that the lack of in-house IT training and systems breakdown are significant enough to be considered as technical barriers affecting the TFSI's ability to use ICTs. This is consistent with the literature as the lack of effective training was one of the most frequent barriers highlighted in past studies (e.g., Beggs, 2000; Sicilia, 2005). The challenge limits the opportunity for TFSI employees to increase their efficiency in using ICT tools and hinders their competencies in using ICTs. However, considering that every new technology seems to be complex, it is important that the TFSI provide effective in-house training to enable its employees to develop the skills and expertise necessary to use ICT tools effectively, and this is one of the measures suggested by two-thirds of the participants (see Table 20). Offering effective ICT training has strong potential to assist TFSI employees to fully utilise ICT tools. This would have a direct

bearing on the relationship between ICT and the performance of the Tuvalu financial services industry.

6.5.3 Managerial Challenges and Measures

Mismanagement of office equipment, lack of IT skills by management personnel, ineffective long-term staff training programs and staff turnover were highlighted as key managerial ICT challenges for TFSI employees (see Table 19). The mismanagement of office tools is a major concern as employees are using office equipment for personal gain, hence increasing the likelihood of destroying office equipment and perhaps inflating costs for the industry. Although different financial institutions have regulations or policies on the use of equipment, the data reveal that almost three-quarters (13 participants) of the respondents perceive that TFSI employees do not comply with these policies. In addition, the ineffective long-term staff training program and limited IT skills for management also make TFSI employees feel anxious about utilising new technologies in front of those who perhaps know more than they do. This indicates a lack of confidence and poor motivation for employees to fully use ICTs. The presence of these challenges in the results are in line with Elder and Igbaria (2001) and Chang et al., (2003), studies in which these challenges were considered as factors that negatively affect the adoption and integration of ICT. As a result, it is important that enforcing effective management of ICT tools and employing more qualified IT staff should be considered by the industry. Such measures would enhance the overall management involvement and strategic thinking when making ICT investment decisions.

6.5.4 Security Challenges and Measures

Finally, it is apparent that there is a concern over security, especially the threat of virus attacks was a challenge for successful utilisation of ICTs in the TFSI. The results reveal that 13 of 18 participants agree that the issue of virus attacks is a pressing security challenge (see Table 19). The use of private USB drives and particularly the Internet increases the risk that systems will be attacked by a virus. This limits the opportunity for employees to fully explore their systems capabilities

A study conducted by UNCTAD (2007) confirmed that 71% of all countries considered security or virus attacks as to be the main barrier impeding the use and adoption of ICTs and e-commerce. The results of this particular study confirm the presence of this barrier in the Tuvalu financial services industry and provide unequivocal support of the risk posed by virus attacks. One of the counter measures suggested by nine of the participants was that the TFSI create secure systems by being able to ban the use of private USB drives (see Table 20). Virus attacks are a common problem across all financial institutions in Tuvalu and one which they should work together collaboratively to alleviate. It is anticipated that these measures will prolong the life of existing systems and further enhance the relationship between ICT and organisational performance.

In summary, understanding the levels and impact of these ICT challenges can help the financial industry decide on how these challenges could be addressed. After all, TFSI employees need to be able to use ICT resources successfully in order to improve its performance. Accessing ICTs and fully utilising their potential is not possible without adequate financial resources, technical skills, effective training, proper management and secure systems.

6.6 Future ICT Integration

Although results reported above suggest the financial services offered by the TFSI are effective and efficient, the opportunity for the TFSI to further exploit its ICT investment and increase its operational scope through integration was explored in discussions with the participants. These findings are discusses in this section.

The results show that managers of the TFSI believe that in order for the financial industry to expand its operations, improve its effectiveness and efficiency and become more competitive, it needs to integrate and introduce systems such as ATMs, on-line banking, credit cards, Websites, centralised systems and further upgrades of current systems (see Figure 14). It is evident that TFSI managers recognise the importance and significant impact of integrating advanced ICTs into the industry. This is consistent

with the findings of Birch and Young (1997) that integrating a range of product delivery mechanisms available to a financial institution will have a significant impact on its ability to perform and compete.

With respect to the integration of ATMs, online banking and credit cards, participants believe that introducing these systems would present the Tuvalu financial industry with an opportunity to expand its operations. The introduction of ATMs would increase the product delivery channels that customers could utilise. For instance, ATMs enabled customers to perform a variety of transactions such as cash withdrawal or deposits at their own time instead of visiting bank branches. In terms of online banking, using the Internet for banking would enable customers pay bills, transfer money and view account transactions on line. In the case of credit cards, the participants believe that the introduction of a credit card system would enable government officials, organisations and individuals to perform cashless purchases instead of carrying cash, as is the current practise.

Other aspects of future integration noted by the participants include establishing an industry Website, setting up a centralised computer system and completion of existing systems upgrades. Through a Website, customers would be able to access various financial products more openly and freely, reducing operational costs. Having a Website would not only introduce the Tuvalu financial services industry to new customers and help retain them as customers, but also help increase productivity, performance and speed. Producing reliable service in less time than expected often keeps a customer satisfied, and it often takes months to gain a good customer, but seconds to lose one (Birch & Young, 1997).

With respect to a centralised computer system, the participants perceive that one way of minimising the challenges currently faced by the industry is to have a centralised system that caters for all institutional requirements. In this context, employees will build knowledge and expertise on that particular system. Furthermore, a centralised system ensures that operational and maintenance costs would be reduced and shared

equally amongst different institutions. Finally, a centralised system could streamline business processes to industry best practice and provide more complete and consistent information for decision making. These observations are consistent with past studies (e.g., Collins & Montgomery, 1995; Birch & Young, 1997) in which benefits of future technologies were at the centre of decision making processes.

Overall, it is apparent that the range of technologies available to the TFSI for further integration could have a significant effect on the performance of the industry. However, despite the widespread acceptance of these systems by the representatives of the TFSI, it is important to note that not all customers would utilise these services, as some customers would still value the traditional face-to-face contact with financial institutions. Thus, achieving the right mix of technology is perhaps the ultimate choice for the TFSI if it is to deliver more effective and efficient financial services.

6.7 Addressing the Propositions and Research Questions

To address the overarching topic of the perceived relationship between the use of ICT and the performance of the Tuvalu financial services industry (TFSI), this research utilises a qualitative semi-structured interview research design. A conceptual model (Figure 8) and a number of associated propositions (Table 9) were put forward to answer the research questions (Section 1.3). This section addresses these propositions in the context of the results of this research.

6.7.1 Addressing Proposition 1

ICT investment in capital and staff has a positive effect on organisational performance.

This proposition was fully supported by the results. The findings confirm that continuing investments in ICT by the TFSI has led to improved organisational performance. Although these investments have been relatively small and decreased in recent years, they have had a positive impact on improving organisational performance, according to the participants in this study. In light of the resource-based value framework (Bharadwaj et al., 1999; Brynjolfsson et al., 2002), the study established that TFSI has been most significantly impacted by the use of ICTs in areas

such as collaboration, efficiency, data monitoring and communication. The availability of ICTs enhances the TFSI's ability to honour its obligations. Thus, the findings show that in the case of the TFSI, ICT resources were considered to contribute to improving the performance of organisations in the industry.

6.7.2 Addressing Proposition 2

Non-ICT complementary resources, organisational resources and partners, when combined with ICT, can generate competitive advantage and capture improved organisational performance.

The results show that this proposition was supported. The TFSI participants believe that different stakeholders – especially suppliers, partners, employees and management – support the use of ICTs within the industry. Various reasons were cited for this, including improved performance within the industry through increased capabilities provided by ICT tools.

Key resources that combined with ICTs to generate competitive advantage include strategic leadership and action and knowledge management. These complementary resources not only connect and utilise TFSI synergies, knowledge and resources for better organisational performance, they also generate competitive advantage for the industry, something that the literature suggests would otherwise be very difficult to achieve (Powell & Dent-Micallef, 1997).

Consequently, it is evident from the data that when utilised with physical ICT resources, other complementary resources also have a strong positive influence on the effectiveness of the relationship between ICT and organisational performance and the generation of competitive advantage.

6.7.3 Addressing Proposition 3

Increased use of ICT presents challenges for organisational performance.

Based on the findings, this proposition was supported as observations from the participants showed that the use of ICTs in the TFSI presents financial, technical,

managerial and security challenges. The main challenges cited include the unreliable Internet connectivity, limited financial resources, mismanagement of office equipment, danger of virus attacks, high initial, personnel and implementation costs and lack of in-house core IT training.

Key suggestions to reduce the impact of the challenges include a satellite dish, an increase in the TFSI budget allocation for ICTs, improved management of office equipment and enhanced ICT training for staffs. Addressing the challenges would enable financial institutions in Tuvalu to better deploy ICT resources that would impact positively on organisational performance.

6.7.4 Addressing Proposition 4

Consideration of future ICT integration shapes the degree to which the organisation can improve its performance.

The presence of the consideration for this future integration component suggests a link between organisational performance and other resources. This component effectively completes the model as it brings into consideration the way forward for the industry in terms of ICT investments for better organisational performance or enacted benefits. The analysis indicated that the performance of the TFSI can be further influenced by integrating new technologies such as ATMs, on-line banking and credit card systems. Of particular note was the suggestion from participants that integrating future technologies would not only enhance the relationship between ICT and organisational performance, but will also create long–term competitive advantage for the industry. In verifying the presence of this in the conceptual model, the research provided support for this proposition and highlighted the usefulness of the RBV framework as an assessment framework for future ICT integrations.

6.8 Answering the Research Questions

The first research question asked in Chapter 1 was: What are the finance employees' perceptions of the relationship between the use of ICT and their organisation's performance? The results confirm that ICT investment has had a positive impact on the

performance of the TFSI. Sixteen of the 18 managerial-level employees in the TFSI interviewed in this study rate high or very high that ICT investment has led to an increase in overall TFSI performance (see Table 13). These employees also identified seven specific benefits that generate positive benefits for their organisation, each with strong support (see Table 25). These benefits include enhanced collaboration level amongst TFSI institutions, increased efficiency, better monitoring of data and information, better communication, increased analysis capacity, improved reporting capacity and increases in competitive advantage. Two other perceived benefits – increase in customer service delivery and improvement in staff training and personnel productivity – received moderate support. The results suggest that ICT investments create improvements that lead to higher organisational performance.

The second research question addressed in this study was: What are sources of ICT competitive advantage in the TFSI? The results indicate that combining ICT resources with organisational capabilities such as strategic leadership and action, knowledge management, technical ability, and success generate competitive advantage for the TFSI (see Figure 12). The results suggest that the sources of competitive advantage generated for the industry by the use of ICTs include transformation of the TFSI's operation, gains in institutional knowledge, realisation of organisational synergies and acquisition of better technologies (see Table 24).

The third research question was: What are the challenges TFSI employees encounters when using ICT tools? The results show that the deployment of ICTs in the TFSI presents many challenges for the TFSI. The top eight challenges, all with strong support from the TFSI participants, include unreliable Internet connection, limited finance resources, mismanagement of equipment, danger of virus attacks, expensive initial investment costs, high personnel costs, high cost of implementation and lack of in-house core IT skill training (see Tables 19 and 26). These challenges will have a significant impact on the ability of TFSI employees to use ICT for better organisational performance. The results also suggest a number of measures that could be utilised to address these challenges including an internal satellite dish, an increase in financial

budget allocation for ICT-related tools, improvements in management of office equipment and better in-house ICT training for staff (see Table 20).

The fourth and final research question addressed in this research is: What are the expectations for changes in organisational performance from future ICT investments? The representatives of the Tuvalu financial services industry interviewed in this study identified several more advanced technologies which could contribute to higher levels of organisational performance. The top three technologies for future integration include automated teller machines (ATMs), on-line banking and a credit card system (see Figure 14). Other important technologies include a industry Website, a centralised computer payment system and upgrading current system modules. Funding for and implementation of these technologies offer the most promise that the TFSI would continue to gain improved organisational performance for TFSI organisations and the industry.

6.9 Chapter Summary

This chapter set out to present and discuss the research findings in six main areas. First, the conceptual model was tested in the context of the results from this research and an extended model to describe the relationship between ICT and TFSI performance was presented (see Figure 15). Second, the benefits of ICTs were discussed both in terms of access and use of ICT by the TFSI managers interviewed in this study and the perceived benefits from ICTs in the TFSI, again representing the views of the interview participants. Third, organisational contributors to and sources of competitive advantage for the TFSI were identified and discussed. Fourth, the challenges that face the TFSI in deployment and use of ICT were presented. Fifth, the discussion took a forward-looking view to determine what existing ICT could assist with additional improvements in organisational performance. Finally, both the research propositions and research questions were analysed and addressed in light of the results presented in Chapter 5 and preceding sections of this chapter. This analysis showed that each proposition was supported by the research findings, which signals the importance of this research to the resolution of the research problem and illustrates the validity of the

model. The extended model of ICT investment and organisational performance not only explains the research problem in the TFSI context, but also provides a basis for future research in the area of ICT and organisational performance.

CHAPTER 7 - CONCLUSION

7.1 Introduction

This chapter presents the contributions, conclusions and recommendations arising from this research. In order to achieve this, the chapter is divided into four main sections as follows:

- Contributions of this research
- Conclusions drawn from this research
- Research limitations
- Recommendations for future research

7.2 Contribution of this Research

Based on the results, the implications and contributions of this research to both theory and practice demonstrate the validity of this research and the suitability of both the conceptual and extended models to this field of study. The contributions to theory and practice are presented in separate sections as follows:

7.2.1 Theory

This research contributes to development of theory in the following ways:

- In formulating this study, it was discovered that this research was the only known research of this nature in the South Pacific and one of only a few studies in developing countries. The study succeeded in developing a conceptual model of the relationship between the use of ICT and organisational performance, something which the literature shows has mostly been done before only in large developed countries.
- Through utilising the resource-based value framework, this research demonstrates that ICT investment, combined with other complementary organisational resources, has subsequent positive implications on organisational performance.
- This research has identified a number of qualitative indicators (benefits) that measure the influence of ICTs on organisational performance. These include the

collaboration level, efficiency level, data monitoring, level of communication, data analysis, reporting capacity, competitiveness, customer delivery and staff training. Most previous studies have focused on quantitative measures of performance.

- Furthermore, this research succeeded in identifying a number of ICT competitive advantages within the TFSI as well as a number of challenges that TFSI employees encountered from the use of ICTs.
- This research is focused on a single sector of the economy (financial services). It contributed to the literature because past studies have tended to be broad in their scope and their results were difficult to generalise, and thus unable to generate any useful meaningful contribution to the body of knowledge (Harris & Katz, 1988).

This research can now be extended to other economic sectors of the economy to better understand the relationship between ICT and organisational performance in different sectors and to provide a basis for comparison with the results obtained from this study of the Tuvalu financial services industry. This will facilitate the generalisability of the results and improve even more the contribution of the study.

7.2.2 Practice

This research also contributes to development of practice in the following ways:

- The extended model and results provide management of the TFSI with a much clearer understanding of the areas upon which ICT investment has the most impact. This can better inform them when making their ICT investment decisions. In addition, the management of the TFSI now have a better understanding of other complementary resources that combine with ICTs to influence the performance of the industry.
- The identification of ICTs challenges faced by employees and measures to alleviate the challenges has implications for TFSI management with respect to

the deployment and use of ICTs within the industry. Several minor recommendations to support this were made in section 6.5.

- This research provides management of the TFSI with a consensus view as to future integration of ICTs to continue to improve organisational performance.

Based on the foregoing statements, the implications of this research are significant to both theory and practice. The resultant model can now be used by both researchers and ICT professionals in the field to facilitate a deeper understanding of the relationship between the use of ICT and organisational performance.

7.3 Conclusion

This thesis set out to investigate the relationship between the use of ICT and the performance of the Tuvalu financial services industry (TFSI). Specifically, objectives of the thesis were (i) to investigate the perceived relationship between the use of ICT and organisational performance in the TFSI, (ii) to identify the sources of competitive advantage offered by ICT investment in the TFSI, (iii) to identify the challenges TFSI employees encounter when using ICT tools in their organisation and (iv) to determine expectations for changes in organisational performance from future ICT investment. These objectives were offered as a means for gaining insight and understanding into the contribution offered by ICTs to the TFSI performance.

As identify in the literature (e.g., Rai et al., 1997; Dewan & Kraemer, 1998), the lack of a consistency in the research design suggested the need for an effective research design that would facilitate the testing of the conceptual model and provide answers to the research questions. A qualitative approach was chosen with a semi-structured interview method. This method allows employees of the Tuvalu financial services industry to express their views, beliefs and understandings, thus providing valuable and deeper insights on the topic. The data were gathered on Funafuti, the main island of Tuvalu. The participants were chosen using a random purposeful sampling strategy in which participants are selected randomly from a pool of candidates depending on their availability. The data analysis strategy of thematic analysis using NVivo software

successfully generated a number of key findings that fulfilled the purpose of the study, as described next.

Firstly, based on the literature, the research was able to identify the components of the conceptual model that best explained the relationship between ICT and organisational performance. Testing the model confirmed that the use of ICT tools within the Tuvalu financial services industry was perceived to generate multiple benefits for the organisations. The results confirmed that TFSI investment in ICTs led to improved organisational performance in terms of better communication, increased level of collaboration, better level of data analysis, increased reporting capacity, better data monitoring, improved competitiveness, enhanced staff training, increased efficiency and enhanced customer service delivery. This suggested that the industry's investment in ICT improved its overall operations and performance. Furthermore, this aspect is considered the most significant finding because it most directly explains the relationship between ICT investment and the TFSI performance.

Secondly, it was evident that the level of support rendered by different stakeholders towards the industry's ICT projects was perceived to be very high. This is seen as a sign of commitment to identify appropriate technologies in order to gain improved performance for the organisations. The findings confirmed that combining ICT tools with organisational complementary resources such as strategic leadership, knowledge management, technical ability and success generated competitive advantages for the industry. These advantages include the entire transformation of TFSI operations, utilisation of institutional knowledge, realising organisational synergies and the ability to utilise better technologies. Therefore, this research was able to gain insights into the importance of ICTs, combined with other organisational factors, to generate competitive advantages that influence the overall performance of the organisations in the industry.

Thirdly, the research was able to identify a number of challenges impeding the use of ICT in the Tuvalu financial services industry and influencing the relationship between ICT and organisational performance. The results suggested a number of measures that may be used to address these challenges in order to maximise the positive relationship between ICT and organisational performance.

Finally, these results provide insights into the future technologies that may be considered by the TFSI to continue to improve organisational performance. This was a significant practical outcome of this study as it identified the technologies that managers consider to be highly relevant and appropriate in the context of the industry. This is an outcome that may help senior management and funding agencies in their decision making process. These technologies will undoubtedly provide the basis upon which the industry is most likely to flourish and achieve better organisational performance.

In summary, this research produced reliable and significant results which fulfilled the key objectives of this research. The TFSI and the research literature now have a better understanding on the relationship between ICT and organisational performance.

7.4 Limitations

On reflection, the following limitations were observed to have an effect on the completion of this research. It is important to note that some of the limitations were beyond the control of the researcher and others were revealed only in hindsight. However, tireless efforts were made to minimise the impact of these limitations and none prevented the successful completion of this research.

The first limitation is the lack of extensive prior research in this field for developing countries and especially for small South Pacific island countries. This limitation affected the research in terms of the lack of a foundation upon which this research could be built. Instead, this research utilises literature from studies conducted in

developed countries in other parts of the world to present a model that facilitates exploring the relationship between ICT and the performance of the TFSI.

Secondly, the unavailability of some of the TFSI senior managers to participate in the research was a small limitation. Several participants who initially agreed to participate were not in Tuvalu during the data collection period. This limitation was overcome by approaching the next available senior officer and ultimately this had little or no impact on the results.

Thirdly, the generalisability of results of this thesis to developing countries and developed countries with high technologies is a major limitation. With the low level of various technologies in the TFSI, it affected the research in terms of generalising the findings to other contexts.

The final small limitation is that this study only uses qualitative approach. This limitation affected the research in terms of comparing findings of this study and previous studies findings as most were conducted using quantitative approach.

Despite the foregoing limitations, the research was successfully completed. However, it is important that future researchers in this field should consider mitigating these limitations in order to further extend and refine this topic of ICT and organisational performance.

7.5 Recommendations for Future Research

Although this research was successful in investigating the relationship between the use of ICT and the performance of the Tuvalu financial services industry (TFSI) through the aid of a conceptual model, it is important that the following recommendations are taking into consideration for potential future research in this field.

- More extensive research is required to enhance our knowledge and understanding on this issue in small developing South Pacific island countries.

- Further research in this field is needed to further explain the model components and perhaps extend the scope and practicability of this model to other economic sectors.
- Future study will benefit from a joint study that combines both qualitative and quantitative techniques.

7.6 Concluding Remarks

Despite limitations and recommendations, this study has successfully addressed the research questions and made significant contributions to the area in the field of ICT and organisational performance for those going forward.

REFERENCES

Akkeren, J. K. V., & Cavaye, A. L. M. (2000). Factors influence on entry-level electronic commerce adoption in the automobile industry in Australia. *Working paper*.

Alpar, P. & Kim, M. (1990). A microeconomic approach to the measurement of information technology value. *Journal of Management Information Systems, 7*, 55-69.

Anand, V., Manz, C. C., & Glick, W. H. (1998). An organizational memory approach to information management. *The Academy of Management Review, 23*(4), 796-809.

Andrews, R., Boyne, G. A., & Walker, R. M. (2006). Strategy content and organizational performance: An empirical analysis. *Public Administration Review, 66*(1), 52-63.

Arvanitis, S. (2003). *Information Technology, Workplace Organization, Human Capital and Firm Productivity: Evidence for the Swiss Economy. KOF: Working Paper No. 74*, July, Zurich.

Asian Development Bank. (2003). *Information and communication technology for development in the Pacific: The role of information and communication technology (ICT) in fostering poverty reduction efforts and socioeconomic development in the Pacific region.* Suva, Fiji: ADB.

Asian Development Bank (2007). *Tuvalu Economic Report 2006: From plan to action.* Manila: ADB.

Asian Development Bank (2008*). Country Partnership (2008 – 2010)*. Funafuti, Tuvalu: ADB.

Asian Development Bank (2010). Tuvalu [Fact Sheet*].* Suva, Fiji: ADB.

Asian Development Bank. (2011). *ICT-based inclusive growth and poverty reduction in the Pacific: An investigation of potential ICT interventions confidential network strategies.* Report No. 30022: Suva, Fiji: ADB.

Avgerou, C. (2001). The significance of context in information systems and organizational change. *Information Systems Journal, 11*(1), 43-63.

Baily, M. N., & Chakrabarti, A. K. (1988). *Innovation and the productivity crisis*: Brookings, Institute Press.

Baldwin, J. R., Diverty, B., & Sabourin, D. (1995). Technology use and industrial transformation: empirical perspectives. *Statistics*.

Baldwin, J. R., & Sabourin, D. (2002). Advanced technology use and firm performance in Canadian manufacturing in the 1990s. *Journal of Industrial and Corporate Change, 11*(4), 761 – 763.

Baldwin, J., Sabourin, D., & Smith, D. (2003). Impact of ICT use on firm performance in the Canadian food processing sector. *Economic Analysis Research Paper, 12.*

Banker, R. D., & Kauffman, R. J. (1988). Strategic contributions of information technology: An empirical study of ATM networks.

Banker, R. D., Kauffman, R. J., & Morey, R. C. (1990). Measuring gains in operational efficiency from information technology: a study of the Positran deployment at Hardee's Inc. *Journal of Management Information Systems, 7*(2), 29-54.

Barkos, J. Y. (1987). *Dependent variables for the firm and industry-level impacts of information technology,* in Proceedings of the Eight International Conference on Information Systems, Pittsburgh, 10 – 23.

Barney, J. B. (1986). Organizational culture: Can it be a source of sustained competitive advantage. *Academy of Management Review, 11*(3), 656-665.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17* (1), 99-120.

Barney, J., Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of Management, 27*(6), 625.

Barringer, B. R. & Harrison, J. S. (2000). Walking a tightrope: creating value through interorganizational relationship. *Journal of Management, 26*(3), 367-403.

Bartelsman, E. J., & Doms, M. (2000). Understanding productivity: Lessons from longitudinal microdata. *Journal of Economic literature, 38*(3), 569-594.

Barua, A. & B. Lee. (1997). The information productivity paradox revisited: A theoretical and empirical investigation in the manufacturing sector. *International Journal of Flexible Manufacturing Systems*, *9*, 145-166.

Barua, A., Kriebel, C. & Mukhopadhyay, T. (1995). Information technologies and business value: an analytic and empirical investigation, *Information Systems Research, 6* (1), 3 – 23.

Basu, A., and Blanning, R. W. (2003). Synthesis and decomposition of processes in organisations. *Journal of Information Systems Research.* 14 (4), 337 – 355.

Bazley, M., Hancock, P., Berry, A. and Jarvis, R. (1993). *Contemporary accounting: A conceptual approach.* Victoria, Australia: Thomas Nelson.

Beggs, T. A. (2000). *Influences and barriers to the adoption of instructional technology*. Proceedings of the mid-south instructional technology conference. Retrieved from http:// www.mtsu.edu/Eitconf/proceed/beggs/beggs.htm.

Best, J., & Kahn, J. (2006). *Research in Education* (10th ed.). Boston, MA: Pearson Education.

Bharadwaj, A. S., Bharadwaj, S. G., & Konsynski, B. R. (1999). Information technology effects on firm performance as measured by Tobin's. *Management Science*, 1008-1024.

Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly*, 169-196.

Birch, D & Young, M. A. (1997). Financial services and the internet - What does cyber space mean for the financial service industry? Internet Research. *Electronic Networking Applications and Policy*, *6* (2), 120 – 128.

Black, S., & Lynch, L. (1997). How to Compete: The Impact of Workplace Practices and Information Technology on Productivity. *NBER working paper*, no. 6120, Cambridge, Mass.

Black, S. & Lynch, L. (2000). What's driving the new economy: The benefits of workplace innovation, *NBER Working paper*, no. 7479.

Black, S. E., & Lynch, L. M. (2001). How to compete: the impact of workplace practices and information technology on productivity. *Review of Economics and statistics, 83*(3), 434-445.

Bogdan, R. C., & Biklen, S. K. (1998). *Qualitative research for education: An introduction to theory and methods*. Boston: Allyn and Bacon.

Boland, S., & Dollery, B. (2007). The economic significance of migration and remittances in Tuvalu. *Pacific Economic Bulletin, 22*(1), 102-114.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3* (2), 77-101.

Bresnahan, T. F. (1986). Measuring the spillovers from technical advance: Mainframe computers in financial services. *The American Economic Review, 76*(4), 742-755.

Bresnahan, T. F. (1999). Computerisation and wage dispersion: an analytical reinterpretation. *The Economic Journal, 109*(456), 390-415.

Brown, R. M., Gatian, A. W., & Hicks, J. O. (1995). Strategic information systems and financial performance. *Journal of Management Information Systems. 11*(4), 215-248.

Brown, W. A. (2005). Exploring the association between board and organizational performance in nonprofit organizations. *Non-profit Management and Leadership, 15*(3), 317-339.

Bryman, A. (1998). Quantitative and qualitative research strategies in knowing the social world. *Knowing the SocialWorld*, 138-156.

Brynjolfsson, E. (1993). The productivity paradox of information technology. *Communications of the ACM, 36*(12), 66-77.

Brynjolfsson, E., & Hitt, L. (1995). Information technology as a factor of production: The role of differences among firms. *Economics of Innovation and New technology, 3*(3-4), 183-200.

Brynjolfsson, E., & Hitt, L. (1996). Paradox lost? Firm-level evidence on the returns to information systems spending. *Management Science*, 541-558.

Brynjolfsson, E., & Yang, S. (1996). Information technology and productivity: A review of the literature. *Advances in Computers, 43*, 179-214.

Brynjolfsson, E., & Hitt, L. M. (1998). Beyond the productivity paradox. *Communications of the ACM, 41*(8), 49-55.

Brynjolfsson, E. & Hitt, L. M. (2000). Beyond computation: Information technology, organizational transformation and business performance. *Journal of Economic Perspectives,* 14**,** 23-48.

Brynjolfsson, E., Hitt, L. M., & Yang, S. (2002). Intangible assets: Computers and organizational capital. Brookings papers on economic activity, (1), 137-181.

Brynjolfsson, E., & Hitt, L. (2003). Computing productivity: Firm-level evidence, *Review of Economics and Statistics, 85*(4), 793 - 808.

Burns, R. B. (2000). *Introduction to research methods* (4th ed). Melbourne, Australia: Longman.

Cantwell, J., & Santangelo, G. D. (2002). The new geography of corporate research in information and communications technology (ICT). *Journal of Evolutionary Economics, 12*(1), 163-197.

Carr, N. G. (2003). IT doesn't matter. *Harvard Business Review*, 5 – 12.

Carrington, M., Llanguth, P. & Steiner, T. D. (1997). The cost of technology. *The Banker, 147* (861), 49-50.

Chamberlin, E. H. (1993). *The theory of monopolistic competition*. Cambridge, MA: Harvard University Press.

Chan, Y. E. (2000). IT value: The great divide between qualitative and quantitative and individual and organizational measures. *Journal of Management Information Systems, 16*(4), 225-261.

Chang, K., Jackson, J., & Grover, V. (2003). E-commerce and corporate strategy: An executive perspective. *Information and Management 40*, 663–675.

Chatfield, A. T., & Yetton, P. (2000). Strategic payoff from EDI as a function of EDI embeddedness. *Journal of Management Information Systems, 16*(4), 195-224.

Chau, P. Y. K (1999). On the use of construct reliability in MIS Research: A meta-analysis. *Information and Management, 35*, 217 – 227

Chowdhury, A. (2003) Information technology and productivity, payoff in the Banking Industry: Evidence from the emerging markets. *Journal of International Development, 15*, 693-708.

Clemons, E. K., & Row, M. C. (1991). Sustaining IT advantage: The role of structural differences. *MIS Quarterly*, 275-292.

Cohen, G., Salomon, I., & Nijkamp, P. (2002). Information-communications technologies (ICT) and transport: does knowledge underpin policy? *Telecommunications policy, 26*(1-2), 31-52.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London: Routledge - Taylor & Francis Group.

Colecchia, A., & Schreyer, P. (2002). The contribution of information and communication technologies to economic growth in nine OECD countries. *OECD Economic Studies, 34*(1).

Collins, J. & Hussey, R. (2003). *Business research: A practical guide for undergraduate and postgraduate students* (2nd ed.). UK, Palgrave Macmillian, Basingstoke.

Collis, D. J., & Montgomery, C. A. (1995). Competing on resources: Strategy in the 1990s. *Harvard Business Review,* 118-128.

Coppel, J. (2000). E-Commerce: Impacts and policy challenges (No. 252): OECD. Paris 2000.

Cron, W. & Sobol, M. (1983). The relationship between computerization and performance: A strategy for maximizing economic benefits of computerization. *Information and Management,* 6, 171-181.

Coyne, I. T. (1997). Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *Journal of Advanced Nursing, 26*(3), 623-630.

Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches.* London: Sage.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd edition). Thousand Oaks, CA: Sage.

CSTB (1994): *Realizing the information future: The internet and beyond.* National Academy Press, Washington DC.

Daft, R. L. (1983). *Information richness: A new approach to managerial behavior and organization design*. DTIC Document.

Daft, R. L., & Lewin, A. Y. (1993). Where are the theories for the" new" organizational forms? An editorial essay. *Organization Science, 4*(4).

Davenport, T. H., & Prusak, L. (1997). *Information ecology: Mastering the information and knowledge environment.* USA: Oxford University Press.

Dedrick, J., Gurbaxani, V., & Kraemer, K. L. (2003). Information technology and economic performance: A critical review of the empirical evidence. *ACM Computing Surveys (CSUR), 35*(1), 1-28.

Dehning, B., & Stratopoulos, T. (2003). Determinants of a sustainable competitive advantage due to an IT-enabled strategy. *The Journal of Strategic Information Systems, 12*(1), 7-28.

De Lucia, R. D., & Peters, J. (1998). *Commercial bank management: LBC Information Services*.

Desantics, G. & P. Monge. (1999). Introduction to the special issue: Communication processes for virtual organizations. *Organi. Sci.* 10, 693 – 703.

Devaraj, S., & Kohli, R. (2000). Information technology payoff in the health-care industry: A longitudinal study. *Journal of Management Information Systems, 16*(4), 41-67.

Devaraj, S., & Kohli, R. (2002). *The IT payoff: Measuring the business value of information technology investments.* FT Press.

Devaraj, S., & Kohli, R. (2003). Performance impacts of information technology: Is actual usage the missing link. *Management science*, 273-289.

Development Bank of Tuvalu. (2006). *DBT Annual Reports for the five year period 2000 – 2005.* Funafuti, Tuvalu: Poolo.

Development Bank of Tuvalu. (2011a). *DBT Annual Reports for the five year period 2006 – 2010.* Funafuti, Tuvalu: Poolo.

Development Bank of Tuvalu (2011b). *DBT capital budget for 2011*. Funafuti, Tuvalu: Fatuuga.

Dewan, S., & Kraemer, K. L. (1998). International dimensions of the productivity paradox. *Communications of the ACM, 41*(8), 56-62.

Dewan, S., & Kraemer, K. L. (2000). Information technology and productivity: Evidence from country-level data. *Management Science*, 548-562.

Dewett, T., & Jones, G.R. (2001). The role of information technology in the organization: a review, model, and assessment. *Journal of Management 27* (3), 313–346

Donaldson, L. (1997). A positivist alternative to the structure-action approach. *Organization Studies, 18*(1), 77.

Donath, J. (1999). Identity and deception in the virtual community. In M. A. Smith & P. Kollock (Eds.), *Communities in cyberspace. (*29-59). New York: Routledge.

Doolin, B. (1994). Case research in Information Sytems: An alternative perspective. Need a publication and a publisher.

Dos Santos, B. L. (1991). Justifying investments in new information technologies. *Journal* of *Management Information Systems,* 7(4), 7 1-90.

Dos Santos, B. L., & Peffers, K. (1995). Rewards to investors in innovative information technology applications: First movers and early followers in ATMs. *Organization Science*, 241-259.

Eder, L. B., & Igbaria, M. (2001). Determinants of intranet diffusion and infusion: OMEGA. *The International Journal of Management Science, 29*, 233–242.

Edmondson, A., & Moingeon, B. (1998). From organizational learning to the learning organization. *Management Learning, 29*(1), 5.

Evans, G. R. (1999). *Calling academia to account: Rights and responsibilities.* Buckingham, Great Britain: Society for Research into Higher Education & Open University Press.

Foster, T. (1998). *Industrial marketing communication: An empirical investigating on the use of marketing communication tools.* Licentiate Thesis. Sweden, Lulea University of Technology.

Franke, R. H. (1987). Technological revolution and productivity decline: Computer introduction in the financial industry. *Technological Forecasting and Social Change, 31*, 143- 154.

Fraser, J., N. Fraser, F. Mcdonald. (2000). The strategic challenge of electronic commerce. supply chain management: *An International Journal*, *5* (1), 7-14.

Freeman, R. E. (1984). Strategic management: A stakeholder approach (Vol 1): Boston, MA, Pitman.

Frei, F. X., Harker, P. T., & Hunter, L. W. (2000). Inside the black box: What makes a bank efficient? *Performance of financial institutions: efficiency, innovation, regulation*, 259-311.

Galliers, R. D. (1990). Choosing appropriate information systems research approaches: A revised taxonomy - *The information systems research area of the 90s: Challenges perceptions and alternative approaches.* Proceedings of the IFIP TC8 WG8.2 Conference - Copenhagen, Denmark.

Gay, L. R., & Diehl, P. (1992). *Research methods for business and management.* New York, USA: Macmillan Publishing Company.

Gholami, R., Moshiri, S., & Lee, S. Y. T. (2004). ICT and the productivity of the manufacturing industries in Iran. *The Electronic Journal of Information Systems in Developing Countries, 19*(10), 22-26.

Gilchrist, S., Gurbaxani, V. & Towne, R. (2001). *Productivity and the PC revolution.* Working paper, UC Irvine, Irvine, CA.

Giorgi, A. (1997). The theory, practice, and evaluation of the phenomenological method as a qualitative research procedure. *Journal of phenomenological psychology, 28*(2), 235-260.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*: AldineTransaction.

Glaser, B. G. (1992). *Emergence vs. forcing: Basics of grounded theory analysis*: Mill Valley, CA: Sociology Press.

Goldrige, P. &d Clayton, T. (2005). E-business and labour productivity in manufacturing and services. *Economic Trends No. 609.* Office of National Statistics, London.

Goldsmith, M. (2005). Theories of governance and Pacific microstates: The cautionary tale of Tuvalu. *Asia Pacific Viewpoint*, *46*(2), 105-114.

Government of Tuvalu. (2005). Te Kakeega II: National Strategy for Sustainable Development 2005 – 2015. Funafuti, Tuvalu: GOT.

Government of Tuvalu. (2006). Ministry of Finance Annual Reports (2000 – 2005). Funafuti: Ministry of Finance, Economic Planning and Industries, Simati.

Government of Tuvalu. (2011a). Ministry of Finance Annual reports (2006 – 2010). Ministry of Finance, Economic Planning and Industries, Funafuti: Taupo.

Government of Tuvalu. (2011b). Tuvalu Government Capital Budget. Ministry of Finance, Economic Planning and Industries, Funafuti: Metia.

Graham, S., & Marvin, S. (1996). *Telecommunications and the city*: *Electronic spaces, urban places.* New York: Routledge, Psychology Press.

Grant, R. M. (1991). The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, *33*(3), 114-135.

Grant, R. M. (1996). Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. *Organizational Science, 7*, 375-387.

Grant, D., Brewer, A., Hall, R., Michelson, G., & Wailes, N. (2002). Re-conceptualizing organizational change: Strategies, processes, forms and discourses. *Strategic Change*, *11*, 237-242.

Gregor, S. & Hart, D. (2002). *Information systems foundations: Building the theoretical base.* School of Business and Information Management, Australia National University, Canberra.

Gurbaxani, V., Melville, N., & Kraemer, K. (1998). *Disaggregating the return on investment to IT capital.* Proceedings of the International Conference on Information Systems, Helsinki, Finland.

Hadjimonolis, A. (1999). Barriers to innovation for SMEs in a small less developed country (Cyprus). *Technovation, 19*(9), 561-570.

Hammer, M. (2001): The superefficient company, *Harvard Business Review, 79,* (8), 82-91.

Harris, S. E., & Katz, J. L. (1988). *Profitability and information technology capital intensity in the insurance industry.* Paper presented at the twenty-first Hawaii International Conference on system sciences, Hawaii.

Harris, S. E., & Katz, J. L. (1989). *Predicting organisational performance using information technology managerial control ratios.* Proceedings of the 22nd Annual Hawaii International Conference on Systems Sciences, Cambridge University Press, New York, 197 -204.

Harris, S. E., & Katz, J. L. (1991). Organizational performance and information technology investment intensity in the insurance industry. *Organization Science,* 2(3), 263- 295.

Hartman, F., & Ashrafi, R. A. (2002). Project management in the information systems and information technologies industries. *Project Management Journal, 33(3),* 5-15.

Hawawini, G., Subramanian, V., & Verdin, P. (2003). Is performance driven by industry or firm specific factors? A new look at the evidence. *Strategic Management Journal, 24*(1), 1-16.

Hildebrand, C. (1994). Resounding maybe. *CIO,* February, 35 – 37.

Hiltz, S. R., Johnson, K., & Turoff, M. (1986). Experiments in group decision making communication process and outcome in face-face versus computerized conferences. *Human Communication Research, 13*(2), 225-252.

Hinsliff, G. (2009). President-elect Barack Obama on his American recovery and reinvestment plan. Remarks of President-Elect Barack Obama as prepared for delivery.US News & World Report, January 8. Retrieved from http://www.usnews.com/news/stimstimulus/articles/2009/01/08/president-elect-barack-obama-onhis- american-recovery-and-reinvestment-plan.html.

Hinsliff, G. (2009). Brown unveils plan to create 100,000 Jobs." UK Prime Minister Gordon Brown's New Year Interview with The Observer, January 4. Retrieved from http://www.guardian.co.uk/ politics/2009/jan/04/gordon-brown-employment-new-deal.

Huber, J. C. (1999). Inventive productivity and the statistics of exceedances. *Scientometrics*, 45, 33–53

International Monetary Fund. (2011). Consultation report on Article IV Mission' Tuvalu. (Forthcoming). IMF.

International Statistical Institute (2011). International statistics review, 79 (3), 303 – 505.

Johnson, R. B., & Christensen, L. B. (2008). *Educational research: Quantitative, qualitative, and mixed approaches* (3rd ed.). Thousand Oaks, CA: Sage.

Kauffman, R. J., & Weill, P. (1989). *An evaluative framework for research on the performance effects of information technology investment*, in Proceedings of the Tenth International Conference on Information Systems, J. I. DeGross, J. C. Henderson, and B. R. Konsynski (eds.), Boston, Massachusetts, 377-388.

Keen, P. G. W. (1993). Information technology and the management difference: A fusion map. *IBM Systems Journal,* 32 (1).

Keen, P. G. W. (2000). The déjà vu effect. *Computerworld,* 34 (24), 56.

Kettinger, W., Grover, V., Guha, S, J., Segars, AH. (1994). Strategic information systems revisited: A study in sustainability and performance. *MIS Quarterly*, 31-58.

Key, S. (1999). Toward a new theory of the firm: A critique of stakeholder "theory". *Management Decision, 37*(4), 317-328.

Koh, C., Soh, C., & Markus, M. (2000). A process theory approach to analyzing ERP implementation and impacts: The case of Revel Asia. *Journal of Information Technology Cases and Applications, 2*(1), 4-23.

Lee, A. S. (1991). Integrating Positivist and Interpretive Approaches to Organizational Research. *Orgarnization Science*, 2(4), 342 – 365.

Lee, W. H., & Yang, W. T. (2000). The cradle of Taiwan high technology industry development—Hsinchu Science park (HSP). *Technovation*, *20*(1), 55–59.

Lichtenberg, F. (1995). the output contributions of computer equipment and personnel: A firm-level analysis. *Economics of Innovation and New Technology,* (3), 201 - 217.

Lin, W. T., & Lin, H.J. (2006). International productivity paradox of IT in commercial banking: A cost efficiency analysis. *Business Review, Cambridge, 5*(1), 246–252.

Lin, W. T., & Shao, B. B. M. (2006). The business value of information technology and inputs substitution: The productivity paradox revisited. *Decision Support Systems, 42*(2), 493-507.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquirí.* Thousand Oaks, CA: Sage

Llewellyn, D. T. (1996). Banking in the 21st Century: The Transformation of an Industry. *In Reserve Bank of Australia Conference. The Future of the Financial System*, (ed), M. Edey,., Reserve Bank of Australia, The H.C. Coombs Centre for Financial Studies, Kirribilli.

Lototele, M. (2006). *The impact of household size, household education and household location on poverty in Tuvalu* (Unpublished master's thesis). University of Bradford, UK.

Loveman G. W. (1994). *An assessment of the productivity impact on information technologies.* In T. J. Allen & Morton M. S. (eds.) *Information Technology and the Corporation of the 1990s: Research Studies*, 84 - 110, Cambridge, MA: MIT Press

Lucas, H. C. J. (1975a). Performance and use of an information system. *Management Science, 21*(8), 908-919.

Lucas, H. C. J. (1975b). The use of an accounting information system, action and organizational performance. *The Accounting Review, 4*, 735-746.

Lucas, H. C. (1993). *The business value of information technology:* A historical perspective *and thoughts for future research.* In R. Banker, M. Kauffman, & M. Mahmood (Eds). *Strategic information technology management* (pp. 127-39). Harrisburg, PA Idea Publishing, ,

Lucas, H. C. (1999). *Information technology and the productivity paradox: Assessing the value of investing in IT*. New York: Oxford University Press.

Mackenzie, N., & Knipe, S. (2006). Research dilemmas: Paradigms, methods and methodology. *Issues in Educational Research, 16*(2), 193-205.

Markus, M. L., & Soh, C. (1993). *Banking on information technology: Converting IT spending into firm performance*. in R.D. Banker, R.J. Kauffman and M.A. Mahmood (eds.) Strategic Information Technology Management: Perspectives on Organizational Growth and Competitive Advantage, Idea Group Publishing, Middletown, 375-403.

Mahmood, M.A. & Mann, G. J. (1993). Measuring the organizational impact of information technology investment: An exploratory study. *Journal of Management Information Systems*, *10* (1), 97-122.

Mahmood, M. A., & Mann, G. J. (2000). Special issue: Impacts of information technology investment on organizational performance. *Journal of Management Information Systems, 16*(4), 3-10.

Mahoney, J. T. (2004). *Economic foundations of strategy*: Sage Publications, Inc. Thousand Oaks, CA.

Malecki, E. J. (1991). *Technology and economic development: the dynamics of local, regional, and national change*: Longman Scientific & Technical. Longman, London.

Mangan, J., Lalwani, C., & Gardner, B. (2004). Combining quantitative and qualitative methodologies in logistics research. *International Journal of Physical Distribution & Logistics Management, 34*(7), 565-578.

Mata, FJ., Fuerst, WL., & Barney, JB. (1995). Information technology and sustained competitive advantage: A resource-based analysis. *MIS Quarterly 19*(4), 487-505.

McAfee, A. (2002). The impact of enterprise information technology adoption on operational performance: An empirical investigation. *Production and Operations Management, 11*(1), 33-53.

Mckeen, J. D. & Smith, H. A. (1993b). *The relationship between information technology Use and organistaional performance.* In R.D. Banker, R. J. Kauffman & M. A. Mahmood *(Eds.), Strategic information technology management: Perspectives on organisational growth and competitive advantage (*405 - 444).Harrisburg, PA: Idea Group Publishing.

McKeown, C., & Curran, C. (2003). *ICT training: models of delivery. Information and IT literacy: enabling learning in the 21st century, 132-143.*London, Facet Publishing.

Melville, N., Kraemer, K., & Gurbaxani, V. (2004). Review: Information technology and organizational performance- An integrative model of IT business value. *MIS Quarterly, 28*(2), 283-322.

Meng, Q., & Li, M. (2002). New economy and ICT development in China. *Information Economics and Policy, 14*(2), 275-295.

Michalisin, M. D., Smith, R. D. & Kline, D. M. (1997). In search of strategic assets. *The International Journal of Organizational Analysis*, *5*, 360-87.

Morrow, S. L. (2005). Quality and trustworthiness in qualitative research in counseling psychology. *Journal of Counselling Psychology, 52*(2), 250.

Mutch, C. (2005) *Doing educational research: A practitioner's guide to getting started*. Wellington: NZCER Press.

Nandhakumar, J., & Jones, M. (1997). Too close for comfort? Distance and engagement in interpretive information systems research. *Information Systems Journal, 7*(2), 109-131.

Narayanan V. K. 2001. *Managing Technology and Innovation for Competitive Advantage:* Upper Saddle River, NJ: Prentice-Hall

National Bank of Tuvalu. (2006). *Annual reports for the National Bank of Tuvalu* (2000 – 2005). Funafuti, Tuvalu: Teo.

National Bank of Tuvalu. (2011a). *Annual Reports for the National Bank of Tuvalu* (2006 – 2010). Funafuti, Tuvalu: Solomona.

National Bank of Tuvalu. (2011b). NBT capital budget for 2011, Funafuti, Tuvalu: Tauati.

Nemati, H., & Barko, C. (2002). Key factors for achieving organizational data-mining success. *Industrial Management and Data Systems, 103* (4) 282-92.

Neuman, W. L. (2000). *Social research methods: Qualitative and quantitative approaches*, (4th ed.). Boston: Allyn & Bacon.

Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide*: Cambridge Univ Press.

OECD. (2000). The role of information and communications technology in growth performance in a new economy? *The Changing Role of Innovation and Information Technology in Growth*, OECD, Paris.

OECD. (2002). Organisational Change and Firm Performance. OECD, Paris.

OECD. (2003). The E-government imperative in OECD E-Government studies. Paris: OECD.

Orlikowski, W. J., & Barley, S. R. (2001). Technology and institutions: What can research on information technology and research on organizations learn from each other? *MIS Quarterly*, 145-165.

Oshikoya, T.W. & Hussain, M.N. (2007). *Information technology and the challenge of economic development in Africa.* International Books and the Centre for African Studies, Copenhagen.

Pacific Islands Forum Secretariat. (2004). The Pacific Plan for strengthening regional cooperation and integration. Suva, Fiji: PIFS.

Pacific Islands Forum Secretariat (2010). Review of Pacific Regional Digital Strategy Part A: *Technological Capacity Network Strategies Report. No.* 29029.

Palmer, J. W., & Markus, M. L. (2000). The performance impacts of quick response and strategic alignment in specialty retailing. *Information Systems Research, 11*(3), 241-259.

Pavlou, P. A., & El Sawy, O. A. (2006). From IT leveraging competence to competitive advantage in turbulent environments: The case of new product development. *Information Systems Research, 17*(3), 198.

Pearlson, K. E., & Saunders, C. S. (2010). *Managing and using information systems: A strategic approach* (4th ed.). Hoboken, NJ: Wiley.

Petrazzini, B., & Kibati, M. (1999). The Internet in developing countries. *Communications of the ACM, 42*(6), 31-36.

Pettigrew, A. M., Woodman, R. W., & Cameron, K. S. (2001). Studying organizational change and development: Challenges for future research. *The Academy of Management Journal, 44*(4), 697-713.

Phillips, R., & Gilding, T. (2003). Approaches to evaluating the effect of ICT on student learning. *ALT starter guide, 8*. Retrieved from http://www.warwick.ac.uk/ETS/Resources/evaluation.htm Stankov, S., V.

Pickering, J. M., & King, J. L. (1995). Hardwiring weak ties: Interorganizational computer-mediated communication, occupational communities, and organizational change. *Organization Science*, 479-486.

Pilat, D. (2003). *ICT and economic growth: evidence from OECD countries, industries and firms.* OECD Publications.

Pisano, G., Shuen, A., & Teece, D. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509-533.

Pohjola, M. (2001). *Information technology and economic growth: A cross-country analysis*: Cambridge, Oxford University Press.

Poole, M. S., & Van de Ven, A. H. (2004). Theories of organizational change and innovation processes: Handbook of organizational change and innovation. 374-398.

Pope, C., Ziebland, S., & Mays, N. (2000). Analysing qualitative data. *Bmj, 320*(7227), 114.

Porter, M. E. & V. E. Millar (1985). How information gives you competitive advantage. *Harvard Business Review*, *63*(4), 149-160.

Porter, M. E. (1985). *Competitive advantage: creating and sustaining superior performance*. New York London: Free Press Collier Macmillan.

Powell, P. (1992). Information Technology Evaluation: Is it Different? *The Journal of the Operational Research Society, 43*(1), 29-43.

Powell, T. C., & Dent-Micallef, A. (1997). Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic Management Journal, 18*(5), 375-405.

Prahalad, C. K., & Hamel, G. (1990). The core competence of the organization. *Harvard Business Review, 68*(3), 79-91.

Prattipati, S. N., & Mensah, M. O. (1997). Information systems variables and management productivity. *Information and Management, 33*(1), 33-43.

Rahman, H. (2008). An overview on strategic ICT implementations toward developing knowledge societies. In *Developing Successful ICT Strategies: Competitive Advantages in a Global Knowledge-Driven Society* (pp. 1–39). Hershey, PA.

Rai, A., Patnayakuni, R., & Patnayakuni, N. (1997). Technology investment and business performance. *Communications of the ACM, 40*(7), 89-97.

Ramírez, R. (2003). Bridging disciplines: The natural resource management kaleidoscope for understanding ICTs. *Journal of Development Communication, 14*(1), 51-64.

Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, business processes, and competitive advantage: Choosing the dependent variable in empirical tests of the resource-based view. *Strategic Management Journal, 25*(1), 23-37.

Ray, G., Muhanna, W. A., & Barney, J. B. (2005). Information technology and the performance of the customer service process: A resource based analysis. *MIS Quarterly, 29*(4), 653-672.

Roach, S. (1987). *America's technology dilemma: a profile of the information economy*. Morgan Stanley Special Economic Study, New York, NY.

Robbins, S. P. (1997). *Essentials of Organizational Behaviour*(5th ed.). , Upper Saddle River, NJ: Prentice-Hall

Robinson, J. (1993). *The economics of imperfect competition*. London: Macmillan Press.

Rumelt, R. P. (1987). Theory, strategy and entrepreneurship. In D. J. Teece (Ed.), *The competitive challenge* (pp. 137-158). New York: Harper & Row.

Rumelt, R. P., Schendel, D., & Teece, D. J. (1991). Strategic management and economics. *Strategic Management Journal, 12*(2), 5-29.

Salomon, G. (1998) Novel constructivist learning environments and novel technologies: Some issues to be considered. *Research Dialog in Learning and Instruction*, *1*(1) 3–12.

Santhanam, R., & Hartono, E. (2003). Issues in linking information technology capability to firm performance. *MIS Quarterly*, 125-153.

Schwartz, G. G. (1990). Telecommunications and economic development policy. *Economic Development Quarterly, 4*(2), 83.

Secretariat of the Pacific Community. (2001). *Pacific ICT needs assessment and strategy planning workshop.*, Noumea, New Caledonia: SPC.

Secretariat of the Pacific Community. (2005). *Tuvalu 2002 Population and Housing Census: Volume 1 & 2 - Analytical Report & demographic Profile, 1991 – 2002.* Noumea, New Caledonia: SPC.

Seddon, P. B., Graeser, V., & Willcocks, L. P. (2002). Measuring organizational IS effectiveness: an overview and update of senior management perspectives. *ACM SIGMIS Database, 33*(2), 11-28.

Shanks, G. (2002). Guidelines for conducting positivist case study research in information systems. *The Australian Journal of Information Systems*, *9*, 76-85.

Sharpe, A. (1999). Organizational structure, information technology and productivity: Can organizational change resolve the productivity paradox? Report prepared for the Applied Research Branch, Human Resources Development. Canada.

Shih, E., Kraemer, K. L., & Dedrick, J. (2008). IT diffusion in developing countries. *Communications of the ACM, 51*(2), 43-48.

Sicilia, C. (2005). *The challenges and benefits to teachers practices in constructivist learning environments supported by technology* (Unpublished master's thesis), McGill University, Montreal, Canada.

Smith, H., & McKeen, J. (1993). How does information technology affect business value? A reassessment and research propositions. *Canadian Journal of Administrative Sciences, 10*(3), 229-240.

Solow, R. M. (1987). We'd better watch out. *New York Times Book Review*, *12*(13).

Spender, J. C. (1996). Organizational knowledge, learning and memory: Three concepts in search of a theory. *Journal of Organizational Change Management, 9*, 63-78.

Spithoven, A. H. G. M. (2003). The productivity paradox and the business cycle. *International Journal of Social Economics, 30*(6), 679-699.

Steinmueller, W. E. (2003). *The role of technical standards in coordinating the division of labour in complex system industries*: Oxford: Oxford University Press.

Strassman, I. (1990). *Business Value of Computers,* New Cannon, CT: Information Economic Press.

Strassman, P. (1997). Computers have yet to make companies more productive. *Computerworld, 31(37), 92.*

Strauss, A. L. (1986). *Qualitative data analysis for social scientists.* Cambridge: Cambridge University Press. .

Strauss, A., & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory. (2nd ed.). Thousand Oaks, CA: Sage.

Tallon, P. P., Kraemer, K. L., & Gurbaxani, V. (2000). Executives' perceptions of the business value of information technology: a process-oriented approach. *Journal of Management Information Systems, 16*(4), 145-173.

Target, T. (2007). Definition of Information Communication Technology. *Retrieved on February 10*, 2009 from http://searchcioidmarket. techtarget.com/sDefinition/0,,sid183_gci928405,00.html

Trice, A. W., & Treacy, M. E. F. (1986). Utilization as a dependent variable in MIS research. ', In Proceedings of the Seventh International Conference on information Systems, IMAC, 32 - 45.

Triplett, J. E. (1999). The Solow productivity paradox: What do computers do to productivity? *The Canadian Journal of Economics/Revue Canadienne d'Economique, 32*(2), 309-334.

Turban, E., & King, D. (2003). *Introduction to e-commerce*. Englewood Cliffs, NJ: Prentice-Hall.

Turner, J., & Lucas, H. (1985). *Developing strategic information systems.* In W. Guth (Ed.), Handbook of Business Strategy. Boston, MA: Warren, Gorham and Lamont..

Tuvalu National Provident Fund. (2006). TNPF annual Corporate Reports for year 2000 – 2005, Funafuti, Tuvalu: Teo.

Tuvalu National Provident Fund. (2011a). TNPF Annual Corporate Reports for year 2006 – 2010, Funafuti, Tuvalu: Niko.

Tuvalu National Provident Fund. (2011b). TNPF Capital Budget for the Year 2011, Funafuti, Tuvalu: Niko.

Tuvalu Telecommunication Corporation (2006). TTC Annual Report for year ended 31st December, 2006. Funafuti, Tuvalu: Lopati.

Tuvalu Telecommunication Corporation. (2010). TTC Annual Report for year ended 31st December, 2010. Funafuti, Tuvalu: Lopati.

Twinn, S. (1997). An exploratory study examining the influence of translation on the validity and reliability of qualitative data in nursing research. *Journal of Advanced Nursing, 26*(2), 418-423.

UNCTAD. (2007). Information Economy Report, 2007 – 2008: Science and Technology for development, the new paradigm of ICT: UN, NY and Geneva. Retrieved from http://www.unctad.org/Templates/Webflyer.asp?intItemID=1397&docID=9479.

UNESCO. (2001). *Internet infrastructure and e-Governance in Pacific Islands Countries*: A survey on the development and use of the internet. Report by Zwimpfer Communications Ltd, Wellington, New Zealand.

Van Nievelt, A.M.C. (1999). *Benchmarking organisational performance and IT', in Beyond the IT productivity paradox,* (ed) Willcocks, L. and Lester, S., John Wiley And Sons, (pp. 99 – 119). Chichester, UK.

Walsham, G. (1995b). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, 4, 74–81.

Weill, M. M., & Rosen, L. D. (1995). The psychological impact of technology from a global perspective: A study of technological sophistication and technophobia in university students from twenty three countries. *Computers in Human Behaviour, 11* (1), 95-133.

Weill, P. (1992). The relationship between investment in information technology and firm performance: A study of the valve manufacturing sector. *Inform. Syst. Res. 3* (4), 307–333.

Weill, P., & Olson, M. H. (1989). Managing investment in information technology: Mini case examples and implications. *MIS Quarterly*, 3-17.

Wernerfelt, B. (1984). A Resource-based view of the firm. *Strategic Management Journal, 5*, 171-180.

Wernerfelt, N. (1989). From critical resources to corporate strategy. *Journal of General Management, 14*, 4-12.

Wood-Harper, T., Bell, S., Bhatnagar, S., & Bjorn-Andersen, N. (1990). Information systems development for developing countries. Information Technology in developing countries, 23 – 39.

Wooldridge, B., & Floyd, S. W. (1990). The strategy process, middle management involvement, and organizational performance. *Strategic Management Journal, 11*(3), 231-241.

Yeoh, P. L., & Roth, K. (1999). An empirical analysis of sustained advantage in the Upharmaceutical industry: Impact of firm resources and capabilities. *Strategic Management Journal, 20*(7), 637-653.

Yin, R. K. (2003). *Applications of case study research.* Thousands, OAKS: Sage Publications, Inc.

Zucca, L., & Campbell, D. (1992). A closer look at discretionary write-downs of impaired assets. *Accounting Horizons, 6*(3), 30-41.

APPENDIX A: Interview Worksheet

Part A: Demographic Data

Name: ……..

Gender: Male ☐ Female ☐

Age (ask for specific age or range (eg, 45-49) if relucant: ……..

Designated Title:

Organisation: ……

How many years have you worked for this organisation? ……

How many years have/did you worked in the TFSI? ……

What is the approximate number of employees in your organisation? ……

What is the ownership structure of your organisation?

Tuvalu government owned ☐ Branch of Foreign Bank ☐

Foreign subsidiary ☐ Other's ☐

Which of the following best describe your organisation's main activity?

Commercial banking ☐

Development banking ☐

Life insurance banking ☐

Mixture / Combination ☐

Ministry department ☐

Others ☐

Have you read the information sheet? Do you have any questions?

Scene Setting

For purposes of this research, we are using the following definition of information and communication technology or ICT: "A family of electronic technologies and services used to process, store and disseminate information, facilitating the performance of information related human activities." This would include computers from smart phones such as the iPhone up to mainframe computers as well as telecommunication networks such as the Internet.

Part B: Interview Questions

Name: _____

Research Q1.

1a How do you perceive the relationship between ICT use and performance of your *organisation*? It might help if you use the following five point scale for each of the following variables:

	Very low				Very high
Communication	1	2	3	4	5
Analysis	1	2	3	4	5
Reporting	1	2	3	4	5
Competitive advantage	1	2	3	4	5
Performance	1	2	3	4	5
Customer service	1	2	3	4	5
Staff training	1	2	3	4	5
Monitoring	1	2	3	4	5
Collaboration	1	2	3	4	5
Efficiency	1	2	3	4	5

Are there any other aspects of organisational performance in which ICT is helpful?

1b. My first question was about ICT impact on performance of your organisation. Thinking of the wider picture now, the Tuvalu financial services industry (TFSI)…. What are your perceptions on the relationship between ICT tools and the TFSI performance over the past 3 years

	Very low				Very high
Communication	1	2	3	4	5
Analysis	1	2	3	4	5
Reporting	1	2	3	4	5
Competitive advantage	1	2	3	4	5
Performance	1	2	3	4	5
Customer service	1	2	3	4	5

Staff training	1	2	3	4	5
Monitoring	1	2	3	4	5
Collaboration	1	2	3	4	5
Efficiency	1	2	3	4	5

Are there any other aspects of TFSI performance in which ICT is helpful?

2. Do you think your organisation gets the results it expected from ICT tools or not? If yes, on a scale of 1 to 5, how do ICT tools meet the needs of your organisation in terms of?

	Very low				Very high
Communication	1	2	3	4	5
Analysis	1	2	3	4	5
Reporting	1	2	3	4	5
Competitive advantage	1	2	3	4	5
Performance	1	2	3	4	5
Customer service	1	2	3	4	5
Staff trainings	1	2	3	4	5
Monitoring	1	2	3	4	5
Collaboration	1	2	3	4	5
Others	1	2	3	4	5

3. What are the types of ICT tools that you access to in your capacity as a TFSI manager / employer?

Research Q2.

1. How are ICT projects perceived in your organisation by these groups of people?

	Strongly ignored				Strongly support
Management	1	2	3	4	5
Employees	1	2	3	4	5
Customer view of ICT	1	2	3	4	5

Partners	1	2	3	4	5
Suppliers	1	2	3	4	5

2. How would you describe the contribution of ICTs to the competitive advantage of your organisation

Research Q3.

1. What are the challenges you encounter when using ICT for personal use and organisational use? If possible, be specific about the ICT being discussed.

   - Personal use
   - Organisation use in terms of:
   - Operation
   - Product delivery
   - Customer satisfaction
   - Staff training and monitoring
   - Others

2. What mechanisms do you have in place to monitor the contribution of ICT tools to the performance of your organisation in terms of;

   Benefits

   Costs

   Others: _____

3. What are the measures taken to eliminate or address these challenges?

Research Q4.

1. How do you perceive the importance of ICT tools in delivering effective and efficient financial services in Tuvalu?

2. How would you perceive future integration of ICT tools into your organisation to match the expectations and actual results?

Thinking generally now, is there any aspect of ICT use and organisational performance that we haven't covered in this interview? Anything else you have to say?

APPENDIX B: Research Information Sheet

1. Research Title

Manager's perceptions of the Relationship between the Use of ICT and Organisational Performance: A Case Study of the Tuvalu Financial Services Industry

This research forms the basis for a 120-credit master's thesis that is in partial fulfilment of a Masters of Management degree at Massey University in New Zealand.

2. Justification for Undertaking this Research

This study will serve Tuvalu in several ways. Principally, it will provide Tuvalu's financial service industry (TFSI) with insight into how ICT is used in information processing, service delivery mechanisms and decision making. The scope of ICT use in the industry will be revealed. This study could provide a basis for further studies to explore the relationship between ICT investments and organisational performance in Tuvalu. More broadly, this research will contribute to the academic literature on this topic.

3. Research Objectives

The general aim of this study is to determine the relevance of ICT use in financial institutions in Tuvalu. More specifically, the objectives of the study are: (i) to investigate the perceived relationship between the use of ICT and organisational performance in Tuvalu; (ii) to identify the sources of ICT use in the TFSI; (iii) to identify the challenges managers encounter when using ICT tools in their organisation and (iv) to determine expectations for changes in organisational performance from ICT and the final outcomes.

4. Research Methodology

The methodology that will be used in this study is face-to-face semi-structured interview with selected participants. The interview will last approximately one hour, depending on the participant's understanding, interest and responses.

5. Research Participants and Consent

The principal participants in this research are managers and senior employees of various financial institutions in Tuvalu. In addition, retired employees of the Tuvalu financial service industry will also be candidates. Finally, some ICT managers in the TFSI will be interviewed.

Before participating in the interview, all participants should understand his/her rights under the terms and conditions of this research as outlined below:

- I understand that my participation in this research is voluntary and I can decline to answer any question. I fully understand my right to withdraw from this research at any time before the thesis is published.

- I understand that the interview transcripts will be held in confidence and results reported in the thesis will not identify me as an individual (i.e., anonymous).
- I understand that the interview data will only be used for the intended purpose of developing and writing up thesis.
- I am fully aware that all the information that I provide will be stored safely for five years and then be destroyed.

6. Ethical Consideration

This research project has been evaluated by peer review and judged to be of low risk. Consequently, it has not been reviewed by one of Massey University's Human Ethics Committees. The researcher named below is responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher or the research supervisor, please contact Professor John O'Neill, Director (Research Ethics) at +64-6-350-5249 or at humanethics@massey.ac.nz.

7. Procedures in which Participants will be Involved

The selected participants will participate in at least one face-to-face semi-structured interview of approximately one hour. The interviews will be recorded and a transcript will be provided to the participant to verify the accuracy and/or suggest amendments or additional information. Participants will be given a reasonable time (approximately two weeks) to provide corrections. If no response is forthcoming, the transcript will stand as a true record of the interviewee's participation.

8. Use of Information

The data collected will only be used for the intended purpose of developing and writing up the researcher's master thesis. The thesis will be accessible through the Massey University library after the completion of the research. An executive summary of the results will be provided to all participants as a thank you gesture for their participation in the research.

9. Contact Persons

All participants of this research can contact the researcher or the research supervisor if they have any doubts, queries or concerns about the research:

Researcher: Taufia Patolo
4 Garton Drive
Massey, Waitakere
Auckland, New Zealand
Phone: (+64) 9-832-9170
Mobile: (+64) 21-0258-8450
E-mail: tpatolo@yahoo.com

Supervisor: Associate Professor Dennis Viehland
Massey University, Albany Campus
Auckland, New Zealand
Phone: (+64) 9-414-0800 extn 9501
Mobile: (+64) 21-414-722
E-mail: d.viehland@massey.ac.nz