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**IT investment management:
A case study and survey on the effects of IT Usage on Organisational strategic
performance in Financial institutions**

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Executive Summary

Information technology (IT) has significantly impacted the operations and strategies of many organisations during the past four decades. The impact of computers, telecommunications and computer-based information system has left few organisations untouched, with the future looking even more turbulent (Gibson and Jackson, 1987; Strassmann, 1990; Eaton and Bawden, 1991; Earl, 1994). However, in the literature there is a common theme found; IT promises much, but quite often offers very little in terms of real business and human benefits (Butler Cox, 1990; Du Plooy, 1993; Galliers, 1992; Hochstrasser and Griffiths, 1991).

The question of getting value for money invested in IT has been the subject of considerable research over recent years with mixed empirical results (Galliers, 1992). According to Soh and Markus (1995) the mixed empirical results about the value of IT investments are an invitation to seek better theory.

IT has profound and important effects within organisations on the dimensions of strategy, finance, and organisational change. The socio-organisational impacts are frequently the most wide-ranging; many examples in the literature show that "success" or "failure" of an IT investment is determined not by technical aspects or investment, but by so-called "people problems.", people using IT appropriately. How does the appropriate usage of IT investments lead to positive organisational performance? What constitutes "appropriate IT usage"? What constitutes organisational performance?

From the above we may hypothesise that *given quality IT assets, appropriate IT use is associated with high levels of organisational performance.* This hypothesis will be the focus of the study in an attempt to get answers to the following questions:

- What constitutes appropriate IT use?
- How do organisations promote appropriate use?
- How does use differ amongst businesses with the same quality of IT assets?
- How do skills and appropriate use translate into favourable IT impacts? (Favourable strategic organisational performance.)

A model relating strategic IT management, organisation structure, IT investment evaluation, project management, ease of IT use, IT usefulness and external influences to the level of strategic organisational performance is proposed.

1. Introduction

Information technology (IT) has significantly impacted the operations and strategies of many organisations during the past four decades. The impact of computers, telecommunications and computer-based information system has left few organisations untouched, with the future looking even more turbulent (Gibson and Jackson, 1987; Strassmann, 1990; Eaton and Bawden, 1991; Earl, 1994). However, in the literature there is a common theme found; IT promises much, but quite often offers very little in terms of real business and human benefits (Butler Cox, 1990; Du Plooy, 1993; Galliers, 1992; Hochstrasser and Griffiths, 1991). Sometimes IT even has quite disastrous effects on, for example, staff motivation and the "bottom line." Thus the question put forward by Galliers (1992) seems to be quite valid:

"Information technology – management's boon or bane?"

It would seem that the traditional approaches used to manage IT investments are not adequate. The question of getting value for money invested in IT has been the subject of considerable research over recent years (Galliers, 1992), and the solution to this "value for money IT" syndrome seems to be *IT investment management* (Farbey *et al.*, 1993).

One definition of *Information technology investment management (ITIM)* is as follows:

"The management and control of the set of all technological solutions to the problem of collecting, storing manipulating and distributing of information" (Hochstrasser and Griffiths, 1991).

From the literature review and personal experience, the author offers the following definition of *IT investment management*.

"IT investment management is the management of:

- *IT expenditure to ensure quality IT assets,*
- *The appropriate use of such quality IT assets,*
- *The organisational impacts resulting from the use of IT to gain competitive positioning and dynamics for the organisation"*.

IT investments constitute a growing proportion of the annual budget of many organisations in Western countries (Revenaugh and Philippakis, 1994). Executives are increasingly concerned about the traditional approaches taken for identifying, evaluating, and subsequently *managing IT investments* (Hochstrasser and Griffiths, 1991; Farbey *et al.*, 1993; Hunt, 1993; Revenaugh and Philippakis, 1994, Semich, 1994, Bacon, 1992).

Proof that the capital spent on IT actually improves the organisation's strategic performance was notoriously difficult to provide during the 1980's. Several studies undertaken found no correlation between the amount of money invested in IT and the return from that investment (Bailey and Chakrabarti, 1988; Barua, *et al.*, 1991; Brooke, 1991; Cron and Sobol, 1983, Harris and Katz, 1989; Parsons *et al.*, 1990; Strassmann, 1990). In particular it was argued that traditional investment appraisal measures are inappropriate for evaluating many IT investment proposals because they focus on the capital cost of technology, not on the business value of the information (Galliers, 1992; Butler Cox, 1990; Farbey *et al.*, 1993; Boland, 1987).

However, Mahmood and Mann (1993) published the first research report that relates comprehensive sets of IT investment measures to organisational strategic and economical performance measures. The fundamental conclusion of their research was that IT investment appears to be related to organisational strategic and economic performance. Their report was followed by Lubbe and Nel (1993) who also found a positive correlation between IT spending and business success in South African companies.

Brynjolfsson and Hitt (1993), who studied the Fortune 500 organisations in the United States of America, used data from 1987 to 1991, which indicate that IT investments have made a substantial and statistically significant contribution to organisational output. Their studies found that between 1987 and 1991, the return on investment (ROI) for IT capital averaged 68%.

According to them the models they applied were essentially the same as those that have been previously used to assess the contribution of IT investments. Although the methods employed in their study can and do indicate correlations between IT investment spending and organisational output, they do not assess causality. The firms with high returns and high levels of IT investment may differ systematically from the low performers in ways that cannot be rectified by simply increasing the amount spent on IT investments. It is suspected that these differences are often on the "human" side, not on the technical IT side of organisations (Mahmood and Mann, 1993; Brynjolfsson and Hitt, 1993; Soh and Markus, 1995).

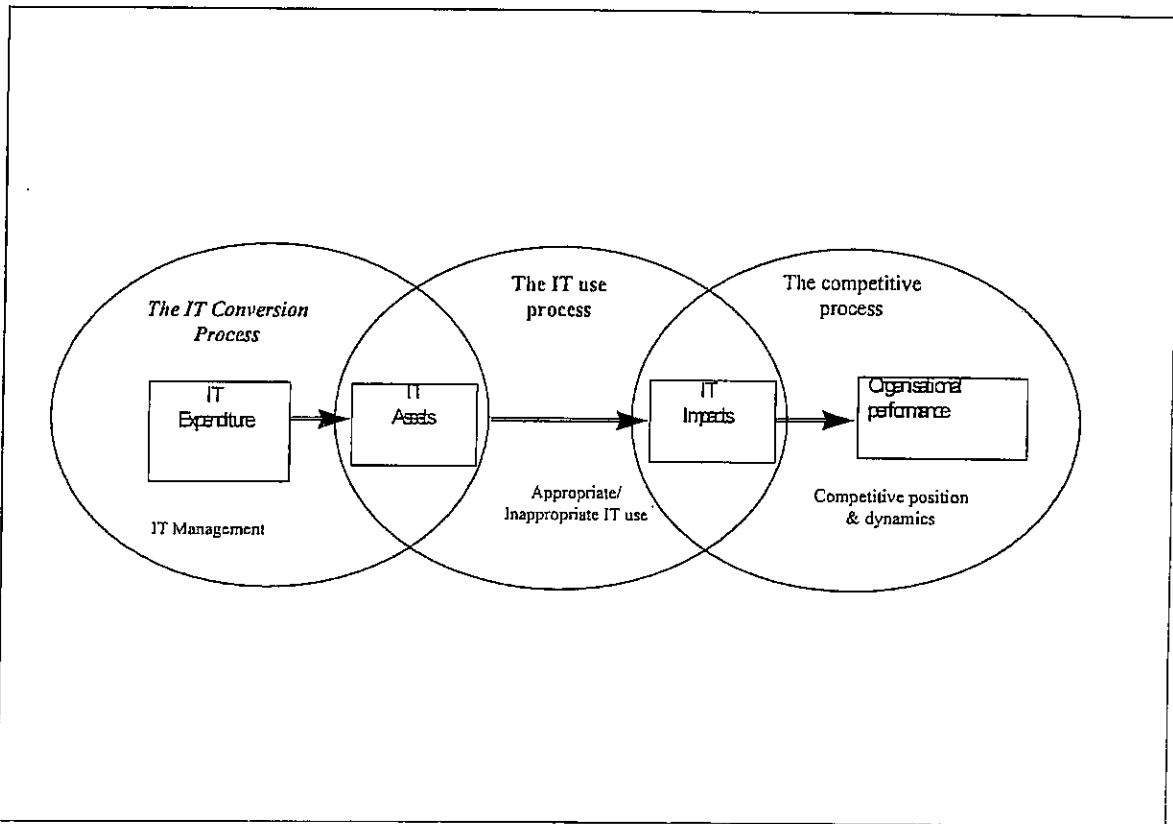


Figure 1 How IT creates Business Value (Soh and Markus, 1995)

The findings of Brynjolfsson and Hitt, as well as Mahmood and Mann, imply that the "success" or "failure" of IT investments also depends on the organisation and the people, utilising or "using" the IT in more successful or less successful ways. This may be called "appropriate use" (Soh and Markus, 1995). Thus, when managing IT investments, both the technical IT sides, as well as the "human factor" side should be managed successfully for IT investments to deliver the expected value to organisations.

According to Soh and Markus (1995) the mixed empirical results about the value of IT investments are an invitation to seek better theory. They attempted their own process theory synthesis based on several previously proposed theoretical models that trace the path between IT investment and business value (Lucas, 1993; Grabowski and Lee, 1993; Markus and Soh, 1993; Sambamurthy and Zmud, 1994 and Beath, Goodhue and Ross, 1994). Their model is depicted as Figure 1. According to Soh and Markus *op cit*, the middle process, namely the usage of IT, requires more empirical work because less is known about it than about the first and last processes of their model. This "IT use process" begs many questions like; what constitutes appropriate IT use?; how do organisations promote appropriate use?; how does appropriate use differ among different lines of business?, and how do skills and appropriate use translate into favourable IT impacts on strategic organisational performance?

Both Mahmood and Mann (1993) and Brynjolfsson and Hitt (1993) argue that further research is needed into the *appropriate use of IT*. Mahmood and Mann mention that further research will shed some light on their contradictory findings, namely that IT use by organisations led to either very good or bad organisational performance. According to Galliers (1992), Farbey *et al* (1993) and Hunt (1993) a *model for IT investment management* is needed. The process based model of Soh and Markus (1995) can be seen as such a model.

We may hypothesise that *given quality IT assets, appropriate IT use is associated with high levels of organisational performance*. This hypothesis will be the focus of the study in an attempt to get answers to the following questions:

- What constitutes appropriate IT use?
- How do organisations promote appropriate use?
- How does use differ amongst businesses with the same quality of IT assets?

- How do use, skills and appropriate use translate into favourable IT impacts? (Favourable strategic organisational performance.)

1.1 The Research Context

The study sample, including all case studies and the survey is restricted to large, publicly held financial institutions for the following reasons:

- The financial sector is perhaps the most information intensive sector, have proportionally high investments in IT and proportionally high potential benefits.
- In order to take advantage of the researcher's subsequent experience with the financial sector.

1.2 The Research Strategy

The field of information technology (IT) research is still young and a universal information technology research philosophy, approach and design are yet pending (Barville and Landry (1989, p 56). Van Maanen (1979), argues that the qualitative- and quantitative research approaches are not mutually exclusive, but that the differences between the two approaches are located in the overall form, focus and emphasis of the study. Attewell and Rule (1991) argued for the combination of survey and fieldwork approaches to study IT. According to them these two approaches could not only be seen as complimentary, but 'incomplete without the other'. Others like Kling (1991), Gutek (1991), Biksen (1991) as well as Attewell and Rule (1991) argue that several methods of data collection are needed to address the impact of IT adequately. Gable (1994) presents an example of the integration of case study and survey research methods in an integrated design as depicted in Figure 2.

Gable's approach to integrate case studies and a survey is used for this study, using case studies as well as a literature survey to specify an IT investment management process model, followed by a survey. This integrated design facilitates the synergistic interplay of interpretive and positivist perspective. It allows the identification of context-specific variables. During later stages (construct measurement, testing and interpretation) the richness of the multiple case studies can be used in ascribing subjective (interpretive) meaning to the objective (positive) phenomenon measured.

1.3 The Study Design

The first task encompassed a single in-depth case study to gain knowledge of the organisational dimensions and variables involved in IT usage, as well as strategic organisational performance. The case study design includes this single, exploratory, in-depth pilot case study. Problems and issues identified in the exploratory pilot case study will point to important variables for further investigation.

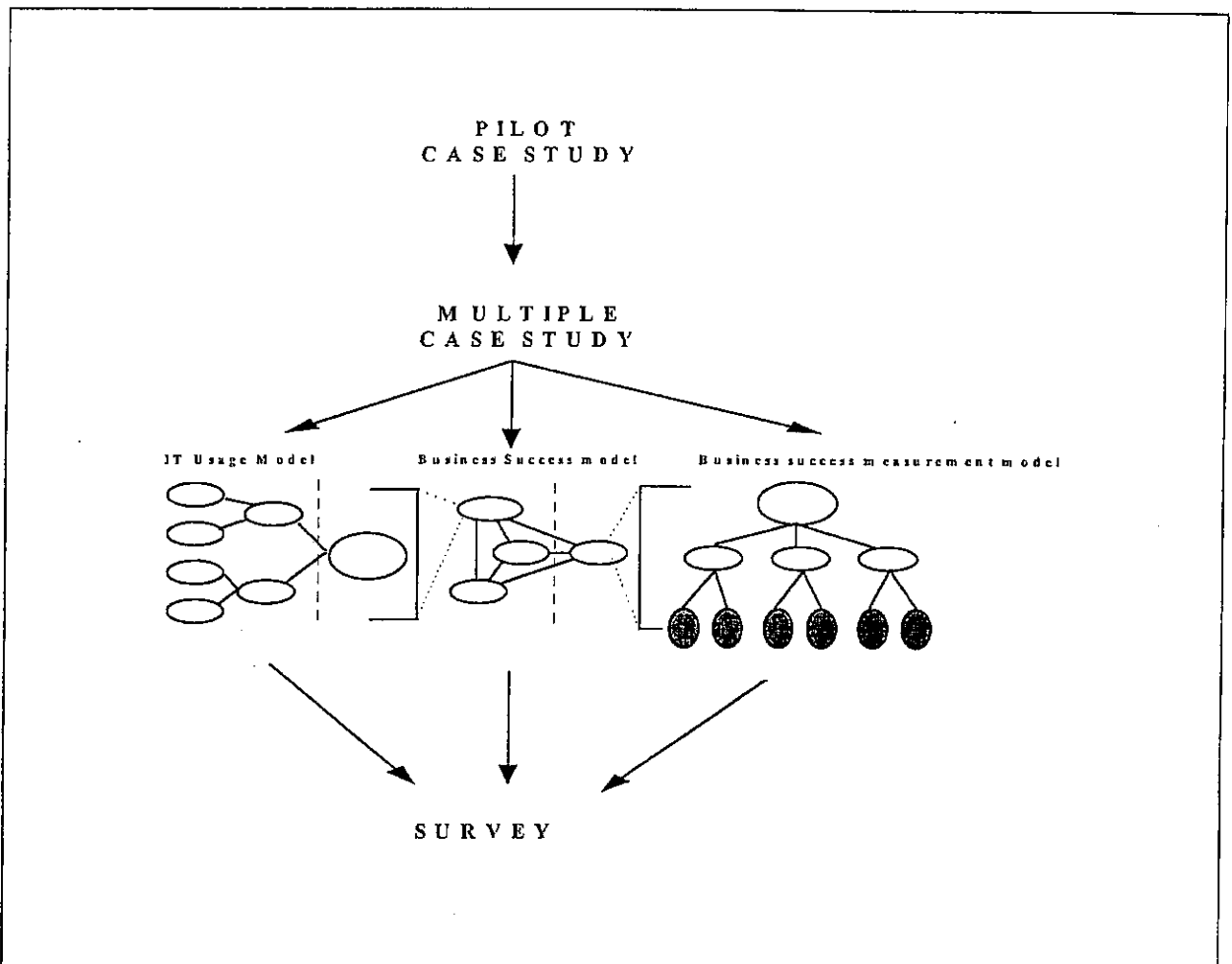


Figure 2 The study design.

The single case study is to be followed by a multiple case study.

During the multiple case study phase a conceptual process model with variables will be developed and a survey of 25 financial institutions (the population of all large Australian financial institutions) will be conducted as an explanatory, statistical, cross-sectional, *ex post facto*, semi-structured field survey

The survey strategy will employ a semi-structured survey instrument during interviews with the IT director, as well as the Managing director of the organisations studied.

Whereas the pilot case study has the objective of describing the situation and identifying problems and issues, the cross-case analysis of the six organisations will be compared against a rough model or pattern of variables derived from the literature and the pilot case study (see figure 3 which represent a rough concept of such a model). If empirically observed patterns from the survey, coincide with the predicted pattern, the case study findings will have greater internal validity. Thus the case studies, when integrated with the survey in a larger, more complex research design, will be useful as a rich source of detail to aid with the interpretation of the quantitative findings from the survey, as well as an aid in identifying alternative *ex post* models (Gable, 1994).

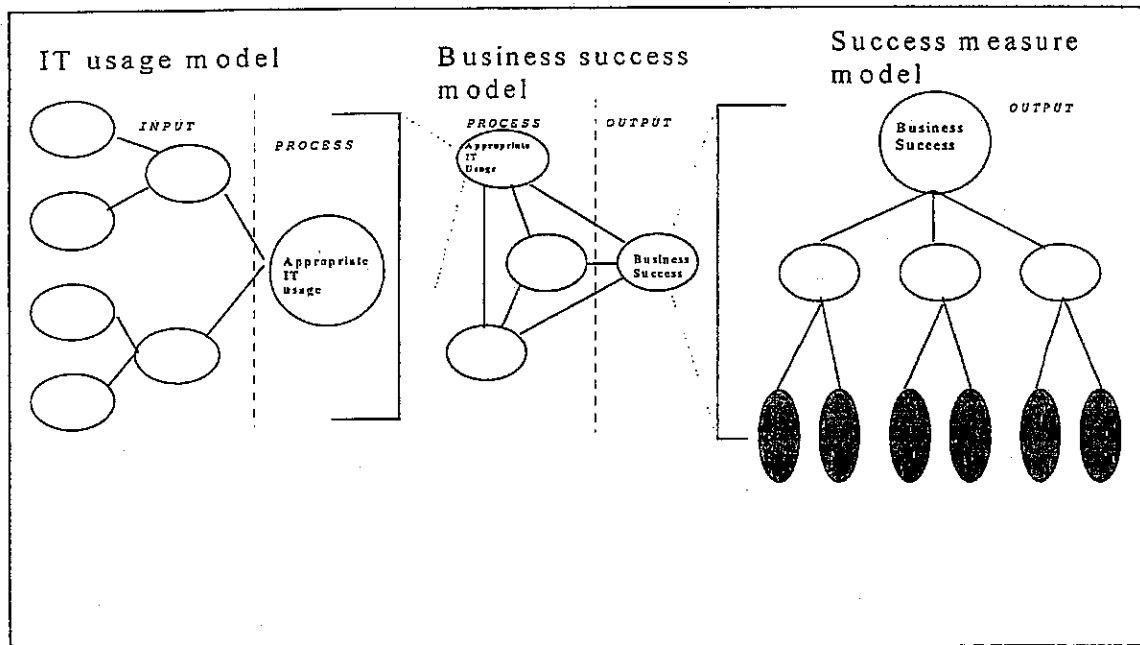


Figure 3 Example of a model

Thus, in summary, the study will endeavour the following:

- To develop and test a "business strategic performance model," identifying important and distinctive dimensions of strategic organisational performance.
- To develop and test an "IT usage model," of factors important to the appropriate usage of IT.
- To develop and test a "business strategic performance measurement model" of factors important to the strategic performance of organisations.
- The dependent variable in the Business strategic performance model is business success. This dependent variable is derived from the Strategic business performance model.

2. THE CASE STUDIES

The case studies will serve both an explanatory function, to aid in model design and interpretation of survey data, as well as an exploratory function, to identify important issues and variables.

2.1 CASE STUDY OBJECTIVES

The pilot case study (not presented in this paper), being exploratory and descriptive, did not specify an *a priori* dependant variable. The multiple case study, however, has the objective of understanding in as far as it is possible, the relationships between key variables. The dependent variable in the multiple case study is "*strategic organisational performance*," and the independent variables are those factors identified from the literature, the pilot case study, and the researcher's past experience.

The case study objectives are as follows:

- Identification of important variables
- Hypothesis generation

- To serve as a rich source of explanatory information to aid in interpretation of statistical findings from the survey
- To serve as a check-and-balance against questionnaire responses as an aid in validating the survey instruments
- To conduct a preliminary test of patterns of significant variables in an early model.

2.2 The Case Study Methodology

The overall case study methodology is as follows:

2.2.1 Develop the Case Study Protocol

The protocol defines the broad structure of the case research effort. A protocol was developed. The protocol enforces a minimum of structure on the study and ensures that the researcher considers in advance the objectives of the study.

2.2.2 Select the Case organizations

The selection of Case organisations was discussed in the previous section. The pilot case study was chosen because of the researcher's involvement with the organisation. The multiple case organisations were selected according to the researcher's current involvement with these organisations.

2.2.3 View IT portfolio

Review the organisations IT portfolio.

2.2.4 Monitor IT usage

Monitor the actual usage of IT in the organisation

2.2.5 Conduct interviews

Conduct semi-structured interviews with IT as well as User management

2.2.6 Produce Case report

For each of the case organisations, prepare a final case report.

2.2.7 The cross-case analysis

The last stage of the case study methodology is a cross-case analysis of the case organisations studied. The primary method of analysis that was employed was pattern matching (Yin, 1994). Pattern matching involves comparing an empirically based pattern of variables with a predicted one. If the patterns coincide, the results can help strengthen the internal validity of the findings. Table 1 lists pattern analysis approaches and tools considered for use in the cross-case analysis. Those flagged with a "***" were employed in this study

Table 1 lists tactics for addressing construct, internal and external validity and reliability in case study research. The tactics employed in this study are marked with a "***". The main objective of reliability is to minimise errors and bias in the study. The two tools employed in the case study research to improve reliability are the case narrative and the case study protocol.

Table 1: Pattern matching approaches and tools (Yin, 1994)

APPROACHES	TOOLS
Brain-storming with peers **	Chronology of events **
Brain-storming with managers **	Case narrative
Review of related literature **	Case study protocol **
IT/User workshops	Case study database
Review User satisfaction **	Table templates

Table 2: Case study tactics for design tests (Yin, 1994)

TESTS	CASE STUDY TACTIC	PHASE IN WHICH TACTIC OCCUR
Construct Validity	**Use multiple sources of evidence **Establish chain of events **Have key informants to review draft case study report	Data collection Data collection Composition
Internal validity	**Do pattern matching Do explanation building Do time series analysis	Data analysis Data analysis Data analysis
External Validity	**Use replication logic in multiple case studies	Research design
Reliability	**Use case study protocol Case narrative	Data collection Data analysis

2.3 Case Study Findings – Cross Case Analysis

Following the preliminary case study (not presented here), a cross case analysis of three Australian banks followed and is presented in this section. Whilst the pilot case study was exploratory, the cross case analysis is explanatory, the experiences of the three case banks will be compared with the pattern of variables identified in the literature and pilot case study. Greater emphasis will be placed on *appropriate IT use*.

2.3.1 The three case banks

The three Australian banks were chosen purely on the merit that the researcher has direct access to all relevant information, as well as to all levels of management due to his involvement as a contractor to the banks.

In general, two of the banks had no or little experience in ITIM, whilst the third bank actively practiced ITIM. Although they are all banks today, offering comprehensive financial services, two of them were building societies before gaining a banking license. The third bank is government owned. The banks are all Queensland based with extended services to other states. Table 3 presents an overview of the three banks.

Table 3 Overview of three Australian Banks

	Case 1	Case 2	Case 3
Business synopsis	Traditionally a building society, then moved into banking during 1991. Offers a wide range of Retail banking and commercial banking products and services (Interview)	Previously government owned building Society and insurance. Today offering some retail banking services as well (Interview)	Government owned commercial bank, offering products and services mostly to farmers (Interview)
External influences	Stable customer base	Partially government owned	Government / Political/Society
Major activity	Banking	Insurance / Banking	Banking

	Case 1	Case 2	Case 3
Number of staff	1 500 (Annual report)	3 000 (Annual report)	500 (Annual report)
Number of IT staff	160 (Annual report)	150 (Annual report)	40 (Annual report)
IT Background	<ul style="list-style-type: none"> • IBM • Client Server • Tandem • LAN/WAN • In-house systems, asked to be replaced in 1991 • Intranet/ Internet 	<ul style="list-style-type: none"> • IBM • Tandem • LAN/WAN • Replacement of systems with HOGAN in 1995 • Intranet/Internet 	<ul style="list-style-type: none"> • HP • UNIX • LAN • Packages • Asked to replace IS portfolio in 1995
Current IS portfolio fit with business requirements	Very good (Interview)	Good (Interview)	Good (Interview)
Project Management	<ul style="list-style-type: none"> • Formal project management, • Good people management • Good planning and control (Interview) 	<ul style="list-style-type: none"> • Formal project management • Not good people management • Bad planning and control (Interview) 	<ul style="list-style-type: none"> • Formal project management • Good people management • Good planning and control (Interview)
Development	Visual Basic, COBOL, Hogan (A banking system)	Hogan, COBOL	Delphi, Visual Basic
Methodologies	Formal methodologies	Formal methodologies	Formal methodologies
Implementation	Not much spent on detail training	Lots of money spent on formal education and training, phased implementation approach	Lots of money spent on formal education and training, phased implementation approach
Systems complexity	Highly complex, integrated systems, broad product and services range High volume	Less complex, medium product range Market follower Used to have a monopoly Medium volume	Highly complex Integrated systems Low volume

	Case 1	Case 2	Case 3
Corporate culture	Open, sharing interactive management style	Bureaucratic management style,	Bureaucratic management style,
Role of IT assets	Main delivery system	Main delivery system	Main delivery system
Quality of IT assets	<ul style="list-style-type: none"> • A mixture of state of art and old technology • Medium (Interview) 	<ul style="list-style-type: none"> • A mixture of state of art and old technology • High (Interview) 	<ul style="list-style-type: none"> • A mixture of state of art and old technology • Medium (Interview)
Integration of IT and business strategies	No formal or informal coordination of strategic management processes (Interview/reports)	Formal and informal coordination of strategic management processes (Interview/reports)	No formal or informal coordination of strategic management processes (Interview/reports)
Organisational structure	<ul style="list-style-type: none"> • Decentralised • Users integrated in project teams 	<ul style="list-style-type: none"> • Centralised • Users integrated in project teams 	<ul style="list-style-type: none"> • Centralised • Users integrated in project teams
IT investment evaluation	No formal IT investment evaluation method	No formal IT investment evaluation method	No formal IT investment evaluation method
Ease of IT use	<ul style="list-style-type: none"> • Easy to learn • Understandable • Easy to use • Not flexible 	<ul style="list-style-type: none"> • Not easy to learn • Not understandable • Not easy to use • Flexible 	<ul style="list-style-type: none"> • Easy to learn • Understandable • Easy to use • Not flexible
IT usefulness	<ul style="list-style-type: none"> • Better job performance • Increases productivity • Increase effectiveness 	<ul style="list-style-type: none"> • Better job performance • Increases productivity • Increase effectiveness 	<ul style="list-style-type: none"> • Better job performance • Increases productivity • Increase effectiveness
Marketing cost	High	High	High
Planning and implementation	Medium	Good	Good
Major problems	<ul style="list-style-type: none"> • IT not flexible enough to adapt fast to changes in client needs (Interview) • IT investment priorities (Interview) 	<ul style="list-style-type: none"> • IT investment priorities (Interview) • Negative user perception (Report) 	<ul style="list-style-type: none"> • No major problems (Interview)

	Case 1	Case 2	Case 3
	<ul style="list-style-type: none"> • Negative user perception (Report) • Problem and change management (Interview) • No clear goals/objectives (Interview) 		

Table 4 presents the strategic performance from a financial view point. Only in one case was the business need for IT satisfied to a high degree, and thus only in this one case could IT be appropriately used. In all cases formal project management was practiced. In all the cases the importance of quality IT assets was appreciated by management during the interviews and in all the cases they are in the process of replacing their IS portfolio with state of art IT.

Table 4 Strategic Organizational Performance - (Annual reports)

Measurement	Case	1991-92	1992-93	1993-94	1994-95	1995-96
ROA	Case 1	0.77	0.78	1.13	0.188	0.159
	Case 2	1.66	1.34	1.20	1.14	2.04
	Case 3	0.79	0.83	0.92	0.87	0.86
ROE	Case 1	0.156	0.160	0.253	0.188	0.159
	Case 2	0.236	0.242	0.206	0.182	0.283
	Case 3	0.163	0.175	0.213	0.181	0.216

2.3.2 The need for appropriate IT use

In analysing the pilot case and literature, several concerns with Quality IT Assets (QIA) were identified:

- Performance of IS
- The software platform /architecture
- Service level management
- Hardware and software, as well as data communication architectures

It was observed that to be able to use IT appropriately, quality asset was a prerequisite, it is thus suggested that quality IT assets can have significant influence on appropriate IT use.

The satisfaction of user needs was also a concern expressed and the following concerns were identified:

- The integration of business- and IT strategies (strategic fit)
- The IT support of required business functionality
- User involvement in the development processes as well as the user perception of the value of IT to their business
- The IT support when needed by business

It was observed that to be able to utilise IT appropriately, IT should fit the needs of business to the highest-degree possible.

Several problems and issues were identified relating to the complexity and the use of IT appropriately:

- The complexity of the interfaces with IT

- Applicable screen layout
- The ease of use of the IT

The case study revealed that the successful implementation is a prerequisite for appropriate IT use, the following problems and issues were identified:

- Training in IT
- Conditioning of expectations of IT through change management
- The correct timing of IT implementation
- Problem and change management
- Project management

It was also observed that external influences and barriers had a significant influence on appropriate IT use.

2.3.3 The misconceived views of ITIM

As suggested in the literature review, inadequate management of the total ITIM process, especially the appropriate use of IT, leads to less positive strategic performance of the organisation. In both cases 1 and 3, ITIM was barely practiced, however, in case 2, ITIM was thoroughly practiced and the appropriate use of IT was a key focus for business success.

2.3.4 Important process variables

From the literature survey, as well as the case study it is apparent that IT supports business and not the other way around. The following variables appear to be important to the appropriate use of IT:

- Strategic IT management
- Organisational structure
- IT investment evaluation
- Project management
- IT usefulness
- Ease of use of IT
- External influences

Table 5 Cross Case Analysis

	Case 1	Case 2	Case 3
Strategic IT Management	Medium	High	Medium
Organization Structure	High	High	Low
IT investment evaluation	Medium	Low	Low
Project Management	Adequate	Very Good	Good
Ease of IT Use	Good	Excellent	Good
IT Usefulness	Good	Very Good	Good
External Influences	Low	Medium	High
Level of performance	Low	High	Medium

3. Summary

In this paper the importance and a definition of ITIM were discussed, as well as the case study objectives, design, and findings were discussed as part of research in progress. Two main case studies were conducted, these were; a preliminary exploratory case study, followed by an explanatory multiple case study. A model relating strategic IT management, organisation structure, IT investment

evaluation, project management, ease of IT use, IT usefulness and external influences, to the level of strategic organisational performance was proposed.

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