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## **A Model Of IS/IT Investment And Organisational Performance In The Banking Industry Sector**

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### **Abstract**

*Information Systems/Information Technology (IS/IT) has now become an integral part of all organisations. Ironically, although there has been a lot of research undertaken in IS/IT strategic planning, little has been done to understand the actual relationship between IS/IT investment and performance. This study will endeavour to investigate this relationship. Given the enormous levels of IS/IT investment that financial institutions have made and continue to make, the results of this study will be of interest to both practioners and academics alike and should assist not only in understanding the value of previous investments, but also in future decision making processes regarding any new investments.*

### **Keywords**

Strategic Information Systems Planning, Information Systems, Information Technology, Organisational Performance, Interest Income, Non-Interest income, Operating Expense, Credit Quality, Conversion Effectiveness, X-Efficiency.

### **INTRODUCTION**

Information Systems/Information Technology (IS/IT) have now become an integral part of large and small organisations. The role that IS/IT plays has also changed over the years, from a focus primarily on process/production efficiency to a present day strategic focus (Ward et al., 1990; Ward et al, 1996; Sohal and Ng, 1998). Further, Ballantine et al. (1996, p129) highlight the fact that the role of IT/IS has changed from “automating to informing... to transformation”. Given this dynamic background, levels of investment in IS/IT have continued to increase as the variety of application and uses (communication, e-mail, office automation, MIS, EIS, SIS) has grown.

According to Campbell, (1992), it was estimated that investments in IS/IT were rising by 12% each year in the U.S.A alone. On the other hand, IS/IT investment in the U.K had increased almost 10 times since 1980 (Carrington et al., 1997). One might infer from this that the increasing investment in IS/IT has led to increased IS/IT cost, but Harris and Katz (1991) argue that high IS/IT spending does not automatically lead to high IS/IT cost ratios.

Falling hardware prices, coupled with increasing technological capabilities in hardware and software, have also contributed to the explosive growth in numbers of computers within organisations (Brynjolfsson, 1993). Ironically, this has also spurred debate into the so-called information systems productivity paradox. Studies of this phenomenon have given a rich variety of results dependent very much on the context (organisational and external environment), the timing of study and a host of other factors. Some have shown that employee productivity may *not* increase with IS/IT availability, while others have been quite successful in showing positive and increasing productivity levels with increasing availability of IS/IT within organisations (Brynjolfsson, 1993; McKeown, 2001).

In terms of the current study, one of the most critical issues that has been facing IS/IT managers, and indeed Chief Executive Officers and other senior management is the question of managing and measuring the effectiveness of their IS/IT infrastructure (Pervan 1998), and in so doing be able to justify continued investment in IS/IT.

### **THE FINANCIAL SECTOR**

Financial institutions have capitalised on the use of IS/IT to increase their service delivery channels. By way of example, some financial institutions have substituted labour for capital in the form of flexible and extendable platforms (new investments or improvements to existing systems). As a result they have been able to contain staff and service delivery costs while greatly increasing their ability to service larger numbers of customers and

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handle significantly higher transaction volumes (Frei et al., 2000; Harker and Zenios, 2000). As new products come onto the market, customers become more sophisticated and demand even more from their financial service providers. Thus, customers themselves have also been instrumental in pushing financial service providers (Harker and Zenios, 2000) to increase the availability of banking services by demanding round the clock access to a multitude of financial services and information as opposed to the traditional banking hours.

With this increasing automation, the traditional “bricks and mortar” concept of banking is rapidly being overtaken by electronic and internet banking via the World Wide Web and other delivery channels all of which require significant investment on the part of the financial institutions. Justifying such investment is increasingly becoming an issue that senior management have to address (Campbell, 1992). This is further complicated by the fact that many benefits may not be immediately obvious but may manifest themselves at a much later stage (Dos Santos, 1991; Weill, 1992). These benefits include a greatly reduced time to market for new products, a wider product portfolio, and better access to customer data by bank staff, all of which are only realised after the initial investment in the platform has been made. Yet, given these rather obvious advantages, the problem of being able to quantify and relate the contribution of such activities to the organisation’s performance remains unresolved (Powell, 1992).

In the case of financial institutions, performance may be measured by a number of key indicators including Interest Income, Non-Interest Income, Operating Expense and Credit Quality (financial risk). However, investing in IS/IT alone cannot produce sustainable performance advantages (Powell and Dent-Micallef, 1997), SISP activities need to be complemented by a comprehensive corporate strategy. As we shall see later, the role of management in an organisation is a factor that also plays a key role in this regard.

## **JUSTIFICATION FOR RESEARCH**

In justifying the need to conduct research in this area, the following points have to be considered;

The need to build on existing research into Strategic Information Systems Planning (SISP).

- The need to increase understanding of the impact of IS/IT on organisational performance, particularly in the banking sector.
- Relatively few studies of this nature have been conducted in the banking sector and there is a need to broaden the theoretical base in this regard.
- Previous investigations have been broad in their scope and thus have been difficult to generalise. Harris and Katz (1988) observed that it is important to measure/study organisations within a single industrial or business sector in order to generate any useful data, the analysis of which can then make a more meaningful contribution to the growth of knowledge in that particular area.
- Against a background of ever-increasing investment in IS/IT, there is a need to further investigate the impact of this investment on performance, as some studies have been able to show a positive relationship yet others have been inconclusive.

By linking and understanding the impact of IS/IT investment on organisational performance, organisations can better address the issues above and thus improve their SISP activity, which then forms an input to the overall organisational strategy formulation and planning process. It is therefore very important to understand the role of IS/IT in strategy formulation if one is to better appreciate its impact on organisational performance (Sohal and Ng, 1998).

In the banking sector, there is growing consensus between researchers and practitioners that not enough research has been undertaken to investigate the performance of financial institutions, although a lot of work has been done to increase the understanding of the markets in which these organisations exist (Harker and Zenios, 2000). The *American Banker 1988 Managing Technology Survey* (Zimmerman, 1988) reported that 55% of senior managers surveyed were able to confirm that their IS/IT investments were of good or excellent value, yet half of them said they did not have any formal mechanism with which to justify this claim. Further, Campbell (1992) showed that three out of four Chief Information Officers (CIO) had been asked to demonstrate the benefits of IS/IT investments.

Given that the financial services sector is a major employer in most countries and one which spends a significant portion of its annual budget on IS/IT investments, the need to understand the effects of this investment becomes critical, not only to the organisation itself but to external parties such as shareholders. Unfortunately, a further complication is that the use of IS/IT in any organisation is pervasive and permeates through the entire organisational structure. This complicates any attempt to attribute a direct cause-and-effect relationship between IS/IT investment and organisational performance.

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## OVERVIEW OF THE LITERATURE

As can be seen in Tables 1 and 2, there have been some studies in this area. However there is a need to further broaden this research base with studies that are more specific and that take into account changes that the banking industry has undergone over the past few years (Harker and Zenios, 2000), including changes in distribution channels, the shift in focus of the use of IS/IT and the advent of e-commerce technologies.

STUDY	INDUSTRY	FOCUS OF STUDY
Lucas (1975a)	Banking	Use of [Accounting] Information Systems and organisational performance
Turner (1982)	Mutual Savings Banks (Banking)	Relationship between size and willingness to utilise IT and whether organisational performance is related to the application of IT in organisation
Bresnahan (1986)	Financial Services,	Effect of use of mainframes in financial services
Banker and Kauffman (1988)	Banking (Single commercial bank)	Relationship between ATM implementation and deposit market share
Alpar and Moshe (1990)	Banking	Impact of IT investment and organisational performance
Floyd and Wooldridge (1990)	Retail Banking	Relationship between IT and performance

Table 1: Summary of studies in the banking sector

STUDY	INDUSTRY	FOCUS OF STUDY
Lucas (1975b)	Salesmen/Account executives in Clothing retail	Performance and usage of Information systems by Sales people and Account Executives
Cron and Sobol (1983)	Medical Wholesale Supplies	Relationship between computerisation and performance
Bender (1986)	Insurance	Financial Impact of IT on organisations
Clement and Gottlieb (1987)	Insurance (Single firm)	Relationship between Information Systems and managerial control
Harris and Katz (1988)	Insurance	Relationship between IT investment and organisational performance
Loveman (1988)	Manufacturing	Relationship between productivity and IT investment in manufacturing
Weill (1992)	Manufacturing	Relationship between IT and organisational performance
Mahmood and Mann (1993)	Cross Sectoral (Computer World Premier 100)	Organisational impact of IT investment

Table 2: Summary of some studies in sectors other than banking

An on-going review of the literature has shown that although there have been earlier studies, there are a number of limitations and constraints to these studies that have made them difficult to generalise and in some cases there have been conflicting findings (Weill and Olson, 1989). As an example, some previous studies were not limited to a particular industry (Mahmood and Mann, 1993). However, most studies were focused on a single industry, even though there may have not been a distinction between various sectors of the same industry, i.e. studies in a particular industry included organisations from different sectors within the same industry (Bresnahan, 1986).

In each of these studies the aim was essentially to investigate the relationship between investment in IS/IT and performance, however different measures for organisational performance were used by different researchers depending on the focus of their studies. For instance, Lucas (1975a) defined a model and a set of variables to determine the relationship between the use of an accounting system and the performance of an organisation. Cron and Sobol (1983) measured the effect of computer usage and organisational performance using generic profitability measures such as sales growth over a five year period, the pre-tax profits, return on assets, and return on net worth.

Previous studies have also been plagued by a lack of consistent definition for IS/IT although this may be attributed in part to the rapidly changing nature of Information technology (Weill and Olson, 1989). One of the shortcomings of many earlier studies has been the focus on *technology*, thereby limiting the scope in terms of

understanding the impact of other factors on organisational performance. This may also be attributed to the aforementioned lack of consistent definitions. Invariably this has meant that previous studies could in fact have underestimated the actual impact of Information Systems on organisational performance (Weill and Olson, 1989).

Therefore, there is a need to extend research in this field and focus on a particular sector within a single industry in order to gain a better understanding of the impact of IS/IT. Further, it is clear that there is a need to utilise key performance indicators that are relevant to that particular industry, in this case banking, in order to obtain results that can be better interpreted in the context of the industry concerned. Banker et al. (1990) concur in concluding that aggregated measures such as revenue, ROI, ROA, and profitability may not adequately depict the true contribution of IS/IT, as there are many other factors that influence the impact of IS/IT on organisational performance. Thus, it is anticipated that this approach will lead to more generalisable results, the lack of which is a problem that has been acknowledged by previous researchers.

## THE MODEL

The central question of the research program is based upon a proposed relationship as shown in figure 1. As can be seen from the diagram, it is hypothesised that a relationship exists between the level of investment in a banking organisation, as evidenced by its Information Systems portfolio, and the performance of that organisation. The performance of an organisation in the banking sector being typified by its fundamental performance measures, namely *Net Interest Income*, *Non-Interest Income*, *Operating Expense* and *Credit Quality* all of which impact upon the share price.

The model consists of four main components:

1. The Information Systems portfolio.
2. The organisation's performance as measured by a given set of indicators.
3. A moderating variable termed *Conversion Effectiveness* (Weill and Olson, 1989; Weill, 1992).
4. The key considerations for strategic planning for Information Systems (Weill and Olson, 1989; Earl, 1993). These considerations raise questions as to how organisations can effectively perform the activities listed therein to plan and implement their Information Systems portfolio.

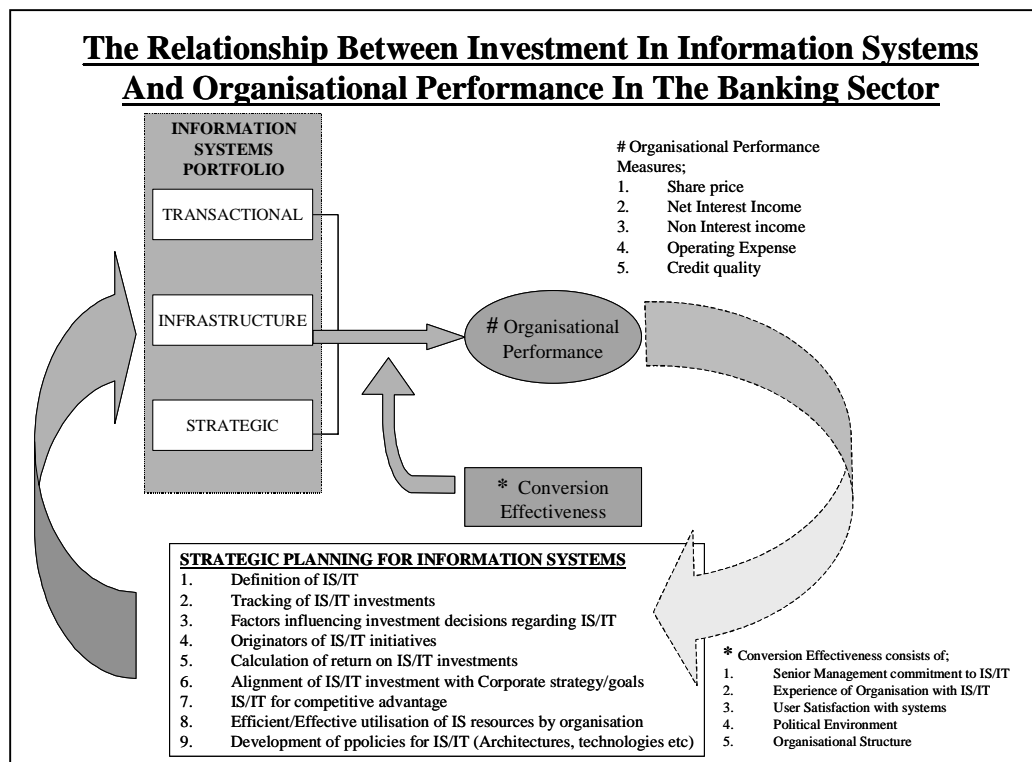


Figure 1: Investment and Performance Relationship Model

In trying to build on the existing research and theory in SISP, there are a number issues that will bear consideration (see Weill and Olson (1989) for points 1 to 5 and Earl (1993) for points 6 to 9):

1. Definition of IS/IT Tracking of IS/IT investments

3. Factors that influence investment decisions regarding IS/IT
4. Originators of IS/IT initiatives Calculation of return on IS/IT investments
6. Alignment of IS/IT investment with corporate strategy/goals
7. IS/IT for competitive advantage
8. Efficient/Effective utilisation of IS resources by organisation
9. Development of policies for IS/IT (Architectures, technologies etc)

The proposed model defines a cyclical relationship in which all aspects are tightly integrated. In trying to understand the information Systems portfolio, it is important to first define and clarify the difference between Information Systems and Information Technology. Although the terms are used interchangeably, their correct definition and use can help to better understand the proposed relationship and behaviour of the model.

Traditionally, Information Technology has been used to reduce costs in organisations by automating organisational processes. This role has changed significantly over time. Ward et al. (1990) and later Ward et al (1996) discuss the evolution of IS/IT from the Data Processing (DP) era with its emphasis on efficiency, through the Management Information Systems (MIS) era, with its emphasis on effectiveness, to the Strategic Information Systems (SIS) era with its emphasis on competitiveness. They accept that this is a very simplified manner of viewing the evolution of IS/IT, but also argue that it is certainly a convenient model and one that is often used to give an overview of the subject.

### **Information Systems Portfolio**

In the context of the proposed study, an organisation's *Information Systems Portfolio* consists of Strategic Systems, Transactional Systems, and Infrastructure. Weill (1992) first proposed a similar classification in his study on the relationship between investment and performance in the manufacturing sector. As originally proposed, the classification related to *management objectives*. It was the first real attempt at looking at the problem from a holistic perspective and in many ways the classification has helped foster a clearer understanding of the contribution of each component. Weill (1992, p312-313) defined *Strategic Systems* as "...investment made to gain a competitive advantage and increase market share, via sales growth...", *Transactional IT* "...processes the transactions of the firm and IT investment of this type is usually to cut costs by substituting capital for labour.", and *Informational Systems* as "...provides the information infrastructure to manage the firm and meet other management objectives besides cutting costs or gaining sales."

### **Conversion Effectiveness**

Weill and Olson (1989), Weill (1992) and Markus and Soh (2000) discuss the concept of *Conversion Effectiveness* and its effect as a moderating variable on the impact of IS/IT on organisational performance. It is argued, and sustained through empirical evidence, that the degree to which IS/IT investments are effectively used can vary from one organisation to another thereby having an effect on the performance of organisations. Banker et al. (1990) also discuss the effect of a similar construct, which they term *the intermediate production process* as being an important factor in complex managerial environments.

This factor highlights the need for management involvement in order for IS/IT investments to produce the required value in terms of increased organisational performance. Harris and Katz (1991) although unable to establish a causal relationship between investment and firm performance did find that those organisations that also practiced good management of resources, did tend to exhibit better performance compared to those that did not do so as well. Frei et al (2000) also acknowledge the importance of managerial intervention particularly the need to align issues such as technology, human resource management and capital investment with and within a given strategy to achieve greater productivity. According to Weill (1992), Conversion Effectiveness consists of five factors, namely;

- (i) Senior management commitment to IS/IT.
- (ii) [Firm] experience with IS/IT.
- (iii) User satisfaction with IS/IT.
- (iv) The organisation's internal political environment.
- (v) The organisational structure.

Quite clearly, the five factors identified above can have far reaching effects on an organisation in general and its IS/IT in particular.

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### **X-Efficiency**

In trying to explain the performance of financial institutions, the metaphor of a *black box* is often used (Frei et al., 2000). Simplistically, every financial institution has inputs, which are processed in this “black box” and associated outputs are produced. The efficiency of conversion of input to output is termed *X-efficiency* (Frei et al., 2000, Leibenstein, 1966; 1980). Essentially, X-Efficiency is a measure of how well management in an organisation is able to utilise assets at their disposal and, in so doing, achieve certain results/outputs. These assets can be human resources, technology, or other forms of capital. Thus differences in X-efficiency account for the variations in performance between financial institutions.

## **REFINING AND TESTING THE MODEL**

### **Target Sample**

The target sample for the research program will be Australian banks. The choice of a single sector has been drawn from the fact that previous studies tended to be cross sectoral in nature and as a consequence, the results were difficult to generalise.

### **Data Collection**

Historical industry data will be collected to in order to enhance knowledge and understanding of the sector. This data will also provide insights as to why certain investment decisions may have been made at given times. This data will also allow for possible regression and correlation analysis to further try and establish the proposed relationships. The choice of a single sector of a particular industry will also facilitate in the design of research instruments as it will be possible to use industry specific terms which practitioners will be able to identify with, thus making the research instrument easier to interpret and increasing the likelihood of more accurate predictions.

In addition, it is anticipated that more explicit data will be collected using a combination of surveys and case studies, which will yield a combination of qualitative and quantitative data. Pilot studies will be conducted to assist in the preparation, testing and enhancement of research instruments.

### **Variables**

It is anticipated that data on such quantitative variables as the key financial performance indicators for financial institutions, demographic data will be collected. By concentrating on a single sector of the industry, it is hoped that this will eliminate the problems faced by earlier researchers in terms of interpretation and analysis of results obtained.

## **SUMMARY**

It is quite clear from the literature that a study of this nature will be most useful in extending and enhancing the theoretical and practical base with regard to SISP process in general and within the financial services sector in particular. Further, it is anticipated that this study will bring together knowledge and experiences from two complex industries, Information Systems and Financial Services. Given the enormous levels of IS/IT investment that financial institutions have made and continue to make, the results of such a study will be of interest to both practitioners and academics alike and should assist not only in understanding the value of previous investments, but also in future decision making processes regarding any new investments.

Practical experience has proven that the need for such studies cannot be emphasised enough. Senior Management in financial institutions are constantly faced with the perplexing problem that they know they have to invest in IS/IT to stay competitive and yet find it very difficult to justify and quantify the return or benefits from these investments with regard to the bottom line.

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